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4

DOE-2.2

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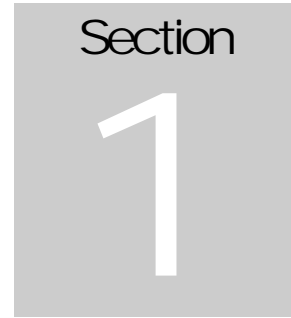
Authorship of the DOE-2.2 program components and documentation is an ongoing team effort that has its roots in previous versions going back over twenty-five years and we expect will continue into future decades. The contributions to DOE-2, both directly as authors and indirectly in the form of advice, comment and testing or feedback, are too numerous to catalog here; however, the primary authors are mentioned below in alphabetical order. Currently, and over the past decade, Marlin Addison, Scott Criswell, Steve Gates, Jeff Hirsch, and Kevin Madison, as consulting staff for JJH, are the major contributors to DOE-2.2. Fred Buhl, Ender Erdem, Kathy Ellington and Fred Winkelmann, as staff members of the Environmental Energy Technologies Division's Simulation Research Group at LBNL, were major contributors to the initial version of DOE-2.2. The primary contributors to the previous versions of DOE-2 (2.1E, 2.1D, 2.1C, etc) were Fred Buhl, Ender Erdem, Kathy Ellington, Steve Gates, Jeff Hirsch and Fred Winkelmann, as LBNL staff and Steve Gates and Jeff Hirsch as consulting staff for JJH.

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Section

1

Envelope Libraries

This section contains the libraries used to construct the building envelope. Included here are:

- Materials Libraries

- Constructions

- Windows

MATERIALS LIBRARY

The following tables list the materials in the Library. Three categories are given: (1) building materials, (2) insulating materials and (3) air spaces.

The format of the tables is as follows. The left-hand column gives the code-word that you use as one of the entries in the list of values of the MATERIAL keyword in the LAYERS command. The next two columns give the description and thickness of the material. The last four columns give the thermophysical properties in both English and metric units.

Because the code-words contain blanks they must be enclosed in parentheses when used in your input. For example:

```
WA-1-2 = LAYERS
    MATERIAL            = (“Wood Sft 3/4in (WD01)”,
                          “MinWool Batt R11 (IN02)”,
                          “GypBd 1/2in (GP01)”) ..
```

The portion of a code-word in parentheses gives the DOE-2.1E name for the material. For example, for the code-word “Wood Sft 3/4in (WD01)” the DOE-2.1E name is WD01.

Materials whose code-words contain “HF”, such as “ClayTile 4in (HF-C1)” are so-called “ASHRAE” materials. These materials are listed in Table 11, Chapter 28 of *ASHRAE Handbook, 1997 Fundamentals*, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

Building Materials

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft^2-F (W/m-K)	Density lb/ft^3 (kg/m^3)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft^2-F/Btu (K-m^2/W)
Acoustic Tile						
AcousTile 3/8in (AC01)	3/8 in (1 cm)	0.0313 (0.0095)	0.0330 (0.057)	18.0 (288)	0.32 (1339)	0.95 (0.167)
AcousTile 1/2in (AC02)	1/2 in (1.3cm)	0.0417 (0.0127)	0.0330 (0.057)	18.0 (288)	0.32 (1339)	1.26 (0.222)
AcousTile 3/4in (AC03)	3/4 in (1.9cm)	0.0625 (0.0191)	0.0330 (0.057)	18.0 (288)	0.32 (1339)	1.89 (0.333)
AcousTile (HF-E5)	3/4 in (1.9cm)	0.0625 (0.0191)	0.0350 (0.061)	30.0 (480)	0.20 (2142)	1.79 (0.313)
Aluminum or Steel Siding						
Steel Siding (AS01)		0.0050 (0.0015)	26.000 (44.97)	480.0 (7690)	0.10 (418)	1.9x10^{-4}(3.3x10^{-5})
Asbestos-Cement						
AbsCem Bd 1/8in (AB01)	Board, 1/8 in (0.32 cm)	0.0104 (0.0032)	0.3450 (0.597)	120.0 (1922)	0.2 (837)	0.03 (0.005)
AbsCem Bd 1/4in (AB02)	Board, 1/4 in (0.63 cm)	0.0208 (0.0063)	0.3450 (0.597)	120.0 (1922)	0.2 (837)	0.06 (0.011)

Table 1 Building Materials						
Code-Word	**Description**	**Thickness** ft (m)	**Conductivity** Btu/hr-ft²-F (W/m-K)	**Density** lb/ft³ (kg/m³)	**Specific Heat** Btu/lb-F (kJ/kg-K)	**Resistance** hr-ft²-F/Btu (K-m²/W)
AbsCem Shingle (AB03)	Shingle					0.21 (0.037)
AbsCem Siding (AB04)	Lapped Siding, 1/4 in (0.63 cm)					0.21 (0.037)
Asbestos Vinyl Tile						
AbsVinyl Tile (AV01)						0.05 (0.009)
Asphalt						
Asph Roll Roof (AR01)	Roofing Roll					0.15 (0.026)
Asph Siding (AR02)	Shingle and Siding					0.44 (0.078)
Ashp Tile (AR03)	Tile					0.05 (0.009)
Brick						
Com Brick 4in (BK01)	4 in (10.1cm) Common	0.3333 (0.1016)	0.4167 (0.721)	120.0 (1922)	0.20 (837)	0.80 (0.141)
Com Brick 8in (BK02)	8 in (20.3 cm) Common	0.6667 (0.2032)	0.4167 (0.721)	120.0 (1922)	0.20 (837)	1.60 (0.282)
Com Brick 12in (BK03)	12 in (30.5 cm) Common	1.0000 (0.3048)	0.4167 (0.721)	120.0 (1922)	0.20 (837)	2.40 (0.423)
Face Brick 3in (BK04)	3 in (7.6cm) Face	0.2500 (0.0762)	0.7576 (1.310)	130.0 (2083)	0.22 (921)	0.33 (0.058)
Face Brick 4in (BK05)	4 in (10.1cm) Face	0.3333 (0.1016)	0.7576 (1.310)	130.0 (2083)	0.22 (921)	0.44 (0.078)
Face Brick 4in (HF-A2)	4 in (10.1cm) Face	0.3333 (0.1016)	0.7700 (1.331)	130.0 (2083)	0.22 (921)	0.43 (0.076)
Face Brick 4in (HF-A7)	4 in (10.1cm) Face	0.3333 (0.1016)	0.7700 (1.331)	125.0 (2003)	0.22 (921)	0.43 (0.076)
Com Brick 4in (HF-C4)	4 in (10.1cm) Common	0.3333 (0.1016)	0.4200 (0.727)	120.0 (1922)	0.2 (837)	0.79 (0.140)
Com Brick 8in (HF-C9)	8 in (20.3cm) Common	0.6667 (0.2032)	0.4200 (0.727)	120.0 (1922)	0.2 (837)	1.59 (0.280)
Building Paper						
Bldg Paper Felt (BP01)	Permeable Felt					0.06 (0.011)
Bldg Paper Seal (BP02)	2-Layer Seal					0.12 (0.022)
Plastic Film Seal (BP03)	Plastic Film Seal					0.01 (0.002)
Built-Up Roof						
Blt-Up Roof 3/8in (BR01)	3/8 in (1 cm)	0.0313 (0.0095)	0.0939 (0.162)	70.0 (1121)	0.35 (1464)	0.33 (0.026)
Carpet						
Carpet & Fiber Pad (CP01)	With Fibrous Pad					2.08 (0.367)
Carpet & Rubber Pad (CP02)	With Rubber Pad					1.23 (0.217)
Cement						
Cmt Mortar 1in (CM01)	Mortar, 1in	0.0833 (0.0254)	0.4167 (0.721)	116.0 (1858)	0.2 (837)	0.20 (0.035)

Table 1 Building Materials						
Code-Word	**Description**	**Thickness** ft (m)	**Conductivity** Btu/hr-ft²-F (W/m-K)	**Density** lb/ft³ (kg/m³)	**Specific Heat** Btu/lb-F (kJ/kg-K)	**Resistance** hr-ft²-F/Btu (K-m²/W)
	(2.5 cm)					
Cmt Mortar 1.75in (CM02)	Mortar, 1.75 in (4.4 cm)	0.1458 (0.0444)	0.4167 (0.721)	116.0 (1858)	0.2 (837)	0.35 (0.062)
Cmt Plaster 1in (CM03)	Plaster with Sand Aggregate, 1 in (2.5 cm)	0.0833 (0.0254)	0.4167 (0.721)	116.0 (1858)	0.2 (837)	0.20 (0.035
Clay Tile, Hollow						
Hol ClayTile 3in (CT01)	1 Cell, 3in (7.6cm)	0.2500 (0.0762)	0.3125 (0.498)	70.0 (1121)	0.2 (837)	0.80 (0.272)
Hol ClayTile 4in (CT02)	1 Cell, 4 in (10.1cm)	0.3333 (0.1016)	0.2999 (0.519)	70.0 (1121)	0.2 (837)	1.11 (0.196)
Hol ClayTile 6in (CT03)	2 Cells, 6 in (15.2 cm)	0.5000 (0.1524)	0.3300 (0.571)	70.0 (1121)	0.2 (837)	1.52 (0.268)
Hol ClayTile 8in (CT04)	2 Cells, 8 in (20.3cm)	0.6667 (0.2032)	0.3600 (0.623)	70.0 (1121)	0.2 (837)	1.85 (0.326)
Hol ClayTile 10in (CT05)	2 Cells, 10 in (25.4 cm)	0.8333 (0.2540)	0.3749 (0.648)	70.0 (1121)	0.2 (837)	2.22 (0.391)
Hol ClayTile 12in (CT06)	3 Cells, 12 in (30.5 cm)	1.0000 (0.3048)	0.4000 (0.692)	70.0 (1121)	0.2 (837)	2.50 (0.441)
ClayTile 4in (HF-C1)	4 in (10.1cm)	0.3333 (0.1016)	0.3300 (0.571)	70.0 (1121)	0.2 (837)	1.01 (0.178)
ClayTile 8in (HF-C6)	8 in (20.3cm)	0.6667 (0.2032)	0.3300 (0.571)	70.0 (1121)	0.2 (837)	2.02 (0.357)
Clay Tile, Paver						
ClayTile Paver 3/8in (CT11)	3/8 in (1 cm)	0.0313 (0.0095)	1.0416 (1.802)	120.0 (1922)	0.2 (837)	0.03 (0.005)
Concrete, Heavy Weight Dried Aggregate, 140 lbs.						
Conc HW 140lb 1.25in (CC01)	1.25 in (3.2 cm)	0.1042 (0.0318)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	0.14 (0.025)
Conc HW 140lb 2in (CC02)	2 in (5.1 cm)	0.1667 (0.0508)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	0.22 (0.039)
Conc HW 140lb 4in (CC03)	4 in (10.1cm)	0.3333 (0.1016)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	0.44 (0.078)
Conc HW 140lb 6in (CC04)	6 in (15.2 cm)	0.5000 (0.1524	0.7576 (1.310)	140.0 (2243)	0.2 (837)	0.66 (0.116)
Conc HW 140lb 8in (CC05)	8 in (20.3cm)	0.6667 (0.2032)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	0.88 (0.155)
Conc HW 140lb 10in (CC06)	10 in (25.4 cm)	0.8333 (0.2540)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	1.10 (0.194)
Conc HW 140lb 12in (CC07)	12 in (30.5 cm)	1.0000 (0.3048)	0.7576 (1.310)	140.0 (2243)	0.2 (837)	1.32 (0.233)
Concrete, Heavy Weight Undried Aggregate, 140 lbs.						
Conc HW 140lb 3/4in (CC11)	3/4 in (1.9 cm)	0.0625 (0.0191)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.06 (0.011)
Conc HW 140lb 1-3/8in (CC12)	1 3/8 in (3.5 cm)	0.1146 (0.0349)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.11 (0.019)
Conc HW 140lb 3.25in (CC13)	3 1/4 in (8.3 cm)	0.2708 (0.0825)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.26 (0.046)
Conc HW 140lb 4in (CC14)	4 in (10.2 cm)	0.3333 (0.1016)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.32 (0.056)
Conc HW 140lb 6in (CC15)	6 in (15.2 cm)	0.5000 (0.1524)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.48 (0.085)
Conc HW 140lb 18in (CC16)	8 in (20.2 cm)	0.6667 (0.2032)	1.0417 (1.802)	140.0 (2243)	0.2 (837)	0.64 (0.113)

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft²-F (W/m-K)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft²-F/Btu (K-m²/W)
Conc HW 140lb 2in (HF-C12)	2 in (5.1 cm)	0.1667 (0.0508)	1.0000 (1.730)	140.0 (2243)	0.2 (837)	0.17 (0.029)
Conc HW 140lb 4in (HF-C5)	4 in (10.2 cm)	0.3333 (0.1016)	1.0000 (1.730)	140.0 (2243)	0.2 (837)	0.33 (0.059)
Conc HW 140lb 6in (HF-C13)	6 in (15.2 cm)	0.5000 (0.1524)	1.0000 (1.730)	140.0 (2243)	0.2 (837)	0.50 (0.088)
Conc HW 140lb 8in (HF-C10)	8 in (20.2 cm)	0.6667 (0.2032)	1.0000 (1.730)	140.0 (2243)	0.2 (837)	0.67 (0.118)
Conc HW 140lb 12in (HF-C11)	12 in (30.5 cm)	1.0000 (0.3048)	1.0000 (1.730)	140.0 (2243)	0.2 (837)	1.00 (0.176)
Concrete, Light Weight, 80 lb.						
ConcLW 80lb 3/4in (CC21)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	0.30 (0.053)
ConcLW 80lb 1.25in (CC22)	1.25 in (3.2 cm)	0.1042 (0.0318)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	0.50 (0.088)
ConcLW 80lb 2in (CC23)	2 in (5.1 cm)	0.1667 (0.0508)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	0.80 (0.141)
ConcLW 80lb 4in (CC24)	4 in (10.2 cm)	0.3333 (0.1016)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	1.60 (0.282)
ConcLW 80lb 6in (CC25)	6 in (15.2 cm)	0.5000 (0.1524)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	2.40 (0.423)
ConcLW 80lb 8in (CC26)	8 in (20.2 cm)	0.6667 (0.2032)	0.2083 (0.360)	80.0 (1282)	0.2 (837)	3.20 (0.564)
Concrete, Light Weight, 30 lb.						
ConcLW 30lb 3/4in (CC31)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0751 (0.130)	30.0 (481)	0.2 (837)	0.83 (0.146)
ConcLW 30lb 1.25in (CC32)	1.25 in (3.2 cm)	0.1042 (0.0191)	0.0751 (0.130)	30.0 (481)	0.2 (837)	1.39 (0.245)
ConcLW 30lb 2in (CC33)	2 in (5.1 cm)	0.1667 (0.0508)	0.0751 (0.130)	30.0 (481)	0.2 (837)	2.22 (0.391)
ConcLW 30lb 4in (CC34)	4 in (10.2 cm)	0.3333 (0.1016)	0.0751 (0.130)	30.0 (481)	0.2 (837)	4.44 (0.782)
ConcLW 30lb 6in (CC35)	6 in (15.2 cm)	0.5000 (0.1524)	0.0751 (0.130)	30.0 (481)	0.2 (837)	6.66 (1.174)
ConcLW 30lb 8in (CC36)	8 in (20.2 cm)	0.6667 (0.2032)	0.0751 (0.130)	30.0 (481)	0.2 (837)	8.88 (1.565)
Concrete, Light Weight, 40 lb.						
ConcLW 40lb 4in (HF-C14)	4 in (10.2 cm)	0.3333 (0.1016)	0.1 (.173)	40.0 (641)	0.2 (837)	3.33 (0.587)
ConcLW 40lb 6in (HF-C15)	6 in (15.2 cm)	0.5000 (0.1524)	0.1 (.173)	40.0 (641)	0.2 (837)	5.00 (0.881)
ConcLW 40lb 8in (HF-C16)	8 in (20.2 cm)	0.6667 (0.2032)	0.1 (.173)	40.0 (641)	0.2 (837)	6.67 (1.175)
Concrete Block, Light Weight						
CMU LW 4in (HF-C2)	4 in (10.2 cm)	0.3333 (0.1016)	0.2200 (0.380)	38.0 (609)	0.2 (837)	1.51 (0.267)
Concrete Block, 4 inch (10.2 cm) Heavy Weight						
CMU HW 4in Hollow (CB01)	Hollow	0.3333 (0.1016)	0.4694 (0.812)	101.0 (1618)	0.2 (837)	0.71 (0.125)
CMU HW 4in ConcFill (CB02)	Concrete Filled	0.3333 (0.1016)	0.7575 (1.310)	140.0 (2234)	0.2 (837)	0.44 (0.078)
CMU HW 4in PerlFill (CB03)	Perlite Filled	0.3333 (0.1016)	0.3001 (0.384)	103.0 (1650)	0.2 (837)	1.11 (0.196)
CMU HW 4in PartFill (CB04)	Part-Filled Concrete *	0.3333 (0.1016)	0.5844 (1.011)	114.0 (1826)	0.2 (837)	0.57 (0.100)
CMU HW 4in Conc/Perl (CB05)	Concrete and Perlite **	0.3333 (0.1016)	0.4772 (0.825)	115.0 (1842)	0.2 (837)	0.70 (0.123)
* One filled and reinforced concrete core every 24 in (61 cm) of wall length ** One filled and reinforced concrete core every 24 in (61 cm) of wall length with the remaining cores filled with Perlite insulation						
Concrete Block, 6 inch (15.2 cm) Heavy Weight						
CMU HW 6in Hollow (CB06)	Hollow	0.5000 (0.1524)	0.5555 (0.961)	85.0 (1362)	0.2 (837)	0.90 (0.159)

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft²-F (W/m-K)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft²-F/Btu (K-m²/W)
CMU HW 6in ConcFill (CB07)	Concrete Filled	0.5000 (0.1524)	0.7575 (1.310)	140.0 (2243)	0.2 (837)	0.66 (0.116)
CMU HW 6in PerlFill (CB08)	Perlite Filled	0.5000 (0.1524)	0.2222 (0.384)	88.0 (1410)	0.2 (837)	2.25 (0.397)
CMU HW 6in PartFill (CB09)	Part-Filled Concrete*	0.5000 (0.1524)	0.6119 (1.058)	104.0 (1666)	0.2 (837)	0.82 (0.145)
CMU HW 6in Conc/Perl (CB10)	Concrete and Perlite**	0.5000 (0.1524)	0.4238 (0.733)	104.0 (1666)	0.2 (837)	1.18 (0.208)
Concrete Block, 8 inch (20.3 cm) Heavy Weight						
CMU HW 8in Hollow (CB11)	Hollow	0.6667 (0.2032)	0.6060 (1.048)	69.0 (1105)	0.2 (837)	1.10 (0.194)
CMU HW 8in ConcFill (CB12)	Concrete Filled	0.6667 (0.2032)	0.7575 (1.310)	140.0 (2243)	0.2 (837)	0.88 (0.155)
CMU HW 8in PerlFill (CB13)	Perlite Fill	0.6667 (0.2032)	0.2272 (0.393)	70.0 (1121)	0.2 (837)	2.93 (0.516)
CMU HW 8in PartFill (CB14)	Part-Filled Concrete*	0.6667 (0.2032)	0.6746 (1.167)	93.0 (1490)	0.2 (837)	0.99 (0.174)
CMU HW 8in Conc/Perl (CB15)	Concrete and Perlite**	0.6667 (0.2032)	0.4160 (0.720)	93.0 (1490)	0.2 (837)	1.60 (0.282)
Concrete Block, 12 inch (30.5 cm) Heavy Weight						
CMU HW 12in Hollow (CB16)	Hollow	1.0000 (0.3048)	0.7813 (1.350)	76.0 (1218)	0.2 (837)	1.28 (0.226)
CMU HW 12in ConcFill (CB17)	Concrete Filled	1.0000 (0.3048)	0.7575 (1.310)	140.0 (2243)	0.2 (837)	1.32 (0.233)
CMU HW 12in PartFill (CB18)	Part-Filled Concrete*	1.0000 (0.3048)	0.7773 (1.344)	98.0 (1570)	0.2 (837)	1.29 (0.227)
Concrete Block, 4 inch (10.1 cm) Medium Weight						
CMU MW 4in Hollow (CB21)	Hollow	0.3333 (0.1016)	0.3003 (0.519)	76.0 (1218)	0.2 (837)	1.11 (0.196)
CMU MW 4in ConcFill (CB22)	Concrete Filled	0.3333 (0.1016)	0.4456 (0.771)	115.0 (1842)	0.2 (837)	0.75 (0.132)
CMU MW 4in PerlFill (CB23)	Perlite Filled	0.3333 (0.1016)	0.1512 (0.262)	78.0 (1250)	0.2 (837)	2.20 (0.388)
CMU MW 4in PartFill (CB24)	Part-Filled Concrete*	0.3333 (0.1016)	0.3306 (0.572)	89.0 (1426)	0.2 (837)	1.01 (0.178)
CMU MW 4in Conc/Perl (CB25)	Concrete and Perlite**	0.3333 (0.1016)	0.2493 (0.431)	90.0 (1442)	0.2 (837)	1.34 (0.236)
* One filled and reinforced concrete core every 24 in (61 cm) of wall length ** One filled and reinforced concrete core every 24 in (61 cm) of wall length with the remaining cores filled with Perlite insulation						
Concrete Block, 6 inch (15.2 cm) Medium Weight						
CMU MW 6in Hollow (CB26)	Hollow	0.5000 (0.1524)	0.3571 (0.618)	65.0 (1041)	0.2 (837)	1.40 (0.247)
CMU MW 6in ConcFill (CB27)	Concrete Filled	0.5000 (0.1524)	0.4443 (0.768)	119.0 (1906)	0.2 (837)	1.13 (0.199)
CMU MW 6in PerlFill (CB28)	Perlite Filled	0.5000 (0.1524)	0.1166 (0.202)	67.0 (1073)	0.2 (837)	4.29 (0.756)
CMU MW 6in PartFill (CB29)	Part-Filled Concrete*	0.5000 (0.1524)	0.3686 (0.638)	83.0 (1330)	0.2 (837)	1.36 (0.240)
CMU MW 6in Conc/Perl (CB30)	Concrete and Perlite**	0.5000 (0.1524)	0.2259 (0.391)	84.0 (1346)	0.2 (837)	2.21 (0.389)

Table 1 Building Materials						
Code-Word	**Description**	**Thickness** ft (m)	**Conductivity** Btu/hr-ft²-F (W/m-K)	**Density** lb/ft³ (kg/m³)	**Specific Heat** Btu/lb-F (kJ/kg-K)	**Resistance** hr-ft²-F/Btu (K-m²/W)
Concrete Block, 8 inch (20.3 cm) Medium Weight						
CMU MW 8in Hollow (CB31)	Hollow	0.6667 (0.2032)	0.3876 (0.670)	53.0 (849)	0.2 (837)	1.72 (0.303)
CMU MW 8in ConcFill (CB32)	Concrete Filled	0.6667 (0.2032)	0.4957 (0.857)	123.0 (1970)	0.2 (837)	1.34 (0.236)
CMU MW 8in PerlFill (CB33)	Perlite Filled	0.6667 (0.2032)	0.1141 (0.197)	56.0 (897)	0.2 (837)	5.84 (1.029)
CMU MW 8in PartFill (CB34)	Part-Filled Concrete*	0.6667 (0.2032)	0.4348 (0.752)	76.0 (1218)	0.2 (837)	1.53 (0.270)
CMU MW 8in PartFill (CB35)	Concrete and Perlite**	0.6667 (0.2032)	0.2413 (0.417)	77.0 (1234)	0.2 (837)	2.76 (0.486)
Concrete Block, 12 inch (30.5 cm) Medium Weight						
CMU MW 12in Hollow (CB36)	Hollow	1.0000 (0.3048)	0.4959 (0.858)	58.0 (929)	0.2 (837)	2.02 (0.356)
CMU MW 12in ConcFill (CB37)	Concrete Filled	1.0000 (0.3048)	0.4814 (0.833)	121.0 (1938)	0.2 (837)	2.08 (0.367)
CMU MW 12in PartFill (CB38)	Part-Filled Concrete*	1.0000 (0.3048)	0.4919 (0.851)	79.0 (1266)	0.2 (837)	2.03 (0.358)
Concrete Block, 4 inch (10.1 cm) Light Weight						
CMU LW 4in Hollow (CB41)	Hollow	0.3333 (0.1016)	0.2222 (0.384)	65.0 (1041)	0.2 (837)	1.50 (0.264)
CMU LW 4in ConcFill (CB42)	Concrete Filled	0.3333 (0.1016)	0.3695 (0.639)	104.0 (1666)	0.2 (837)	0.90 (0.159)
CMU LW 4in PerlFill (CB43)	Perlite Filled	0.3333 (0.1016)	0.1271 (0.220)	67.0 (1073)	0.2 (837)	2.62 (0.462)
CMU LW 4in PartFill (CB44)	Part-Filled Concrete*	0.3333 (0.1016)	0.2808 (0.486)	78.0 (1250)	0.2 (837)	1.19 (0.210)
CMU LW 4in Conc/Perl (CB45)	Concrete and Perlite**	0.3333 (0.1016)	0.2079 (0.360)	79.0 (1266)	0.2 (837)	1.60 (0.282)

*   One filled and reinforced concrete core every 24 in (61 cm) of wall length
** One filled and reinforced concrete core every 24 in (61 cm) of wall length with the remaining cores filled with Perlite insulation

Concrete Block, 6 inch (15.2 cm) Light Weight						
CMU LW 6in Hollow (CB46)	Hollow	0.5000 (0.1524)	0.2777 (0.480)	55.0 (881)	0.2 (837)	1.80 (0.317)
CMU LW 6in ConcFill (CB47)	Concrete Filled	0.5000 (0.1524)	0.3819 (0.661)	110.0 (1762)	0.2 (837)	1.31 (0.231)
CMU LW 6in PerlFill (CB48)	Perlite Filled	0.5000 (0.1524)	0.0985 (0.170)	57.0 (913)	0.2 (837)	5.08 (0.895)
CMU LW 6in PartFill (CB49)	Part-Filled Concrete*	0.5000 (0.1524)	0.3189 (0.552)	73.0 (1169)	0.2 (837)	1.57 (0.277)
CMU LW 6in Conc/Perl (CB50)	Concrete and Perlite**	0.5000 (0.1524)	0.1929 (0.334)	74.0 (1185)	0.2 (837)	2.59 (0.456)
Concrete Block, 8 inch (20.3 cm) Light Weight						
CMU LW 8in Hollow (CB51)	Hollow	0.6667 (0.2032)	0.3333 (0.576)	45.0 (721)	0.2 (837)	2.00 (0.352)
CMU LW 8in ConcFill (CB52)	Concrete Filled	0.6667 (0.2032)	0.4359 (0.754)	115.0 (1842)	0.2 (837)	1.53 (0.270)
CMU LW 8in PerlFill (CB53)	Perlite Filled	0.6667 (0.2032)	0.0963 (0.167)	48.0 (769)	0.2 (837)	6.92 (1.219)
CMU LW 8in PartFill (CB54)	Part-Filled Concrete*	0.6667 (0.2032)	0.3846 (0.665)	68.0 (1089)	0.2 (837)	1.73 (0.305)

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft²-F (W/m-K)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft²-F/Btu (K-m²/W)
CMU LW 8in Conc/Perl (CB55)	Concrete and Perlite**	0.6667 (0.2032)	0.2095 (0.362)	69.0 (1105)	0.2 (837)	3.18 (0.560)
Concrete Block, 12 inch (30.5 cm) Light Weight						
CMU LW 12in Hollow (CB56)	Hollow	1.0000 (0.3048)	0.4405 (0.762)	49.0 (785)	0.2 (837)	2.27 (0.400)
CMU LW 12in ConcFill (CB57)	Concrete Filled	1.0000 (0.3048)	0.4194 (0.725)	113.0 (1810)	0.2 (837)	2.38 (0.419)
CMU LW 12in PartFill (CB58)	Part-Filled Concrete*	1.0000 (0.3048)	0.4274 (0.739)	70.0 (1121)	0.2 (837)	2.34 (0.412)
Felt and Membrane						
Felt 3/8in (HF-E3)	3/8 in (1 cm)	0.0313 (0.0095)	0.1100 (0.190)	70.0 (1121)	0.4 (1674)	0.28 (0.050)
Finish (HF-A6)	1/2 in (1.3 cm)	0.0417 (0.0127)	0.2400 (0.415)	78.0 (1249)	0.26 (1088)	0.17 (0.031)
Gypsum or Plaster Board						
GypBd 1/2in (GP01)	1/2 in (1.3 cm)	0.0417 (0.0127)	0.0926 (0.160)	50.0 (801)	0.2 (837)	0.45 (0.079)
GypBd 5/8in (GP02)	5/8 in (1.6 cm)	0.0521 (0.0159)	0.0926 (0.160)	50.0 (801)	0.2 (837)	0.56 (0.099)
GypBd 3/4in (GP03)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0926 (0.160)	50.0 (801)	0.2 (837)	0.67 (0.118)
* One filled and reinforced concrete core every 24 in (61 cm) of wall length ** One filled and reinforced concrete core every 24 in (61 cm) of wall length with the remaining cores filled with Perlite insulation						
Gypsum Plaster						
Gypsum LW Agg 3/4in (GP04)	3/4 in (1.9cm) Lt. Wt. Aggregate	0.0625 (0.0191)	0.1330 (0.230)	45.0 (721)	0.2 (837)	0.47 (0.083)
Gypsum LW Agg 1in (GP05)	1 in (2.5 cm) Lt. Wt. Aggregate	0.0833 (0.0254)	0.1330 (0.230)	45.0 (721)	0.2 (837)	0.63 (0.111)
Gypsum Sand Agg 3/4in (GP06)	3/4 in (1.9cm) Sand Aggregate	0.0625 (0.0191)	0.4736 (0.819)	105.0 (1682)	0.2 (837)	0.13 (0.023)
Gypsum Sand Agg 1in (GP07)	1 in (2.5 cm) Sand Aggregate	0.0833 (0.0254)	0.4736 (0.819)	105.0 (1682)	0.2 (837)	0.18 (0.032)
Hard Board, 3/4 inch (1.9 cm)						
Hd Bd 3/4in Md Dens (HB01)	Medium Density Siding	0.0625 (0.0191)	0.0544 (0.094)	40.0 (641)	0.28 (1171)	1.15 (0.203)
Hd Bd 3/4in Md Dens (HB02)	Medium Density Others	0.0625 (0.0191)	0.0608 (0.105)	50.0 (801)	0.31 (1297)	1.03 (0.182)
Hd Bd 3/4in Std Temp (HB03)	High Density Standard Tempered	0.0625 (0.0191)	0.0683 (0.118)	55.0 (881)	0.33 (1381)	0.92 (0.162)
Hd Bd 3/4in Srv Temp (HB04)	High Density Service Tempered	0.0625 (0.0191)	0.0833 (0.144)	63.0 (1009)	0.33 (1381)	0.75 (0.132)
Linoleum Tile						
Linoleum Tile (LT01)						0.05 (0.009)

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft²-F (W/m-K)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft²-F/Btu (K-m²/W)
Particle Board						
PartBd Lo Dens 3/4in (PB01)	Low Density, 3/4 in (1.9 cm)	0.0625 (0.0191)	0.0450 (0.078)	75.0 (1202)	0.31 (1297)	1.39 (0.245)
PartBd Md Dens 3/4in (PB02)	Medium Density, 3/4 in (1.9 cm)	0.0625 (0.0191)	0.7833 (1.355)	75.0 (1202)	0.31 (1297)	0.08 (0.014))
PartBd Hi Dens 3/4in (PB03)	High Density, 3/4 in (1.9 cm)	0.0625 (0.0191)	0.9833 (1.701)	75.0 (1202)	0.31 (1297)	0.06 (0.011)
PartBd Underlay 5/8in (PB04)	Underlayment, 5/8 in (1.6 cm)	0.0521 (0.0159)	0.1796 (0.311)	75.0 (1202)	0.29 (1213)	0.29 (0.051)
Plywood						
Plywd 1/4in (PW01)	1/4 in (0.64 cm)	0.0209 (0.0064)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	0.31 (0.055)
Plywd 3/8in (PW02)	3/8 in (1 cm)	0.0313 (0.0095)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	0.47 (0.083)
Plywd 1/2in (PW03)	1/2 in (1.3 cm)	0.0417 (0.0127)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	0.63 (0.111)
Plywd 5/8in (PW04)	5/8 in (1.6 cm)	0.0521 (0.0159)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	0.78 (0.137)
Plywd 3/4 (PW05)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	0.94 (0.166)
Plywd 1in (PW06)	1 in (2.5 cm)	0.0833 (0.0254)	0.0667 (0.115)	34.0 (545)	0.29 (1213)	1.25 (0.220)
Roof Gravel or Slag						
Gravel 1/2in (RG01)	1/2 in (1.3cm)	0.0417 (0.0127)	0.8340 (1.442)	55.0 (881)	0.4 (1674)	0.05 (0.009)
Gravel 1in (RG02)	1 in (2.5 cm)	0.0833 (0.0254)	0.8340 (1.442)	55.0 (881)	0.4 (1674)	0.10 (0.018)
Rubber Tile						
Rubber Tile (RT01)						0.05 (0.009)
Slate						
Slate 1/2in (SL01)	1/2 in (1.3 cm)	0.0417 (0.0127)	0.8340 (1.442)	100.0 (1602)	0.35 (1464)	0.05 (0.009)
Soil						
Soil 12in	12in (30.5cm)	1.000 (0.3048)	1.000 (1.729)	115.0 (1842)	0.2 (837)	1.0000 (0.176)
Steel Siding						
Steel Siding (HF-A3)	0.06in (0.15cm)	0.0050 (0.0015)	26.000 (45.0)	480.0 (7690)	0.10 (419)	0.0002 (3.5x10⁻⁵)
Stone						
Stone 1in (ST01)	1 in (2.5 cm)	0.0833 (0.0254)	1.0416 (1.802)	140.0 (2243)	0.2 (837)	0.08 (0.014)
Stone1/2in (HF-E2)	1/2 in(1.3 cm)	0.0417 (0.0127)	0.8300 (1.435)	55.0 (881)	0.4 (1674)	0.05 (0.009)
Stucco						
Stucco 1in (SC01)	1 in (2.5 cm)	0.0833 (0.0254)	0.4167 (0.721)	166.0 (2659)	0.2 (837)	0.20 (0.035)
Terrazzo						
Terrazzo 1in (TZ01)	1 in (2.5 cm)	0.0833 (0.0254)	1.0416 (1.802)	140.0 (2243)	0.2 (837)	0.08 (0.014)
Wood, Soft						
Wood Sft 3/4in (WD01)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0667 (0.115)	32.0 (513)	0.33 (1381)	0.94 (0.166)

Table 1 Building Materials						
Code-Word	Description	Thickness ft (m)	Conductivity Btu/hr-ft²-F (W/m-K)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb-F (kJ/kg-K)	Resistance hr-ft²-F/Btu (K-m²/W)
Wood Sft 1.5in (WD02	1.5 in (3.8 cm)	0.1250 (0.0381)	0.0667 (0.115)	32.0 (513)	0.33 (1381)	1.87 (0.330)
Wood Sft 2.5in (WD03	2.5 in (6.4 cm)	0.2083 (0.0635)	0.0667 (0.115)	32.0 (513)	0.33 (1381)	3.12 (0.550)
Wood Sft 3.5in (WD04	3.5 in (8.9 cm)	0.2917 (0.0889)	0.0667 (0.115)	32.0 (513)	0.33 (1381)	4.37 (0.770)
Wood Sft 4in (WD05	4 in (10.2 cm)	0.3333 (0.1016)	0.0667 (0.115)	32.0 (513)	0.33 (1381)	5.00 (0.881)
Wood, Hard						
Wood Hd 3/4in (WD11)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0916 (0.158)	45.0 (721)	0.30 (1255)	0.68 (0.120)
Wood Hd 1in (WD12)	1 in (2.5 cm)	0.0833 (0.0254)	0.0916 (0.158)	45.0 (721)	0.30 (1255)	0.91 (0.160
Wood, Shingle						
Wood Shingle (WS01)	For Wall	0.0583(.0178)	0.0667 (0.115)	32.0 (513)	0.30 (1255)	0.87 (0.153)
Wood Shingle (WS02)	For Roof					0.94 (0.166)
Wood						
Wood 1in (HF-B7)	1 in (2.5 cm)	0.0833 (0.0254)	0.0700 (0.121)	37.0 (593)	0.2 (837)	1.19 (0.210)
Wood 2in (HF-B10	2 in (3.1 cm)	0.1667 (0.0508)	0.0700 (0.121)	37.0 (593)	0.2 (837)	2.38 (0.420))
Wood 2.5in (HF-B8	2.5 in (6.4 cm)	0.2083 (0.0635)	0.0700 (0.121)	37.0 (593)	0.2 (837)	2.98 (0.526)
Wood 3in (HF-B11	3 in (7.6 cm)	0.2500 (0.0762)	0.0700 (0.121)	37.0 (593)	0.2 (837)	3.57 (0.630)
Wood 4in (HF-B9	4 in (10.2 cm)	0.3330 (0.1016)	0.0700 (0.121)	37.0 (593)	0.2 (837)	4.76 (0.840)

Insulating Materials

Table 1 Insulating Materials						
Code-Word	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
		ft (m)	Btu/hr-ft²-F (W/m-K)	lb/ft³ (kg/m³)	Btu/lb-F (kJ/kg-K)	hr-ft²-F/Btu (K-m²/W)
Mineral Wool/Fiber						
MinWool Batt R7 (IN01)	Batt, R-7*	0.1882 (0.0574)	0.0250 (0.043)	0.60 (10)	0.2 (837)	7.53 (1.327)
MinWool Batt R11 (IN02)	Batt, R-11	0.2957 (0.0901)	0.0250 (0.043)	0.60 (10)	0.2 (837)	11.83 (2.085)
MinWool Batt R19 (IN03)	Batt, R-19	0.5108 (0.1557)	0.0250 (0.043)	0.60 (10)	0.2 (837)	20.43 (3.600)
MinWool Batt R24 (IN04)	Batt, R-24	0.6969 (0.2124)	0.0250 (0.043)	0.60 (10)	0.2 (837)	27.88 (4.913)
MinWool Batt R30 (IN05)	Batt, R-30	0.8065 (0.2458)	0.0250 (0.043)	0.60 (10)	0.2 (837)	32.26 (5.685)
MinWool Fill 3.5in R11 (IN11)	Fill, 3.5 in (8.9 cm), R-11	0.2917 (0.0889)	0.0270 (0.046)	0.60 (10)	0.2 (837)	10.80 (1.903)
MinWool Fill 5.5in R19 (IN12)	Fill, 5.5 in (13.4 cm), R-19	0.4583 (0.1397)	0.0270 (0.046)	0.63 (11)	0.2 (837)	16.97 (2.991)
Cellulose Fill						
Cellulose 3.5in R-13 (IN13)	3.5 in (8.9 cm), R-13	0.2917 (0.0889)	0.0225 (0.039)	3.0 (48)	0.33 (1381)	12.96 (2.284)
Cellulose 5.5in R-20 (IN14)	5.5 in (13.4 cm), R-20	0.4583 (0.1397)	0.0225 (0.039)	3.0 (48)	0.33 (1381)	20.37 (3.590)
Insulation						
Insul Bd 1in (HF-B2)	1 in (2.5 cm)	0.0830 (0.0254)	0.0250 (0.043)	2.0 (32)	0.2 (837)	3.32 (0.585)
Insul Bd 2in (HF-B3)	2 in (3.1 cm)	0.1670 (0.0508)	0.0250 (0.043)	2.0 (32)	0.2 (837)	6.68 (1.177)
Insul Bd 3in (HF-B4)	3 in (7.6 cm)	0.2500 (0.0762)	0.0250 (0.043)	2.0 (32)	0.2 (837)	10.00 (1.762)
Insul Bd 1in (HF-B5)	1 in (2.5 cm)	0.0830 (0.0254)	0.0250 (0.043)	5.7 (91)	0.2 (837)	3.29 (0.580)
Insul Bd 2in (HF-B6)	2 in (3.1 cm)	0.1670 (0.0508)	0.0250 (0.043)	5.7 (91)	0.2 (837)	6.68 (1.177)
Insul Bd 3in (HF-B12)	3 in (7.6 cm)	0.2500 (0.0762)	0.0250 (0.043)	5.7 (91)	0.2 (837)	10.00 (1.762)
Preformed Mineral Board						
MinBd 7/8in R-3 (N21)	7/8 in (2.2 cm), R-3	0.0729 (0.0222)	0.0240 (0.042)	15.0 (240)	0.17 (711)	3.04 (0.536)
MinBd 1in R-3 (IN22)	1 in (2.5 cm), R-3.5	0.0833 (0.0254)	0.0240 (0.042)	15.0 (240)	0.17 (711)	3.47 (0.612)
MinBd 2in R-7 (IN23)	2 in (2.5 cm), R-7	0.1667 (0.0508)	0.0240 (0.042)	15.0 (240)	0.17 (711)	6.95 (1.225)
MinBd 3in R-10.4 (IN24)	3 in (7.6 cm), R-10.4	0.2500 (0.0762)	0.0240 (0.042)	15.0 (240)	0.17 (711)	10.42 (1.836)
Polystyrene, Expanded						
Polystyrene 1/2in (IN31)	1/2 in (1.3cm)	0.0417 (0.0127)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	2.08 (0.367)
Polystyrene 3/4in (IN32)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	3.12 (0.550)
Polystyrene 1in (IN33)	1 in (2.5 cm)	0.0833 (0.0254)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	4.16 (0.733)

Table 1 Insulating Materials						
Code-Word	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
		ft (m)	Btu/hr-ft²-F (W/m-K)	lb/ft³ (kg/m³)	Btu/lb-F (kJ/kg-K)	hr-ft²-F/Btu (K-m²/W)
Polystyrene 1.25in (IN34)	1.25 in (3.2 cm)	0.1042 (0.0318)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	5.21 (0.918)
Polystyrene 2in (IN35)	2 in (3.1 cm)	0.1667 (0.0508)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	8.33 (1.468)
Polystyrene 3in (IN36)	3 in (7.6 cm)	0.2500 (0.0762)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	12.50 (2.203)
Polystyrene 4in (IN37)	4 in (10.2 cm)	0.3333 (0.1016)	0.0200 (0.035)	1.8 (29)	0.29 (1213)	16.66 (2.936)
Polyurethane, Expanded						
Polyurethane 1/2in (IN41)	1/2 in (1.3cm)	0.0417 (0.0127)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	3.14 (0.553)
Polyurethane 3/4n (IN42)	3/4 in (1.9 cm)	0.0625 (0.0191)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	4.67 (0.823)
Polyurethane 1in (IN43)	1 in (2.5 cm)	0.0833 (0.0254)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	6.26 (1.103)
Polyurethane 1.25in (IN44)	1.25 in (3.2 cm)	0.1042 (0.0318)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	7.83 (1.380)
Polyurethane 2in (IN45)	2 in (3.1 cm)	0.1667 (0.0508)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	12.53 (2.208)
Polyurethane 3in (IN46)	3 in (7.6 cm)	0.2500 (0.0762)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	18.80 (3.313)
Polyurethane 4in (IN47)	4 in (10.2 cm)	0.3333 (0.1016)	0.0133 (0.023)	1.5 (24)	0.38 (1590)	25.06 (4.416)
* Nominal thickness is 2 to 2-3/4 in (3.1 to 7 cm). Resistance value is based on a thickness of 2.26 in (5.74 cm).						
Urea Formaldehyde						
Urea Formald 3.5in R19 (IN51)	3.5 in (8.9 cm), R-15	0.2910 (0.0887)	0.0200 (0.035)	0.7 (11)	0.3 (1255)	14.55 (2.564)
Urea Formald 5.5in R23 (IN52)	5.5 in (13.4 cm), R-23	0.4580 (0.1396)	0.0200 (0.035)	0.7 (11)	0.3 (1255)	22.90 (4.036)
Insulation Board						
Insul Bd 1/2in (IN61)	Sheathing, 1/2 in (1.3cm)	0.0417 (0.0127)	0.0316 (0.055)	18.0 (288)	0.31 (1297)	1.32 (0.232)
Insul Bd 3/4in (IN62)	Sheathing, 3/4 in (1.9 cm)	0.0625 (0.0191)	0.0316 (0.055)	18.0 (288)	0.31 (1297)	1.98 (0.348)
Insul Bd 3/8in (IN63)	Shingle Backer, 3/8 in (1 cm)	0.0313 (0.0096)	0.0331 (0.058)	18.0 (288)	0.31 (1297)	0.95 (0.167)
Insul Bd 1/2in (IN64)	Nail Base Sheathing, 1/2 in (1.3cm)	0.0417 (0.0127)	0.0366 (0.064)	25.0 (400)	0.31 (1297)	1.14 (0.200)
Roof Insulation, Preformed						
Roof Insul 1/2in (IN71)	1/2 in (1.3cm)	0.0417 (0.0127)	0.0300 (0.052)	16.0 (256)	0.2 (837)	1.39 (0.244)
Roof Insul 1in (IN72)	1 in (2.5 cm)	0.0833 (0.0254)	0.0300 (0.052)	16.0 (256)	0.2 (837)	2.78 (0.489)
Roof Insul 1.5in (IN73)	1.5 in (3.8 cm)	0.1250 (0.0381)	0.0300 (0.052)	16.0 (256)	0.2 (837)	4.17 (0.732)
Roof Insul 2in (IN74)	2 in (3.1 cm)	0.1667 (0.0508)	0.0300 (0.052)	16.0 (256)	0.2 (837)	5.56 (0.977)
Roof Insul 2.5in (IN75)	2.5 in (6.4 cm)	0.2083 (0.0635)	0.0300 (0.052)	16.0 (256)	0.2 (837)	6.94 (1.220)
Roof Insul 3in (IN76)	3 in (7.6 cm)	0.2500 (0.0762)	0.0300 (0.052)	16.0 (256)	0.2 (837)	8.33 (1.464)

Air Spaces

Table 2 Air Spaces						
Code-Word	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
		ft	Btu/hr-ft²-F	lb/ft³	Btu/lb-F	hr-ft²-F/Btu
		(m)	(W/m-K)	(kg/m³)	(kJ/kg-K)	(K-m²/W)
Air Layer, 3/4 in (1.9 cm) or less						
Air Lay <3/4in Vert (AL11)	Vertical Walls					0.90 (0.158)
Air Lay <3/4in Slope (AL12)	Slope 45º					0.84 (0.148)
Air Lay <3/4in Horiz (AL13)	Horizontal Roofs					0.82 (0.144)
Air Layer, 3/4 in to 4 in (1.9 cm to 10.2 cm)						
Air Lay <4in Vert (AL21)	Vertical Walls					0.89 (0.156)
Air Lay <4in Slope (AL22)	Slope 45º					0.87 (0.152)
Air Lay <4in Horiz (AL23)	Horizontal Roofs					0.87 (0.152)
Air Layer, 4 in (10.2 cm) or more						
Air Lay >4in Vert (AL31)	Vertical Walls					0.92 (0.162)
Air Lay >4in Slope (AL32)	Slope 45º					0.89 (0.156)
Air Lay >4in Horiz (AL33)	Horizontal Roofs					0.92 (0.161)
* A more extensive list of data can be found in the 1993 ASHRAE Handbook of Fundamentals, Chap. 22, Table 2						

CONSTRUCTION LIBRARY

The following tables list the constructions in the Library. Three categories are given: (1) exterior walls, (2) roofs, and (3) interior walls.

The format of the tables is as follows. The first column gives the code-word that you use as the value of the LAYERS keyword in LAYERS keyword in a CONSTRUCTION command. The second column gives a description of the construction. The third column lists the materials that make up the construction. For example the construction "ASH Wall-1" contains the materials

HF-A2, HF-B3, HF-C2 and HF-E1, listed from outside to inside. These materials can be found in the "Materials Library" in this document. For example HF-A2 corresponds to the material with code-word "Face Brick 4in (HF-A2)." These materials can also be found in Table 11, Chapter 26 of *ASHRAE Handbook, 1989 Fundamentals*, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

The constructions in the library are so-called "ASHRAE constructions." They are listed in Tables 13 and 18 of Chapter 26 of *ASHRAE Handbook, 1989 Fundamentals*.

Because the construction code-words contain blanks they must be enclosed in double quotes when used in your input. For example:

```
WALL-1 = CONSTRUCTION
    TYPE                = LAYERS
    LAYERS              = "ASH Wall-1"
    ..
```

Exterior-Wall Constructions

LAYERS Code-word	Description	Materials (outside to inside)
ASH Wall-1	4 In. Face Brick, 2 In. Insulation, and 4 In. Light Wt. Concrete Block	HF-A2,HF-B3,HF-C2,HF-E1
ASH Wall-2	4 In. Light Weight Concrete	HF-C14,HF-E1
ASH Wall-3	4 In. Face Brick, Air Space and 8 In. Common Brick	HF-A2,HF-B1,HF-C9,HF-E1
ASH Wall-4	4 In. Face Brick, Air Space and 8 In. Heavy Wt. Concrete Block	HF-A2,HF-B1,HF-C8,HF-E1
ASH Wall-5	4 In. Face Brick, Air Space and 8 In. Light Weight Concrete Block	HF-A2,HF-B1,HF-C7,HF-E1
ASH Wall-6	4 In. Face Brick, Air Space and 8 In. Clay Tile	HF-A2,HF-B1,HF-C6,HF-E1
ASH Wall-7	4 In. Face Brick, Air Space and 2 In. Heavy Weight Concrete	HF-A2,HF-B1,HF-C12,HF-E1
ASH Wall-8	4 In. Face Brick, Air Space and 4 In. Common Brick	HF-A2,HF-B1,HF-C4,HF-E1
ASH Wall-9	4 In. Face Brick, Air Space and 4 In. Heavy Weight Concrete Block	HF-A2,HF-B1,HF-C3,HF-E1
ASH Wall-10	4In. Face Brick, Air Space and 4 In. Light Weight Concrete Block	HF-A2,HF-B1,HF-C2,HF-E1
ASH Wall-11	12 In. Heavy Weight Concrete	HF-A1,HF-C11,HF-E1
ASH Wall-12	8 In. Heavy Weight Concrete with 2 In. Insulation	HF-A1,HF-C10,HF-B6,HF-E1
ASH Wall-13	8 In. Heavy Weight Concrete with 1 In. Insulation	HF-A1,HF-C10,HF-B5,HF-E1
ASH Wall-14	8 In. Heavy Weight Concrete with Air Space	HF-A1,HF-C10,HF-B1,HF-E1
ASH Wall-15	8 In. Heavy Weight Concrete	HF-A1,HF-C10,HF-E1
ASH Wall-16	4 In. Face Brick, 8 In. Common Brick with 1 In. Insulation	HF-A2,HF-C9,HF-B2,HF-E1
ASH Wall-17	4 In. Face Brick, 8 In. Common Brick with Air Space	HF-A2,HF-C9,HF-B1,HF-E1
ASH Wall-18	4 In. Face Brick, Air Space and 4 In. Light Weight Block	HF-A7,HF-B1,HF-C14
ASH Wall-19	Wall with 3 In. Fiberglass Insulation and Stucco Outside Finish	HF-A6,HF-B4,HF-A6
ASH Wall-20	Two-sided Brick Wall with Air Space	HF-A7,HF-B1,HF-A2
ASH Wall-21	Brick Wall, 8 In. Concrete Block and No Air Space	HF-A7,HF-C7,HF-A6
ASH Wall-22	Brick Wall with 4 In. Concrete Block	HF-A7,HF-B1,HF-C3,HF-A6
ASH Wall-23	Brick Wall with 8 In. Concrete Block	HF-A7,HF-B1,HF-C8,HF-A6
ASH Wall-24	Brick Wall with 6 In. Concrete	HF-A7,HF-B1,HF-C15,HF-A6
ASH Wall-25	Frame Wall with 2 In. Insulation and 4 In. Brick Veneer	HF-A7,HF-B6,HF-A6
ASH Wall-26	Frame Wall with 2 In. Insulation	HF-A6,HF-B6,HF-A6
ASH Wall-27	Metal Curtain Wall with 3 In. Insulation	HF-A3,HF-B12,HF-A3
ASH Wall-28	Metal Curtain Wall with 2 In. Insulation	HF-A3,HF-B6,HF-A3
ASH Wall-29	Metal Curtain Wall with 1 In. Insulation	HF-A3,HF-B5,HF-A3
ASH Wall-30	Wall 12 In. Concrete with 2 In. Insulation on the Outside	HF-A3,HF-B6,HF-C11,HF-A6
ASH Wall-31	Wall 8 In. Concrete with 2 In. Insulation on the Outside	HF-A3,HF-B6,HF-C10,HF-A6
ASH Wall-32	Wall 4 In. Concrete with 2 In. Insulation on the Outside	HF-A3,HF-B6,HF-C5,HF-A6
ASH Wall-33	Wall 12 In. Concrete with 2 In. Insulation on the Inside	HF-C11,HF-B6,HF-A6
ASH Wall-34	Wall 8 In. Concrete with 2 In. Insulation on the Inside	HF-C10,HF-B6,HF-A6
ASH Wall-35	Wall 4 In. Concrete with 2 In. Insulation on the Inside	HF-C5,HF-B6,HF-A6
ASH Wall-36	Frame Wall with 3 In. Insulation	HF-A1,HF-B1,HF-B4,HF-E1
ASH Wall-37	Frame Wall with 2 In. Insulation	HF-A1,HF-B1,HF-B3,HF-E1
ASH Wall-38	Frame Wall with 1 In. Insulation	HF-A1,HF-B1,HF-B2,HF-E1
ASH Wall-39	Frame Wall without Insulation	HF-A1,HF-B1,HF-E1
ASH Wall-40	2 In. Insulation with 12 In. Heavy Weight Concrete	HF-A1,HF-B3,HF-C11,HF-E1
ASH Wall-41	2 in. Insulation with 8 In. Heavy Weight Concrete	HF-A1,HF-B3,HF-C10,HF-E1
ASH Wall-42	2 In. Insulation with 8 In. Common Brick	HF-A1,HF-B3,HF-C9,HF-E1
ASH Wall-43	2 In. Insulation with 8 In. Heavy Weight Concrete Block	HF-A1,HF-B3,HF-C8,HF-E1
ASH Wall-44	2 In. Insulation with 8 In. Light Weight Concrete Block	HF-A1,HF-B3,HF-C7,HF-E1
ASH Wall-45	2 In. Insulation with 8 In. Clay Tile	HF-A1,HF-B3,HF-C6,HF-E1
ASH Wall-46	2 In. Insulation with 4 In. Heavy Weight Concrete	HF-A1,HF-B3,HF-C5,HF-E1
ASH Wall-47	2 In. Insulation with 4 In. Common Brick	HF-A1,HF-B3,HF-C4,HF-E1
ASH Wall-48	2 In. Insulation with 4 In. Heavy Weight Concrete Block	HF-A1,HF-B3,HF-C3,HF-E1
ASH Wall-49	2 In. Insulation with 4 In. Light Weight Concrete Block	HF-A1,HF-B3,HF-C2,HF-E1
ASH Wall-50	2 In. Insulation with 4 In. Clay Tile	HF-A1,HF-B3,HF-C1,HF-E1
ASH Wall-51	4 In. Face Brick, 2 In. Insulation and 12 In. Heavy Weight Concrete	HF-A2,HF-B3,HF-C11,HF-E1
ASH Wall-52	4 In. Face Brick, 2 In. Insulation and 8 In. Heavy Weight Concrete	HF-A2,HF-B3,HF-C10,HF-E1

Table 3 Exterior-Wall Constructions		
LAYERS Code-word	**Description**	**Materials** (outside to inside)
ASH Wall-53	4 In. Face Brick, 2 In. Insulation and 8 In. Common Brick	HF-A2,HF-B3,HF-C9,HF-E1
ASH Wall-54	4 In. Face Brick, Air Space and 12 In. Heavy Weight Concrete	HF-A2,HF-B1,HF-C11,HF-E1
ASH Wall-55	4 In. Face Brick, Air Space and 8 In. Heavy Weight Concrete	HF-A2,HF-B1,HF-C10,HF-E1
ASH Wall-56	4 In. Face Brick, 2 In. Insulation and 8 In. Heavy Weight Concrete Block	HF-A2,HF-B3,HF-C8,HF-E1
ASH Wall-57	4 In. Face Brick, 2 In. Insulation and 8 In. Light Weight Concrete Block	HF-A2,HF-B3,HF-C7,HF-E1
ASH Wall-58	2 In. Face Brick, 2 In. Insulation and 8 In. Clay Tile	HF-A2,HF-B3,HF-C6,HF-E1
ASH Wall-59	4 In. Face Brick, 2 In. Insulation and 4 In. Heavy Weight Concrete	HF-A2,HF-B3,HF-C5,HF-E1
ASH Wall-60	4 In. Face Brick, 2 In. Insulation and 4 In. Common Brick	HF-A2,HF-B3,HF-C4,HF-E1
ASH Wall-61	4 In. Face Brick, 2 In. Insulation and 4 In. Heavy Weight Concrete Block	HF-A2,HF-B3,HF-C3,HF-E1
ASH Wall-62	4 In. Face Brick with 8 In. Common Brick	HF-A2,HF-C9,HF-E1
ASH Wall-63	8 In. Heavy Weight Concrete Block with 1 In. Insulation	HF-A1,HF-C8,HF-B2,HF-E1
ASH Wall-64	8 In. Heavy Weight Concrete Block	HF-A1,HF-C8,HF-E1
ASH Wall-65	8 In. Light Weight Concrete Block with Insulation	HF-A1,HF-C7,HF-B2,HF-E1
ASH Wall-66	8 In. Light Weight Concrete Block	HF-A1,HF-C7,HF-E1
ASH Wall-67	4 In. Face Brick, 8 In. Clay Tile and 1 In. Insulation	HF-A2,HF-C6,HF-B2,HF-E1
ASH Wall-68	4 In. Face Brick, 8 In. ClayTile and Air Space	HF-A2,HF-C6,HF-B1,HF-E1
ASH Wall-69	4 In. Face Brick with 8 In. Clay Tile	HF-A2,HF-C6,HF-E1
ASH Wall-70	8 In. Clay Tile with 1 In.Insulation	HF-A1,HF-C6,HF-B2,HF-E1
ASH Wall-71	8 In. Clay Tile with Air Space	HF-A1,HF-C6,HF-B1,HF-E1
ASH Wall-72	8 In. Clay Tile	HF-A1,HF-C6,HF-E1
ASH Wall-73	4 In. Heavy Weight Concrete with 2 In. Insulation	HF-A1,HF-C5,HF-B3,HF-E1
ASH Wall-74	4 In. Heavy Weight Concrete with 1 In. Insulation	HF-A1,HF-C5,HF-B2,HF-E1
ASH Wall-75	4 In. Heavy Weight Concrete with Air Space	HF-A1,HF-C5,HF-B1,HF-E1
ASH Wall-76	4 In. Heavy Weight Concrete	HF-A1,HF-C5,HF-E1
ASH Wall-77	4 In. Face Brick, 4 In. Common Brick and 1 In. Insulation	HF-A2,HF-C4,HF-B2,HF-E1
ASH Wall-78	4 In. Face Brick, 4 In. Common Brick and Air Space	HF-A2,HF-C4,HF-B1,HF-E1
ASH Wall-79	4 In. Face Brick with 4 In. Common Brick	HF-A2,HF-C4,HF-E1
ASH Wall-80	4 In. Common Brick	HF-A1,HF-C4,HF-E1
ASH Wall-81	4 In. Heavy Weight Concrete Block	HF-A1,HF-C3,HF-E1
ASH Wall-82	4 In. Face Brick, 4 In. Light Wt. Concrete Block and 1 In. Insulation	HF-A2,HF-C2,HF-B2,HF-E1
ASH Wall-83	4 In. Face Brick, 4 In. Light Wt. Concrete Block and Air Space	HF-A2,HF-C2,HF-B1,HF-E1
ASH Wall-84	4 In. Face Brick with 4 In. Light Weight Concrete Block	HF-A2,HF-C2,HF-E1
ASH Wall-85	4 In. Light Weight Concrete Block and 1 In. Insulation	HF-A1,HF-C2,HF-B2,HF-E1
ASH Wall-86	4 In. Light Weight Concrete Block and Air Space	HF-A1,HF-C2,HF-B1,HF-E1
ASH Wall-87	4 In. Light Weight ConcreteBlock	HF-A1,HF-C2,HF-E1
ASH Wall-88	4 In. Face Brick, 4 In. Clay Tile and 1 In. Insulation	HF-A2,HF-C1,HF-B2,HF-E1
ASH Wall-89	4 In. Face Brick, 4 In. Clay Tile and Air Space	HF-A2,HF-C1,HF-B1,HF-E1
ASH Wall-90	4 In. Face Brick and 4 In. Clay Tile	HF-A2,HF-C1,HF-E1
ASH Wall-91	4 In. Clay Tile and 1 In. Insulation	HF-A1,HF-C1,HF-B2,HF-E1
ASH Wall-92	4 In. Clay Tile and Air Space	HF-A1,HF-C1,HF-B1,HF-E1
ASH Wall-93	4 In. Clay Tile	HF-A1,HF-C1,HF-E1
ASH Wall-94	Sheet Metal with 1 In. Insulation	HF-A3,HF-B2,HF-B1,HF-A3
ASH Wall-95	Sheet Metal with 2 In. Insulation	HF-A3,HF-B3,HF-B1,HF-A3
ASH Wall-96	Sheet Metal with 3 In. Insulation	HF-A3,HF-B4,HF-B1,HF-A3

Roof Constructions

Table 4 Roof Constructions		
LAYERS **Code-word**	**Description**	**Materials** (outside to inside)
ASH Roof-1	Roof Terrace System	HF-C12,HF-B1,HF-B6,HF-E2,HF-E3,HF-C5,HF-E4,HF-E5
ASH Roof-2	4 In. Wood with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-B9,HF-E4,HF-E5
ASH Roof-3	2.5 In. Wood with 2 In.Insulation	HF-E2,HF-E3,HF-B6,HF-B8,HF-E4,HF-E5
ASH Roof-4	4 In. Wood with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-B7,HF-E4,HF-E5
ASH Roof-5	4 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B9,HF-E4,HF-E5
ASH Roof-6	2.5 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B8,HF-E4,HF-E5
ASH Roof-7	1 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B7,HF-E4,HF-E5
ASH Roof-8	8 In. Light Weight Concrete	HF-E2,HF-E3,HF-C16,HF-E4,HF-E5
ASH Roof-9	6 In. Light Weight Concrete	HF-E2,HF-E3,HF-C15,HF-E4,HF-E5
ASH Roof-10	4 In. Light Weight Concrete	HF-E2,HF-E3,HF-C14,HF-E4,HF-E5
ASH Roof-11	6 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C13,HF-E4,HF-E5
ASH Roof-12	4 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C5,HF-E4,HF-E5
ASH Roof-13	2 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C12,HF-E4,HF-E5
ASH Roof-14	6 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C13,HF-E4,HF-E5
ASH Roof-15	4 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C5,HF-E4,HF-E5
ASH Roof-16	2 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C12,HF-E4,HF-E5
ASH Roof-17	Steel Sheet with 2 In. Insulationn	HF-E2,HF-E3,HF-B6,HF-A3,HF-E4,HF-E5
ASH Roof-18	Steel Sheet with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-A3,HF-E4,HF-E5
ASH Roof-19	Roof Terrace System	HF-C12,HF-B1,HF-B6,HF-E2,HF-E3,HF-C5
ASH Roof-20	4 In. Wood with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-B9
ASH Roof-21	2.5 In. Wood with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-B8
ASH Roof-22	1 In. Wood with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-B7
ASH Roof-23	4 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B9
ASH Roof-24	2.5 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B8
ASH Roof-25	1 In. Wood with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-B7
ASH Roof-26	8 In. Light Weight Concrete	HF-E2,HF-E3,HF-C16
ASH Roof-27	6 In. Light Weight Concrete	HF-E2,HF-E3,HF-C15
ASH Roof-28	4 In. Light Weight Concrete	HF-E2,HF-E3,HF-C14
ASH Roof-29	6 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C13
ASH Roof-30	4 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C5
ASH Roof-31	2 In. Heavy Weight Concrete with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-C12
ASH Roof-32	6 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C13
ASH Roof-33	4 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C5
ASH Roof-34	2 In. Heavy Weight Concrete with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-C12
ASH Roof-35	Steel Sheet with 2 In. Insulation	HF-E2,HF-E3,HF-B6,HF-A3
ASH Roof-36	Steel Sheet with 1 In. Insulation	HF-E2,HF-E3,HF-B5,HF-A3

Interior-Wall Constructions

Table 5 Interior-Wall Constructions		
LAYERS **Code-word**	**Description**	**Materials** (outside to inside)
ASH Int Wall-1	4 In. Clay Tile with 0.75 In.Plaster	HF-E1,HF-C1,HF-E1
ASH Int Wall-2	4 In. Light Weight ConcreteBlock with 0.75 In. Plaster	HF-E1,HF-C2,HF-E1
ASH Int Wall-3	4 In. Heavy Weight ConcreteBlock with 0.75 In. Plaster	HF-E1,HF-C3,HF-E1
ASH Int Wall-4	4 In. Common Brick with 0.75 In. Plaster	HF-E1,HF-C4,HF-E1
ASH Int Wall-5	4 In. Heavy Weight Concretewith 0.75 In. Plaster	HF-E1,HF-C5,HF-E1
ASH Int Wall-6	5 In. Clay Tile with 0.75 In. Plaster	HF-E1,HF-C6,HF-E1
ASH Int Wall-7	8 In. Light Weight Concrete Block, Plastered Both Sides	HF-E1,HF-C7,HF-E1
ASH Int Wall-8	8 In. Heavy Weight Concrete Block, Plastered Both Sides	HF-E1,HF-C8,HF-E1
ASH Int Wall-9	8 In. Common Brick, Plastered Both Sides	HF-E1,HF-C9,HF-E1
ASH Int Wall-10	8 In. Heavy Concrete, Plastered Both Sides	HF-E1,HF-C10,HF-E1
ASH Int Wall-11	12 In. Heavy Concrete, Plastered Both Sides	HF-E1,HF-C11,HF-E1
ASH Int Wall-12	4 In. Clay Tile	HF-C1
ASH Int Wall-13	4 In. Light Weight Concrete Block	HF-C2
ASH Int Wall-14	4 In. Heavy Weight Concrete Block	HF-C3
ASH Int Wall-15	4 In. Common Brick	HF-C4
ASH Int Wall-16	4 In. Heavy Weight Concrete	HF-C5
ASH Int Wall-17	8 In. Clay Tile	HF-C6
ASH Int Wall-18	8 In. Light Weight Concrete Block	HF-C7
ASH Int Wall-19	8 In. Heavy Weight Concrete Block	HF-C8
ASH Int Wall-20	8 In. Common Brick	HF-C9
ASH Int Wall-21	8 In. Heavy Weight Concrete	HF-C10
ASH Int Wall-22	12 In. Heavy Weight Concrete	HF-C11
ASH Int Wall-23	Frame Partition with 0.75 In. Gypsum Board	HF-E1,HF-B1,HF-E1
ASH Int Wall-24	1 In. Wood	HF-B7
ASH Int Wall-25	2 In. Wood	HF-B10
ASH Int Wall-26	3 In. Wood	HF-B11
ASH Int Wall-27	4 In. Wood	HF-B9
ASH Int Wall-28	Frame Partition with 1 In. Wood	HF-B7,HF-B1,HF-B7
ASH Int Wall-29	2 In. Furniture	HF-B10,HF-B1,HF-B10
ASH Int Wall-30	3 In. Furniture	HF-B11,HF-B1,HF-B11
ASH Int Wall-31	2 In. Heavy Weight Concrete Floor Deck	HF-C12
ASH Int Wall-32	4 In. Heavy Weight Concrete Floor Deck	HF-C5
ASH Int Wall-33	2 In. Light Weight Concrete Floor Deck	HF-C5
ASH Int Wall-34	8 In. Heavy Weight Concrete Floor Deck	HF-C10
ASH Int Wall-35	8 In. Light Weight Concrete Floor Deck	HF-C7
ASH Int Wall-36	2 In. Wood Deck	HF-B10
ASH Int Wall-37	3 In. Wood Deck	HF-B11
ASH Int Wall-38	2 In. Heavy Weight Concrete Deck with False Ceiling	HF-C10,HF-E4,HF-E5
ASH Int Wall-39	4 In. Heavy Weight Concrete Deck with False Ceiling	HF-C5,HF-E4,HF-E5
ASH Int Wall-40	4 In. Light Weight Concrete Deck with False Ceiling	HF-C2,HF-E4,HF-E5
ASH Int Wall-41	8 In. Heavy Weight Concrete Deck with False Ceiling	HF-C10,HF-E4,HF-E5
ASH Int Wall-42	8 In. Light Weight Concrete Deck with False Ceiling	HF-C7,HF-E4,HF-E5
ASH Int Wall-43	2 In. Wood Deck with False Ceiling	HF-B10,HF-E4,HF-E5
ASH Int Wall-44	3 In. Wood Deck with False Ceiling	HF-B11,HF-E4,HF-E5
ASH Int Wall-45	12 In. Heavy Weight Concrete Deck with False Ceiling	HF-C11,HF-E4,HF-E5
ASH Int Wall-46	4 In. Wood Deck with False Ceiling	HF-B9,HF-E4,HF-E5
ASH Int Wall-47	Steel Deck with False Ceiling	HF-A3,HF-E4,HF-E5

WINDOW LIBRARY

This section summarizes the available glazings in the window library. Single-pane entries are given first, followed by double-, triple-, and quadruple-pane. For a given number of panes, clear and low-iron glazings are given first, followed by tinted, reflective, low-E, and electrochromic options.

You can find the best GLASS-TYPE-CODE for a particular glazing product by matching the number of panes, glass thickness, gap width, tint, coating, and gas fill from the manufacturer's data sheet with the corresponding information in Table 6. Manufacturer's values for shading coefficient, transmittance, and reflectance can be used to check your selection. If you can't find a good match, you can create your own glazing layer-by-layer using the Window Layer Method.

The terminology used in the glazing descriptions is as follows:

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Table 7 Library Terminology

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Term	Description
Clear:	No impurities added to the glass mix.
Low Iron:	Clear glass with a low iron content, resulting in higher transmittance.
Tint:	Outer pane is tinted with inorganic materials to increase absorption in certain areas of the visible spectrum in order to produce a certain color.
Ref:	Reflective; i.e., a metallic coating is applied to one surface of a pane in order to increase solar reflection. Ref-A refers to stainless steel coatings, Ref-B to titanium, Ref-C to pewter, and Ref-D to tin-oxide. L, M, and H used with Clear and Tint refer to low, medium, and high transmittance coating, respectively.
Low-E:	A low emissivity metallic coating is applied in order to increase thermal IR reflectance. The coated surface is indicated by $en = v$, where $n = 1$ is the outside of the outer pane, $n = 2$ is the inside of the outer pane, etc., and v is the emissivity (see, for example, G-T-C = 2635, where $e2 = 0.1$ indicates a coating with an emissivity of 0.1 on surface #2).
Film:	A polyester film (with low-E coating) stretched between glass panes. The approximate visible transmittance of the film (in percent) is shown as (nn); see, for example, G-T-C = 3641.
Electrochromic:	A coating that makes the glazing more absorbing or more reflecting as the voltage applied to glazing changes.
Bleached:	The clearest state of electrochromic glass.
Colored:	The darkest state of electrochromic glass.

Table 8 Column Headings in Glazing Table

Heading	Description
G-T-C:	The GLASS-TYPE-CODE. The first digit is the number of panes. The second digit is 0 for clear or low-iron; 2 for tinted but no coating; 4 for reflective coating with clear or tinted glass; 6 for low-E coating on clear or tinted glass, and 8 for electrochromic glass.
U-SI:	Center-of-glass U-value in SI units (W/m2-K) for ASHRAE winter conditions [-17.8C (0F) outside temperature, 21.1C (70F) inside temperature, 6.71 m/s (15 mph) windspeed and zero incident solar radiation]. The program calculates the overall conductance of a window as the area-weighted average of the center-of-glass U-value, the edge-of-glass U-value and the frame U-value. The center-of-glass U-value includes a combined convective plus radiative outside air film conductance of 28.7 W/m2-K.
U-IP:	Center-of-glass U-value in inch-pound units (Btu/ft2-h-F) for ASHRAE winter conditions. Includes a combined convective plus radiative outside air film conductance of 5.0 Btu/ft2-h-F.
SC:	Center-of-glass ASHRAE shading coefficient for ASHRAE summer conditions [35C (95F) outside temperature, 24C (75F) inside temperature, 3.3 m/s (7.5 mph) windspeed, and near-normal incident solar radiation of 783 W/m2 (248 Btu/h-ft2)].
SHGC:	Center-of-glass solar heat gain coefficient at near normal incidence for ASHRAE summer conditions.
Tsol:	Center-of-glass solar transmittance for all glazing layers, at normal incidence.
Rfsol:	Center-of-glass solar reflectance for all glazing ayers for radiation incident from the front at normal incidence.
Tvis:	Center-of-glass visible transmittance for all glazing layers, at normal incidence.
Rfvis:	Center-of-glass visible reflectance for all glazing layers for radiation incident from the front at normal incidence.
Pane #n ID:	Identification number of the nth solid layer (pane) in the glazing assembly. The panes are numbered from the outdoor side of the window to the room side. (For windows in an interior wall between a sunspace and adjacent room, the "outdoor" side is the sunspace side.) The properties of this layer are given in the "Glass Layers Library" in this document. Although called the "Window Layer Library", some of the entries are for plastic films. (This library was used with WINDOW-4 to create the Window Library.)
Pane #n Wid:	Thickness of the nth pane (mm).
GAP #n Gas:	Type of gas (air, argon, etc.) in the nth gap. Gaps are numbered from the outdoor side of the window to the room side.
Gap #n Wid:	Thickness of the nth gap (mm).

Legacy DOE-2 Window Library

The Following tables 9-15 contain the legacy version of the DOE-2 Window Library as it was previously published for DOE-2.1E and DOE-2.2 prior to version 44d.

Table 6 Windows - Single Glazing

									Pane #1	
G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Id	Wid
Single Clear										
1000	6.31	1.11	1.00	.86	.84	.08	.90	.08	2	3.0
1001	6.17	1.09	.95	.81	.77	.07	.88	.08	3	6.0
Single Low Iron										
1002	6.31	1.11	1.05	.90	.90	.08	.91	.08	14	3.0
1003	6.22	1.10	1.04	.90	.89	.08	.91	.08	16	5.0
Single Tint Bronze										
1200	6.31	1.11	.84	.73	.64	.06	.69	.06	5	3.0
1201	6.17	1.09	.71	.61	.48	.05	.53	.06	6	6.0
Single Tint Green										
1202	6.31	1.11	.83	.72	.63	.06	.82	.08	11	3.0
1203	6.17	1.09	.71	.61	.49	.06	.75	.07	12	6.0
Single Tint Grey										
1204	6.31	1.11	.83	.71	.63	.06	.61	.06	8	3.0
1205	6.17	1.09	.69	.59	.46	.05	.43	.05	9	6.0
Single Tint Blue										
1206	6.17	1.09	.71	.61	.48	.05	.57	.06	17	6.0
Single Ref-A Clear-L										
1400	4.90	.86	.23	.19	.07	.34	.08	.41	200	6.0
Single Ref-A Clear-L										
1401	5.11	.90	.29	.25	.11	.27	.14	.31	201	6.0
Single Ref-A Clear-L										
1402	5.41	.95	.36	.31	.16	.22	.20	.25	202	6.0
Single Ref-A Tint-L										
1403	4.93	.87	.26	.22	.04	.15	.05	.17	210	6.0
Single Ref-A Tint-M										
1404	5.11	.90	.29	.25	.06	.13	.09	.14	211	6.0
Single Ref-A Tint-H										
1405	5.29	.93	.34	.29	.10	.11	.10	.11	212	6.0
Single Ref-B Clear-L										
1406	5.44	.96	.35	.31	.15	.22	.20	.23	220	6.0
Single Ref-B Clear-H										
1407	5.50	.97	.45	.39	.24	.16	.30	.16	221	6.0
Single Ref-B Tint-L										
1408	4.93	.87	.26	.23	.04	.13	.05	.09	230	6.0
Single Ref-B Tint-M										
1409	5.05	.89	.33	.28	.10	.11	.13	.10	231	6.0
Single Ref-B Tint-H										
1410	5.50	.97	.40	.34	.15	.09	.18	.08	232	6.0
Single Ref-C Clear-L										
1411	4.99	.88	.29	.25	.11	.25	.13	.28	240	6.0
Single Ref-C Clear-M										
1412	5.23	.92	.37	.32	.17	.20	.19	.21	241	6.0
Single Ref-C Clear-H										
1413	5.35	.94	.41	.35	.20	.16	.22	.17	242	6.0
Single Ref-C Tint-L										
1414	4.99	.88	.29	.25	.07	.13	.08	.13	250	6.0
Single Ref-C Tint-M										
1415	5.23	.92	.34	.29	.10	.10	.11	.10	251	6.0
Single Ref-C Tint-H										
1416	5.35	.94	.37	.31	.12	.09	.13	.09	252	6.0
Single Ref-D Clear										
1417	6.12	1.08	.58	.50	.43	.31	.33	.45	260	6.0
Single Ref-D Tint										
1418	6.12	1.08	.53	.46	.30	.14	.25	.18	270	6.0
Single Low-E Clear (e2=.4)										
1600	4.99	.88	.91	.78	.75	.10	.85	.12	300	3.0
Single Low-E Clear (e2=.2)										

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid
1601	4.34	.76	.89	.77	.74	.09	.82	.11	350	3.0
1602	4.27	.75	.84	.72	.68	.09	.81	.11	351	6.0
Single Electrochromic Absorbing Bleached/Colored										
1800	6.17	1.09	.98	.84	.81	.09	.85	.10	700	6.0
1801	6.17	1.09	.36	.31	.11	.18	.13	.08	701	6.0
Single Electrochromic Reflecting Bleached/Colored										
1802	6.17	1.09	.85	.73	.69	.17	.82	.11	702	6.0
1803	6.17	1.09	.34	.29	.10	.22	.16	.07	703	6.0

Table 7 Windows - Double Glazed

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid
Double Clear														
2000	3.23	.57	.88	.76	.70	.13	.81	.15	2	3.0	Air	6.3	2	3.0
2001	2.79	.49	.89	.76	.70	.13	.81	.15	2	3.0	Air	12.7	2	3.0
2002	2.61	.46	.89	.76	.70	.13	.81	.15	2	3.0	Arg	12.7	2	3.0
2003	3.16	.56	.81	.69	.60	.11	.78	.14	3	6.0	Air	6.3	3	6.0
2004	2.74	.48	.81	.70	.60	.11	.78	.14	3	6.0	Air	12.7	3	6.0
2005	2.56	.45	.81	.70	.60	.11	.78	.14	3	6.0	Arg	12.7	3	6.0
Double Low Iron														
2006	3.23	.57	.96	.83	.81	.14	.84	.15	14	3.0	Air	6.3	14	3.0
2007	2.79	.49	.96	.83	.81	.14	.84	.15	14	3.0	Air	12.7	14	3.0
2008	2.61	.46	.96	.83	.81	.14	.84	.15	14	3.0	Arg	12.7	14	3.0
2009	3.18	.56	.95	.82	.80	.14	.83	.15	16	5	Air	6.3	16	5.0
2010	2.76	.49	.95	.82	.80	.14	.83	.15	16	5	Air	12.7	16	5.0
2011	2.58	.45	.95	.82	.80	.14	.83	.15	16	5	Arg	12.7	16	5.0
Double Tint Bronze														
2200	3.23	.57	.72	.62	.54	.09	.62	.10	5	3.0	Air	6.3	2	3.0
2201	2.79	.49	.72	.62	.54	.09	.62	.10	5	3.0	Air	12.7	2	3.0
2202	2.61	.46	.72	.62	.54	.09	.62	.10	5	3.0	Arg	12.7	2	3.0
2203	3.16	.56	.57	.49	.38	.07	.47	.08	6	6.0	Air	6.3	3	6.0
2204	2.74	.48	.57	.49	.38	.07	.47	.08	6	6.0	Air	12.7	3	6.0
2205	2.56	.45	.56	.49	.38	.07	.47	.08	6	6.0	Arg	12.7	3	6.0
Double Tint Green														
2206	3.23	.57	.72	.62	.53	.09	.74	.13	11	3.0	Air	6.3	2	3.0
2207	2.79	.49	.71	.61	.53	.09	.74	.13	11	3.0	Air	12.7	2	3.0
2208	2.61	.46	.71	.61	.53	.09	.74	.13	11	3.0	Arg	12.7	2	3.0
2209	3.16	.56	.58	.50	.38	.07	.66	.12	12	6.0	Air	6.3	3	6.0
2210	2.74	.48	.57	.49	.38	.07	.66	.12	12	6.0	Air	12.7	3	6.0
2211	2.56	.45	.57	.49	.38	.07	.66	.12	12	6.0	Arg	12.7	3	6.0
Double Tint Grey														
2212	3.23	.57	.71	.61	.53	.09	.55	.09	8	3.0	Air	6.3	2	3.0
2213	2.79	.49	.71	.61	.53	.09	.55	.09	8	3.0	Air	12.7	2	3.0
2214	2.61	.46	.70	.61	.53	.09	.55	.09	8	3.0	Arg	12.7	2	3.0
2215	3.16	.56	.55	.47	.35	.07	.38	.07	9	6.0	Air	6.3	3	6.0
2216	2.74	.48	.54	.47	.35	.07	.38	.07	9	6.0	Air	12.7	3	6.0
2217	2.56	.45	.54	.47	.35	.07	.38	.07	9	6.0	Arg	12.7	3	6.0
Double Tint Blue														
2218	3.16	.56	.57	.49	.37	.07	.50	.09	17	6.0	Air	6.3	3	6.0
2219	2.74	.48	.57	.49	.37	.07	.50	.09	17	6.0	Air	12.7	3	6.0
2220	2.56	.45	.56	.49	.37	.07	.50	.09	17	6.0	Arg	12.7	3	6.0

Table 8 Windows - Reflective Glazing

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Gap #1 Wid	Pane Gas	Wid	Id	Wid
Double Ref-A Clear-L														
2400	2.79	.49	.17	.14	.05	.34	.07	.41	200	6.0	Air	6.3	3	6.0
2401	2.26	.40	.15	.13	.05	.34	.07	.41	200	6.0	Air	12.7	3	6.0
2402	2.02	.36	.14	.12	.05	.34	.07	.41	200	6.0	Arg	12.7	3	6.0
Double Ref-A Clear-M														
2403	2.86	.50	.22	.19	.09	.27	.13	.31	201	6.0	Air	6.3	3	6.0
2404	2.35	.41	.20	.17	.09	.27	.13	.31	201	6.0	Air	12.7	3	6.0
2405	2.13	.38	.20	.17	.09	.27	.13	.31	201	6.0	Arg	12.7	3	6.0
Double Ref-A Clear-H														
2406	2.95	.52	.27	.23	.13	.22	.18	.25	202	6.0	Air	6.3	3	6.0
2407	2.47	.44	.26	.22	.13	.22	.18	.25	202	6.0	Air	12.7	3	6.0
2408	2.26	.40	.25	.22	.13	.22	.18	.25	202	6.0	Arg	12.7	3	6.0
Double Ref-A Tint-L														
2410	2.80	.49	.18	.15	.03	.15	.05	.17	210	6.0	Air	6.3	3	6.0
2411	2.27	.40	.15	.13	.03	.15	.05	.17	210	6.0	Air	12.7	3	6.0
2412	2.04	.36	.15	.13	.03	.15	.05	.17	210	6.0	Arg	12.7	3	6.0
Double Ref-A Tint-M														
2413	2.86	.50	.20	.17	.05	.13	.08	.14	211	6.0	Air	6.3	3	6.0
2414	2.35	.41	.18	.15	.05	.13	.08	.14	211	6.0	Air	12.7	3	6.0
2415	2.13	.38	.17	.15	.05	.13	.08	.14	211	6.0	Arg	12.7	3	6.0
Double Ref-A Tint-H														
2416	2.92	.51	.24	.21	.08	.11	.09	.11	212	6.0	Air	6.3	3	6.0
2417	2.42	.43	.22	.19	.08	.11	.09	.11	212	6.0	Air	12.7	3	6.0
2418	2.21	.39	.21	.19	.08	.11	.09	.11	212	6.0	Arg	12.7	3	6.0
Double Ref-B Clear-L														
2420	2.96	.52	.27	.23	.12	.22	.18	.23	220	6.0	Air	6.3	3	6.0
2421	2.48	.44	.25	.22	.12	.22	.18	.23	220	6.0	Air	12.7	3	6.0
2422	2.27	.40	.25	.21	.12	.22	.18	.23	220	6.0	Arg	12.7	3	6.0
Double Ref-B Clear-H														
2426	2.98	.53	.35	.30	.19	.16	.27	.17	221	6.0	Air	6.3	3	6.0
2427	2.50	.44	.34	.29	.19	.16	.27	.17	221	6.0	Air	12.7	3	6.0
2428	2.30	.41	.34	.29	.19	.16	.27	.17	221	6.0	Arg	12.7	3	6.0
Double Ref-B Tint-L														
2430	2.80	.49	.18	.15	.03	.13	.05	.09	230	6.0	Air	6.3	3	6.0
2431	2.27	.40	.16	.14	.03	.13	.05	.09	230	6.0	Air	12.7	3	6.0
2432	2.04	.36	.15	.13	.03	.13	.05	.09	230	6.0	Arg	12.7	3	6.0
Double Ref-B Tint-M														
2433	2.84	.50	.24	.20	.08	.11	.12	.10	231	6.0	Air	6.3	3	6.0
2434	2.33	.41	.22	.19	.08	.11	.12	.10	231	6.0	Air	12.7	3	6.0
2435	2.10	.37	.21	.18	.08	.11	.12	.10	231	6.0	Arg	12.7	3	6.0
Double Ref-B Tint-H														
2436	2.98	.53	.29	.25	.12	.09	.16	.08	232	6.0	Air	6.3	3	6.0
2437	2.50	.44	.27	.23	.12	.09	.16	.08	232	6.0	Air	12.7	3	6.0
2438	2.30	.41	.27	.23	.12	.09	.16	.08	232	6.0	Arg	12.7	3	6.0
Double Ref-C Clear-L														
2440	2.82	.50	.22	.19	.09	.25	.12	.28	240	6.0	Air	6.3	3	6.0
2441	2.30	.41	.20	.18	.09	.25	.12	.28	240	6.0	Air	12.7	3	6.0
2442	2.07	.36	.20	.17	.09	.25	.12	.28	240	6.0	Arg	12.7	3	6.0
Double Ref-C Clear-M														
2443	2.90	.51	.28	.24	.14	.20	.17	.21	241	6.0	Air	6.3	3	6.0
2444	2.40	.42	.27	.23	.14	.20	.17	.21	241	6.0	Air	12.7	3	6.0
2445	2.18	.38	.26	.23	.14	.20	.17	.21	241	6.0	Arg	12.7	3	6.0
Double Ref-C Clear-H														
2446	2.94	.52	.32	.27	.16	.16	.20	.17	242	6.0	Air	6.3	3	6.0
2447	2.45	.43	.30	.26	.16	.16	.20	.17	242	6.0	Air	12.7	3	6.0
2448	2.23	.39	.30	.26	.16	.16	.20	.17	242	6.0	Arg	12.7	3	6.0
Double Ref-C Tint-L														
2450	2.82	.50	.21	.18	.06	.13	.07	.13	250	6.0	Air	6.3	3	6.0
2451	2.30	.41	.19	.16	.06	.13	.07	.13	250	6.0	Air	12.7	3	6.0

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Gap #1 Wid	Pane Gas	Wid	Id	Wid
2452	2.07	.36	.18	.15	.06	.13	.07	.13	250	6.0	Arg	12.7	3	6.0
Double Ref-C Tint-M														
2453	2.90	.51	.24	.21	.08	.10	.10	.10	251	6.0	Air	6.3	3	6.0
2454	2.40	.42	.22	.19	.08	.10	.10	.10	251	6.0	Air	12.7	3	6.0
2455	2.18	.38	.21	.19	.08	.10	.10	.10	251	6.0	Arg	12.7	3	6.0
Double Ref-D Tint-H														
2456	2.94	.52	.26	.23	.10	.09	.12	.09	252	6.0	Air	6.3	3	6.0
2457	2.45	.43	.24	.21	.10	.09	.12	.09	252	6.0	Air	12.7	3	6.0
2458	2.23	.39	.24	.20	.10	.09	.12	.09	252	6.0	Arg	12.7	3	6.0
Double Ref-D Clear														
2460	3.15	.56	.49	.42	.34	.32	.31	.46	260	6.0	Air	6.3	3	6.0
2461	2.72	.48	.49	.42	.34	.32	.31	.46	260	6.0	Air	12.7	3	6.0
2462	2.54	.45	.49	.42	.34	.32	.31	.46	260	6.0	Arg	12.7	3	6.0
Double Ref-D Tint														
2470	3.15	.56	.41	.35	.24	.15	.23	.19	270	6.0	Air	6.3	3	6.0
2471	2.72	.48	.40	.35	.24	.15	.23	.19	270	6.0	Air	12.7	3	6.0
2472	2.54	.45	.40	.34	.24	.15	.23	.19	270	6.0	Arg	12.7	3	6.0

Table 9 Windows – Low-emissivity Glazings

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Gap #1 Wid	Pane Gas	Wid	Id	Wid
Double Low-E (e3=.4) Clear														
2600	2.85	.50	.84	.72	.63	.15	.77	.18	2	3.0	Air	6.3	300	3.0
2601	2.30	.41	.85	.73	.63	.15	.77	.18	2	3.0	Air	12.7	300	3.0
2602	2.05	.36	.85	.73	.63	.15	.77	.18	2	3.0	Arg	12.7	300	3.0
Double Low-E (e3=.2) Clear														
2610	2.61	.46	.84	.72	.62	.15	.74	.18	2	3.0	Air	6.3	350	3.0
2611	1.99	.35	.85	.73	.62	.15	.74	.18	2	3.0	Air	12.7	350	3.0
2612	1.70	.30	.86	.74	.62	.15	.74	.18	2	3.0	Arg	12.7	350	3.0
2613	2.57	.45	.77	.66	.53	.13	.72	.17	3	6.0	Air	6.3	351	6.0
2614	1.96	.35	.78	.67	.53	.13	.72	.17	3	6.0	Air	12.7	351	6.0
2615	1.67	.29	.79	.68	.53	.13	.72	.17	3	6.0	Arg	12.7	351	6.0
Double Low-E (e2=.1) Clear														
2630	2.47	.44	.69	.60	.54	.22	.77	.14	400	3.0	Air	6.3	2	3.0
2631	1.81	.32	.69	.60	.54	.22	.77	.14	400	3.0	Air	12.7	2	3.0
2632	1.48	.26	.69	.59	.54	.22	.77	.14	400	3.0	Arg	12.7	2	3.0
2633	2.43	.43	.65	.56	.47	.20	.75	.11	401	6.0	Air	6.3	3	6.0
2634	1.78	.31	.65	.56	.47	.20	.75	.11	401	6.0	Air	12.7	3	6.0
2635	1.46	.26	.66	.56	.47	.20	.75	.11	401	6.0	Arg	12.7	3	6.0
Double Low-E (e2=.1) Tint														
2636	2.43	.43	.45	.39	.28	.10	.44	.05	451	6.0	Air	6.3	3	6.0
2637	1.78	.31	.43	.37	.28	.10	.44	.05	451	6.0	Air	12.7	3	6.0
2638	1.46	.26	.43	.37	.28	.10	.44	.05	451	6.0	Arg	12.7	3	6.0
Double Low-E (e3=.1) Clear														
2640	2.47	.44	.74	.63	.54	.23	.77	.13	2	3.0	Air	6.3	400	3.0
2641	1.81	.32	.75	.64	.54	.23	.77	.13	2	3.0	Air	12.7	400	3.0
2642	1.48	.26	.75	.65	.54	.23	.77	.13	2	3.0	Arg	12.7	400	3.0
Double Low-E (e2=.04) Clear														
2660	2.38	.42	.51	.44	.39	.36	.70	.12	500	3.0	Air	6.3	2	3.0
2661	1.68	.30	.51	.44	.39	.36	.70	.12	500	3.0	Air	12.7	2	3.0
2662	1.34	.24	.50	.43	.39	.36	.70	.12	500	3.0	Arg	12.7	2	3.0
Double Low-E (e3=.04) Clear														
2663	2.41	.42	.49	.42	.34	.31	.68	.12	501	6.0	Air	6.3	3	6.0
2664	1.67	.29	.48	.42	.34	.31	.68	.12	501	6.0	Air	12.7	3	6.0
2665	1.32	.23	.48	.42	.34	.31	.68	.12	501	6.0	Arg	12.7	3	6.0
Double Low-E (e2=.04) Tint														
2666	2.41	.42	.35	.31	.21	.14	.41	.08	550	6.0	Air	6.3	3	6.0
2667	1.67	.29	.33	.29	.21	.14	.41	.08	550	6.0	Air	12.7	3	6.0
2668	1.32	.23	.32	.28	.21	.14	.41	.08	550	6.0	Arg	12.7	3	6.0

Table 10 Windows – Electrochromic Glazings

| | | | | | | | | | Pane #1 | | Gap #1 | Pane | | |
G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Id	Wid	Gas	Wid	Id	Wid
Double Electrochromic Absorbing Bleached/Colored, 6.3-mm Gap														
2800	2.43	0.43	.85	.73	.64	.14	.76	.16	704F	6.0	Air	6.3	709	6.0
2801	2.43	0.43	.21	.18	.09	.18	.12	.08	705F	6.0	Air	6.3	709	6.0
Double Electrochromic Absorbing Bleached/Colored, 12.7-mm Gap														
2802	1.78	0.31	.86	.74	.64	.14	.76	.16	704F	6.0	Air	12.7	709	6.0
2803	1.78	0.31	.19	.20	.16	.18	.12	.08	705F	6.0	Air	12.7	709	6.0
Double Electrochromic Absorbing Bleached/Colored, 12.7-mm Gap, Argon														
2804	1.49	0.26	.86	.74	.64	.14	.76	.16	704F	6.0	Arg	12.7	709	6.0
2805	1.49	0.26	.18	.15	.09	.18	.12	.08	705F	6.0	Arg	12.7	709	6.0
Double Electrochromic Reflecting Bleached/Colored, 6.3-mm Gap														
2820	2.43	0.43	.73	.63	.55	.21	.73	.17	706F	6.0	Air	6.3	709	6.0
2821	2.43	0.43	.20	.17	.09	.22	.14	.08	707F	6.0	Air	6.3	709	6.0
Double Electrochromic Reflecting Bleached/Colored, 12.7-mm Gap														
2822	1.78	0.31	.74	.64	.55	.21	.73	.17	706F	6.0	Air	12.7	709	6.0
2823	1.78	0.31	.17	.15	.09	.22	.14	.08	707F	6.0	Air	12.7	709	6.0
Double Electrochromic Reflecting Bleached/Colored, 12.7-mm Gap, Argon														
2824	1.49	0.26	.74	.64	.55	.21	.73	.17	706F	6.0	Arg	12.7	709	6.0
2825	1.49	0.26	.16	.15	.09	.22	.14	.08	707F	6.0	Arg	12.7	709	6.0
Double Low-E (e2=.029) Electrochromic Absorbing Bleached/Colored, 6.3-mm Gap														
2840	2.33	0.41	.51	.44	.34	.33	.66	.14	704F	6.0	Air	6.3	708F	5.7
2841	2.33	0.41	.18	.16	.06	.19	.10	.08	705F	6.0	Air	6.3	708F	5.7
Double Low-E (e2=.029) Electrochromic Absorbing Bleached/Colored, 12.7-mm Gap														
2842	1.64	0.29	.59	.51	.34	.33	.66	.14	704F	6.0	Air	12.7	708F	5.7
2843	1.64	0.29	.15	.13	.06	.19	.10	.08	705F	6.0	Air	12.7	708F	5.7
Double Low-E (e2=.029) Electrochromic Absorbing Bleached/Colored, 12.7-mm Gap, Argon														
2844	1.33	0.23	.60	.52	.34	.33	.66	.14	704F	6.0	Arg	12.7	708F	5.7
2845	1.33	0.23	.14	.12	.06	.19	.10	.08	705F	6.0	Arg	12.7	708F	5.7
Double Low-E (e2=.029) Electrochromic Reflecting Bleached/Colored, 6.3-mm Gap														
2860	2.33	0.41	.54	.46	.32	.32	.64	.14	706F	6.0	Air	6.3	708F	5.7
2861	2.33	0.41	.18	.16	.07	.22	.12	.08	707F	6.0	Air	6.3	708F	5.7
Double Low-E (e2=.029) Electrochromic Reflecting Bleached/Colored, 12.7-mm Gap														
2862	1.64	0.29	.55	.47	.32	.32	.64	.14	706F	6.0	Air	12.7	708F	5.7
2863	1.64	0.29	.16	.14	.07	.22	.12	.08	707F	6.0	Air	12.7	708F	5.7
Double Low-E (e2=.029) Electrochromic Reflecting Bleached/Colored, 12.7-mm Gap, Argon														
2864	1.33	0.23	.56	.48	.32	.32	.64	.14	706F	6.0	Arg	12.7	708F	5.7
2865	1.33	0.23	.15	.13	.07	.22	.12	.08	707F	6.0	Arg	12.7	708F	5.7

Table 11 Windows – Triple Glazing

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Gap #2 Gas	Gap #2 Wid	Pane #3 Id	Pane #3 Wid
Triple Clear																		
3001	2.19	.39	.79	.68	.60	.17	.74	.20	2	3.0	Air	6.3	2	3.0	Air	6.3	2	3.0
3002	1.79	.32	.79	.68	.60	.17	.74	.20	2	3.0	Air	12.7	2	3.0	Air	12.7	2	3.0
3002	1.64	.29	.79	.68	.60	.17	.74	.20	2	3.0	Arg	12.7	2	3.0	Arg	12.7	2	3.0
Triple Low-E (e5=.1) Clear																		
3601	1.81	.32	.67	.57	.46	.24	.70	.18	2	3.0	Air	6.3	2	3.0	Air	6.3	400	3.0
3602	1.28	.23	.67	.58	.46	.24	.70	.18	2	3.0	Air	12.7	2	3.0	Air	12.7	400	3.0
3603	1.06	.19	.67	.58	.46	.24	.70	.18	2	3.0	Arg	12.7	2	3.0	Arg	12.7	400	3.0
Triple Low-E (e2=e5=.1) Clear																		
3621	1.55	.27	.54	.47	.36	.29	.66	.17	400	3.0	Air	6.3	2	3.0	Air	6.3	400	3.0
3622	.99	.17	.55	.47	.36	.29	.66	.17	400	3.0	Air	12.7	2	3.0	Air	12.7	400	3.0
3623	.77	.14	.55	.47	.36	.29	.66	.17	400	3.0	Arg	12.7	2	3.0	Arg	12.7	400	3.0
Triple Low-E Film (88) Clear																		
3641	1.83	.32	.66	.57	.48	.28	.71	.18	2	3.0	Air	6.3	600	0.1	Air	6.3	2	3.0
3642	1.32	.23	.67	.57	.48	.28	.71	.18	2	3.0	Air	12.7	600	0.1	Air	12.7	2	3.0
Triple Low-E Film (77) Clear																		
3651	1.79	.32	.53	.46	.38	.38	.64	.24	2	3.0	Air	6.3	601	0.1	Air	6.3	2	3.0
3652	1.26	.22	.54	.47	.38	.38	.64	.24	2	3.0	Air	12.7	601	0.1	Air	12.7	2	3.0
Triple Low-E Film (66) Clear																		
3661	1.75	.31	.41	.35	.26	.40	.54	.31	3	6.0	Air	6.3	602	0.1	Air	6.3	3	6.0
3662	1.23	.22	.42	.36	.26	.40	.54	.31	3	6.0	Air	12.7	602	0.1	Air	12.7	3	6.0
Triple Low-E Film (66) Tint																		
3663	1.75	.31	.30	.26	.16	.18	.32	.14	6	6.0	Air	6.3	602	0.1	Air	6.3	3	6.0
3664	1.23	.22	.29	.25	.16	.18	.32	.14	6	6.0	Air	12.7	602	0.1	Air	12.7	3	6.0
Triple Low-E Film (55) Clear																		
3671	1.74	.31	.35	.30	.21	.44	.45	.37	3	6.0	Air	6.3	603	0.1	Air	6.3	3	6.0
3672	1.22	.22	.36	.31	.21	.44	.45	.37	3	6.0	Air	12.7	603	0.1	Air	12.7	3	6.0
Triple Low-E Film (55) Tint																		
3673	1.74	.31	.26	.23	.13	.19	.27	.16	6	6.0	Air	6.3	603	0.1	Air	6.3	3	6.0
3674	1.22	.22	.25	.22	.13	.19	.27	.16	6	6.0	Air	12.7	603	0.1	Air	12.7	3	6.0
Triple Low-E Film (44) Tint																		
3681	1.74	.31	.23	.20	.10	.21	.22	.18	6	6.0	Air	6.3	604	0.1	Air	6.3	3	6.0
3682	1.21	.21	.22	.19	.10	.21	.22	.18	6	6.0	Air	12.7	604	0.1	Air	12.7	3	6.0
Triple Low-E Film (33) Tint																		
3691	1.74	.31	.19	.16	.07	.23	.17	.23	6	6.0	Air	6.3	605	0.1	Air	6.3	3	6.0
3692	1.20	.21	.17	.15	.07	.23	.17	.23	6	6.0	Air	12.7	605	0.1	Air	12.7	3	6.0

Table 12 Windows – Quadruple Glazing

G-T-C	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Gap #2 Gas	Gap #2 Wid	Pane #3 Id	Pane #3 Wid
Quadruple, Two Low-E Glass, Two Low-E Film, Clear. Krypton																		
4651	.66	.12	.52	.45	.34	.34	.62	.21	2	3.0	Kry	7.9	600	0.1	Kry	3.2	600	0.1

	Gap #3 Gas	Gap #3 Wid	Pane #4 Id	Pane #4 Wid
	Kry	7.9	2	3.0

Window Manufacturers Window Library

These window entries reflect actual products sold on the market as of mid-2006. Depending on whether the glazing system is single glazed, double glazed or triple glazed, the user can select a window with a glazing system from a specific glass manufacturer. The user needs to be familiar with the glass types offered by a manufacturer in order to select the corresponding window system from the library. A listing of the new window library follows this

discussion. The listing is set up the same way as the existing DOE-2 Window Library with the addition of the name for each pane of glass. If the user cannot find the window in the library, we recommend creating the window in WINDOW 5 and importing it to eQUEST.

The new windows were created in WINDOW 5.2 using glass from release 14.4 of the International Glazing Database (IGDB 14.4). The International Glazing Database includes spectral data for glass manufactured by all glass manufacturers who have chosen to submit their data for peer review to Lawrence Berkeley National Laboratory.   Use of these windows improves the accuracy of the calculations because the windows represent actual products and the simulations employ the angular properties of the glazing systems from WINDOW 5.2.

The new Glass Manufacturer Window Library is organized by type of window (single, double, triple), the manufacturer, and the glass type. The user selects single, double or triple-glazed units by manufacturer. The list of products offered by a manufacturer has a window name and a description. The window name gives an abbreviated name for each glazing layer separated by the gas fill type, e.g. Brz /Air/Clr 6. . The description of the glazing system indicates the window library identification number, U-Factor, SHGC and visible light transmittance for the glazing system.

In the window name, the first glazing listed represents the outboard lite. In units with multiple glazings, the gas fill is either air or argon (Arg). For air, two different widths were modeled. Air1 designates a 6.3 mm (0.25 in) gap in the double and triple glazed units. In the double glazed units, Air or Arg corresponds to a 12.7 mm (0.5 in) gap. In the triple glazed units with suspended films, Air corresponds to a 9.5 mm (0.375 in.) gap width.

The thickness of the glass in the glazing system is given at the end of the window name.   There is 3mm (3) and 6mm (6) glass. Typically, 3mm glass is used on residential-scale projects and 6mm glass is used for commercial applications. All double-glazed units with 6mm glass have a gap that is air-filled and 12.7 mm (o.5 in) wide. It is rare to see the narrower gap widths on commercial projects; however, a user can use WINDOW 5.2 to create such a product.

The window ID number can be used to reference the window library documentation and see the details of the glazing system. In the window ID number, the first three digits have significance:
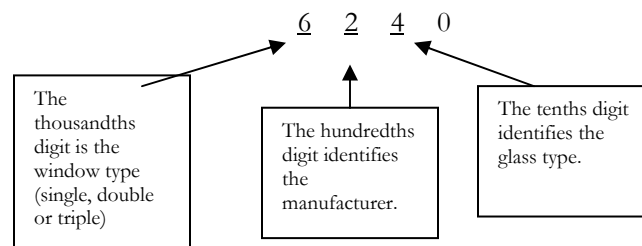
In this set of library entries all window ID's in the 5000 range are single glazed; those in the 6000 range are double glazed and those in the 7000 range are triple glazed. Within each of these window types, glass manufacturer have been assigned a range of ID's. Window ID numbers between 5000 and 5100, and 6000 and 6100 represent generic glazing. Clr/Tint glazings are those glass types that are produced by multiple manufacturers and have nearly the same performance, such as clear, bronze, grey and green. The range of ID's for AFG are in the 100's, so 5100 to 5199 and 6100 to 6199 are AFG products.

Because there are so many different types of glass, the library attempts to segregate the most common glass types. Windows with clear glass are assigned ID's between 0 and 10 within the window type and manufacturer categories. For example, a window ID of 6120 is a double-glazed window from AFG and has grey tinted glass. Coding by glass types falls apart with all the different kinds of coatings, so verify that you have selected the appropriate window. The table below shows the corresponding ID's for each manufacturer.

Guide to Glass Manufacturer Window Library ID's					
Window		**Manufacturer**		**Glass Type**	
ID	**Type**	**ID**	**Name**	**ID**	**Type**
5000	Single	<100	Clr/Tint	<10	Clear
6000	Double	100	AFG	10	Bronze
7000	Triple	200	Visteon	20	Grey
		300	Cardinal	30	Green
		400	Guardian	40	Blue
		500	PPG	45	Bluegreen
		600	Viracon	>50	Low-E on Clear
		700	Interpane (not included)		
		800	Pilkington		

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name
Single Clr/Tint												
5000	Clr 3	5.88	1.04	0.99	0.86	0.83	0.08	0.90	0.08	102	3.0	Generic Clear Glass
5001	Clr 6	5.78	1.02	0.94	0.82	0.77	0.07	0.88	0.08	103	5.7	Generic Clear Glass
5002	Optiwhite 3	5.88	1.04	1.04	0.91	0.90	0.08	0.91	0.09	9811	2.9	Optiwhite
5003	Optiwhite 6	5.78	1.02	1.03	0.90	0.89	0.08	0.91	0.08	9814	5.8	Optiwhite
5004	Lexan XL 3	5.63	0.99	0.96	0.83	0.80	0.09	0.86	0.09	3501	3.0	Lexan XL
5005	Lexan XL 6	5.17	0.91	0.93	0.81	0.77	0.08	0.81	0.08	3503	6.0	Lexan XL
5006	Plexiglas MC 3	5.63	0.99	1.00	0.87	0.85	0.07	0.92	0.07	2601	3.0	Plexiglas MC
5007	Plexiglas MC 6	5.16	0.91	0.99	0.86	0.83	0.07	0.92	0.07	2604	6.0	Plexiglas MC
5010	Brz 3	5.87	1.03	0.84	0.73	0.65	0.06	0.68	0.07	100	3.1	Generic Bronze Glass
5011	Brz 6	5.78	1.02	0.71	0.62	0.49	0.05	0.53	0.06	101	5.7	Generic Bronze Glass
5020	Gry 3	5.87	1.03	0.81	0.70	0.61	0.06	0.62	0.06	104	3.1	Generic Grey Glass
5021	Gry 6	5.79	1.02	0.69	0.60	0.45	0.05	0.47	0.05	1334	5.7	Versalux Grey
5030	Grn Float 3	5.88	1.04	0.80	0.70	0.60	0.06	0.83	0.08	3023	3.0	Green Float Glass
5031	Grn Float 6	5.79	1.02	0.68	0.59	0.44	0.06	0.76	0.07	3026	5.6	Green Float Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Wid	Pane #1 IGDB Glass Name
Single Visteon												
5212	Versalux Brz RC 6	5.79	1.02	0.47	0.41	0.28	0.28	0.21	0.35	1315	5.7	Versalux Bronze RC
5220	Versalux Gry 2000 6	5.79	1.02	0.38	0.33	0.07	0.04	0.08	0.04	1336	5.7	Versalux Grey 2000
5222	Versalux Gry RC 6	5.79	1.02	0.45	0.39	0.26	0.28	0.18	0.35	1338	5.7	Versalux Grey RC
5230	Versalux Grn 2000 3	5.87	1.03	0.70	0.61	0.48	0.05	0.76	0.07	1323	3.2	Versalux Green 2000
5231	Versalux Grn 2000 6	5.79	1.02	0.59	0.51	0.33	0.05	0.66	0.06	1326	5.7	Versalux Green 2000
5232	Versalux Grn RC 6	5.79	1.02	0.43	0.38	0.23	0.27	0.30	0.35	1330	5.7	Versalux Green RC
5233	Versalux Grn 2000 R 6	5.78	1.02	0.37	0.32	0.15	0.27	0.25	0.35	1328	5.9	Versalux Green 2000 R
5240	Versalux Blu 6	5.78	1.02	0.70	0.61	0.47	0.05	0.57	0.06	1305	5.9	Versalux Blue
5241	Versalux Blu 2000 6	5.78	1.02	0.57	0.50	0.31	0.05	0.43	0.05	1302	5.9	Versalux Blue 2000
5242	Versalux Blu RC 6	5.78	1.02	0.46	0.40	0.27	0.28	0.22	0.35	1307	5.9	Versalux Blue RC
5243	Versalux Blu2 RC 6	5.78	1.02	0.37	0.32	0.16	0.27	0.16	0.35	1309	5.9	Versalux Blue RC
Single PPG												
5501	Starphire 6	5.79	1.02	1.03	0.90	0.89	0.08	0.91	0.08	5004	5.7	Starphire
5511	Solarcool SolarBrz 6	5.79	1.02	0.45	0.40	0.27	0.30	0.21	0.36	5108	5.7	Solarcool Solarbronze
5521	Solargray 6	5.79	1.02	0.66	0.57	0.42	0.05	0.44	0.06	5052	5.7	Solargray
5522	Graylite 6	5.79	1.02	0.53	0.46	0.26	0.05	0.14	0.05	5057	5.7	Graylite
5523	Solarcool Solargray 6	5.79	1.02	0.42	0.36	0.23	0.30	0.17	0.36	5120	5.7	Solarcool Solargray
5524	Optigray 23 6	5.79	1.02	0.48	0.42	0.19	0.05	0.23	0.05	5294	5.7	Optigray 23
5531	SolarGrn 6	5.79	1.02	0.60	0.52	0.34	0.05	0.67	0.07	5028	5.7	Solargreen
5541	Azurlite 6	5.79	1.02	0.58	0.51	0.32	0.05	0.68	0.07	5036	5.7	Azurlite
5542	Caribia 6	5.79	1.02	0.58	0.51	0.32	0.05	0.68	0.07	5326	5.7	Caribia
5543	Solarcool Azurlite 6	5.79	1.02	0.35	0.30	0.14	0.30	0.26	0.36	5095	5.7	Solarcool Azurlite
5544	Solarcool Caribia 6	5.79	1.02	0.35	0.30	0.14	0.30	0.26	0.36	5336	5.7	Solarcool Caribia

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Wid	Pane #1 IGDB Glass Name
Single Pilkington												
5820	SuperGry 3	5.87	1.03	0.51	0.44	0.23	0.04	0.25	0.05	9891	3.2	SuperGrey
5821	SuperGry 6	5.79	1.02	0.39	0.34	0.08	0.04	0.09	0.04	9894	5.7	SuperGrey
5830	EverGrn 3	5.87	1.03	0.71	0.62	0.49	0.06	0.77	0.07	9881	3.2	EverGreen
5831	EverGrn 6	5.78	1.02	0.59	0.51	0.33	0.05	0.66	0.06	9889	5.9	EverGreen
5840	Arctic Blu 6	5.78	1.02	0.59	0.51	0.33	0.05	0.53	0.06	9989	5.9	Arctic Blue
5845	Optifloat Blu-Grn 6	5.78	1.02	0.71	0.62	0.48	0.06	0.75	0.07	9879	5.9	Optifloat Blue-Green
5850	Eclipse AdvClr 6	3.66	0.65	0.71	0.62	0.58	0.19	0.67	0.25	9909	5.9	Eclipse AdvantageClear
5851	Eclipse AdvBrz 6	3.66	0.65	0.51	0.45	0.35	0.10	0.38	0.11	9908	5.9	Eclipse AdvantageBronze
5852	Eclipse AdvGry 6	3.66	0.65	0.46	0.40	0.29	0.09	0.32	0.10	9911	5.9	Eclipse AdvantageGrey
5853	Eclipse Adv EverGrn 6	3.66	0.65	0.41	0.36	0.23	0.08	0.48	0.16	9910	5.9	Eclipse AdvantageEverGreen
5854	Eclipse Adv Arctic Blu 6	3.66	0.65	0.41	0.36	0.23	0.08	0.39	0.12	9906	5.9	Eclipse Advantagerctic Blue
5855	Eclipse Adv Blu-Grn 6	3.66	0.65	0.51	0.45	0.35	0.11	0.56	0.19	9907	5.9	Eclipse AdvantageBlue-Green
5860	Energy Adv LowE 3	3.51	0.62	0.83	0.72	0.69	0.11	0.82	0.11	9921	3.0	Energy AdvantageLow-E
5861	Energy Adv LowE 6	3.48	0.61	0.80	0.70	0.66	0.10	0.82	0.10	9924	5.6	Energy AdvantageLow-E
5870	Solar E 3	3.49	0.62	0.63	0.55	0.48	0.08	0.60	0.08	9931	3.0	Solar E
5871	Solar E 6	3.49	0.62	0.61	0.53	0.46	0.07	0.61	0.07	9935	5.7	Solar E
5880	Activ Clr 3	5.88	1.04	0.95	0.82	0.80	0.12	0.84	0.15	9937	3.0	Activon Clear
5881	Activ Clr 6	5.79	1.02	0.90	0.78	0.75	0.12	0.83	0.15	9941	5.6	Activon Clear

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Wid	Pane #2 Id	Wid	Pane #2 IGDB Glass Name
Double Clr/Tint New																	
6000	Clr/Air1/Clr 3	3.12	0.55	0.87	0.76	0.70	0.13	0.81	0.15	102	3.0	Generic Clear Glass	Air	6.3	102	3.0	Generic Clear Glass
6001	Clr/Air1/Clr 6	3.07	0.54	0.80	0.70	0.61	0.11	0.79	0.14	103	5.7	Generic Clear Glass	Air	6.3	103	5.7	Generic Clear Glass
6002	Clr/Air/Clr 3	2.73	0.48	0.88	0.76	0.70	0.13	0.81	0.15	102	3.0	Generic Clear Glass	Air	12.7	102	3.0	Generic Clear Glass
6003	Clr/Air/Clr 6	2.68	0.47	0.81	0.70	0.61	0.11	0.79	0.14	103	5.7	Generic Clear Glass	Air	12.7	103	5.7	Generic Clear Glass
6010	Brz /Air1/Clr 3	3.12	0.55	0.72	0.63	0.55	0.09	0.61	0.10	100	3.1	Generic Bronze Glass	Air	6.3	102	3.0	Generic Clear Glass
6011	Brz /Air1/Clr 6	3.09	0.54	0.59	0.52	0.41	0.07	0.48	0.08	101	5.7	Generic Bronze Glass	Air	6.3	102	3.0	Generic Clear Glass
6012	Brz /Air/Clr 3	2.72	0.48	0.72	0.62	0.55	0.09	0.61	0.10	100	3.1	Generic Bronze Glass	Air	12.7	102	3.0	Generic Clear Glass
6013	Brz /Air/Clr 6	2.71	0.48	0.59	0.51	0.41	0.07	0.48	0.08	101	5.7	Generic Bronze Glass	Air	12.7	103	5.7	Generic Clear Glass
6020	Gry /Air1/Clr 3	3.12	0.55	0.69	0.60	0.51	0.09	0.56	0.09	104	3.1	Generic Grey Glass	Air	6.3	102	3.0	Generic Clear Glass
6021	Versalux Gry/Air1/Clr 6	3.07	0.54	0.55	0.48	0.36	0.07	0.41	0.07	1334	5.7	Versalux Grey	Air	6.3	103	5.7	Generic Clear Glass
6022	Gry /Air/Clr 3	2.72	0.48	0.69	0.60	0.51	0.09	0.56	0.09	104	3.1	Generic Grey Glass	Air	12.7	102	3.0	Generic Clear Glass
6023	Versalux Gry/Air/Clr 6	2.69	0.47	0.55	0.48	0.36	0.07	0.41	0.07	1334	5.7	Versalux Grey	Air	12.7	103	5.7	Generic Clear Glass
6030	Grn Float /Air1/Clr 3	3.12	0.55	0.69	0.60	0.51	0.09	0.75	0.13	3023	3.0	Green Float Glass	Air	6.3	102	3.0	Generic Clear Glass
6031	Grn Float /Air1/Clr 6	3.07	0.54	0.55	0.48	0.37	0.07	0.67	0.12	3026	5.6	Green Float Glass	Air	6.3	103	5.7	Generic Clear Glass
6032	Grn Float /Air/Clr 3	2.73	0.48	0.68	0.59	0.51	0.09	0.75	0.13	3023	3.0	Green Float Glass	Air	12.7	102	3.0	Generic Clear Glass
6033	Grn Float /Air/Clr 6	2.69	0.47	0.55	0.47	0.37	0.07	0.67	0.12	3026	5.6	Green Float Glass	Air	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Wid	Pane #2 Id	Wid	Pane #2 IGDB Glass Name
Double AFG																	
6170	Comfort E Clr/Air1/Clr 3	2.54	0.45	0.75	0.65	0.59	0.14	0.75	0.15	907	3.1	Comfort E on Clear	Air	6.3	102	3.0	Generic Clear Glass
6171	Comfort E Clr/Air1/Clr 6	2.5	0.44	0.71	0.62	0.52	0.13	0.73	0.14	910	5.6	Comfort E on Clear	Air	6.3	103	5.7	Generic Clear Glass
6172	Comfort E Clr/Air/Clr 3	1.98	0.35	0.75	0.65	0.59	0.14	0.75	0.15	907	3.1	Comfort E on Clear	Air	12.7	102	3.0	Generic Clear Glass
6173	Comfort E Clr/Air/Clr 6	1.95	0.34	0.71	0.62	0.52	0.13	0.73	0.14	910	5.6	Comfort E on Clear	Air	12.7	103	5.7	Generic Clear Glass
6174	Comfort E Clr/Arg/Clr 3	1.76	0.31	0.75	0.65	0.59	0.14	0.75	0.15	907	3.1	Comfort E on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6175	Comfort E Clr/Arg/Clr 6	1.73	0.30	0.71	0.62	0.52	0.13	0.73	0.14	910	5.6	Comfort E on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6176	Comfort Ti-AC LowE/Air1/Clr 3	2.31	0.41	0.46	0.40	0.36	0.41	0.61	0.29	917	3.1	Comfort Ti-AC LowE on Clear	Air	6.3	102	3.0	Generic Clear Glass
6177	Comfort Ti-AC LowE/Air1/Clr 6	2.28	0.40	0.44	0.38	0.32	0.36	0.59	0.29	919	5.6	Comfort Ti-AC LowE on Clear	Air	6.3	103	5.7	Generic Clear Glass
6178	Comfort Ti-AC LowE/Air/Clr 3	1.67	0.29	0.46	0.40	0.36	0.41	0.61	0.29	917	3.1	Comfort Ti-AC LowE on Clear	Air	12.7	102	3.0	Generic Clear Glass
6179	Comfort Ti-AC LowE/Air/Clr 6	1.65	0.29	0.43	0.38	0.32	0.36	0.59	0.29	919	5.6	Comfort Ti-AC LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6180	Comfort Ti-AC LowE/Arg/Clr 3	1.41	0.25	0.46	0.40	0.36	0.41	0.61	0.29	917	3.1	Comfort Ti-AC LowE on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6181	Comfort Ti-AC LowE/Arg/Clr 6	1.39	0.25	0.43	0.37	0.32	0.36	0.59	0.29	919	5.6	Comfort Ti-AC LowE on Clear	Arg	12.7	103	5.7	Generic Clear Glass

| | | | | | | | | | Pane #1 | | Pane #1 IGDB | Gap #1 | | Pane #2 | | Pane #2 IGDB |
G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Id	Wid	Glass Name	Gas	Wid	Id	Wid	Glass Name
Double AFG (cont.)																	
6182	Comfort Ti-PS LowE/Air1/Clr 3	2.34	0.41	0.64	0.56	0.50	0.25	0.77	0.12	921	3.1	Comfort Ti - PS LowE on Clear	Air	6.3	102	3.0	Generic Clear Glass
6183	Comfort Ti-PS LowE/Air1/Clr 6	2.32	0.41	0.61	0.53	0.45	0.21	0.75	0.12	923	5.7	Comfort Ti - PS LowE on Clear	Air	6.3	103	5.7	Generic Clear Glass
6184	Comfort Ti-PS LowE/Air/Clr 3	1.72	0.30	0.63	0.55	0.50	0.25	0.77	0.12	921	3.1	Comfort Ti - PS LowE on Clear	Air	12.7	102	3.0	Generic Clear Glass
6185	Comfort Ti-PS LowE/Air/Clr 6	1.71	0.30	0.61	0.53	0.45	0.21	0.75	0.12	923	5.7	Comfort Ti - PS LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6186	Comfort Ti-PS LowE/Arg/Clr 3	1.46	0.26	0.63	0.55	0.50	0.25	0.77	0.12	921	3.1	Comfort Ti - PS LowE on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6187	Comfort Ti -PS LowE/Arg/Clr 6	1.45	0.26	0.60	0.53	0.45	0.21	0.75	0.12	923	5.7	Comfort Ti - PS LowE on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6188	Comfort Ti-R LowE/Air1/Clr 3	2.3	0.41	0.55	0.48	0.43	0.36	0.71	0.21	925	3.2	Comfort Ti-R LowE on Clear	Air	6.3	102	3.0	Generic Clear Glass
6189	Comfort Ti-R LowE/Air1/Clr 6	2.28	0.40	0.50	0.44	0.37	0.30	0.66	0.21	927	5.6	Comfort Ti-R LowE on Clear	Air	6.3	103	5.7	Generic Clear Glass
6190	Comfort Ti-R LowE/Air/Clr 3	1.67	0.29	0.54	0.47	0.43	0.36	0.71	0.21	925	3.2	Comfort Ti-R LowE on Clear	Air	12.7	102	3.0	Generic Clear Glass
6191	Comfort Ti-R LowE/Air/Clr 6	1.65	0.29	0.50	0.43	0.37	0.30	0.66	0.21	927	5.6	Comfort Ti-R LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6192	Comfort Ti-R LowE/Arg/Clr 3	1.4	0.25	0.54	0.47	0.43	0.36	0.71	0.21	925	3.2	Comfort Ti-R LowE on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6193	Comfort Ti-R LowE/Arg/Clr 6	1.39	0.25	0.49	0.43	0.37	0.30	0.66	0.21	927	5.6	Comfort Ti-R LowE on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6194	Radiance3.AFG/Air1/Clr 3	2.89	0.51	0.78	0.68	0.62	0.18	0.69	0.26	970	3.1	Radiance3.AFG	Air	6.3	102	3.0	Generic Clear Glass
6195	Radiance3.AFG/Air/Clr 3	2.43	0.43	0.78	0.68	0.62	0.18	0.69	0.26	970	3.1	Radiance3.AFG	Air	12.7	102	3.0	Generic Clear Glass
6196	Radiance3.AFG/Arg/Clr 3	2.26	0.40	0.78	0.68	0.62	0.18	0.69	0.26	970	3.1	Radiance3.AFG	Arg	12.7	102	3.0	Generic Clear Glass

| | | | | | | | | | | Pane #1 | | Pane #1 IGDB | Gap #1 | | Pane #2 | | Pane #2 IGDB |
G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Id	Wid	Glass Name	Gas	Wid	Id	Wid	Glass Name
Double Visteon																	
6212	Versalux Brz RC/Air/Clr 6	2.69	0.47	0.36	0.31	0.21	0.28	0.19	0.35	1315	5.7	Versalux Bronze RC	Air	12.7	103	5.7	Generic Clear Glass
6220	Versalux Gry 2000/Air/Clr 6	2.69	0.47	0.23	0.20	0.05	0.04	0.07	0.04	1336	5.7	Versalux Grey 2000	Air	12.7	103	5.7	Generic Clear Glass
6221	Versalux Gry RC/Air/Clr 6	2.69	0.47	0.34	0.30	0.20	0.28	0.16	0.35	1338	5.7	Versalux Grey RC	Air	12.7	103	5.7	Generic Clear Glass
6230	Versalux Grn 2000/Air1/Clr 3	2.72	0.48	0.58	0.51	0.41	0.08	0.69	0.12	1323	3.2	Versalux Green 2000	Air	12.7	102	3.0	Generic Clear Glass
6231	Versalux Grn 2000/Air1/Clr 6	2.69	0.47	0.45	0.40	0.28	0.06	0.59	0.10	1326	5.7	Versalux Green 2000	Air	12.7	103	5.7	Generic Clear Glass
6232	Versalux Grn RC/Air/Clr 6	2.69	0.47	0.33	0.28	0.19	0.28	0.27	0.36	1330	5.7	Versalux Green RC	Air	12.7	103	5.7	Generic Clear Glass
6233	Versalux Grn 2000 R/Air/Clr 6	2.68	0.47	0.26	0.23	0.12	0.28	0.23	0.35	1328	5.9	Versalux Green 2000 R	Air	12.7	103	5.7	Generic Clear Glass
6240	Versalux Blu/Air/Clr 6	2.68	0.47	0.56	0.49	0.37	0.07	0.51	0.08	1305	5.9	Versalux Blue	Air	12.7	103	5.7	Generic Clear Glass
6241	Versalux Blu 2000/Air/Clr 6	2.68	0.47	0.43	0.37	0.25	0.06	0.38	0.07	1302	5.9	Versalux Blue 2000	Air	12.7	103	5.7	Generic Clear Glass
6242	Versalux Blu RC/Air/Clr 6	2.68	0.47	0.35	0.31	0.21	0.28	0.19	0.35	1307	5.9	Versalux Blue RC	Air	12.7	103	5.7	Generic Clear Glass
6243	Versalux Blu2 RC/Air/Clr 6	2.68	0.47	0.26	0.23	0.12	0.28	0.15	0.35	1309	5.9	Versalux Blue RC	Air	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double Cardinal																	
6308	Brz /Air1/LoE 270 Clr 3	2.31	0.41	0.43	0.37	0.26	0.26	0.53	0.09	100	3.1	Generic Bronze Glass	Air	6.3	2026	3.0	LoE 270 on Clear
6309	Brz /Air1/LoE 270 Clr 6	2.28	0.40	0.36	0.32	0.19	0.16	0.41	0.07	101	5.7	Generic Bronze Glass	Air	6.3	2029	6.0	LoE 270 on Clear
6310	Brz /Air/LoE 270 Clr 3	1.67	0.29	0.42	0.37	0.26	0.26	0.53	0.09	100	3.1	Generic Bronze Glass	Air	12.7	2026	3.0	LoE 270 on Clear
6311	Brz /Air/LoE 270 Clr 6	1.65	0.29	0.35	0.30	0.19	0.16	0.41	0.07	101	5.7	Generic Bronze Glass	Air	12.7	2029	6.0	LoE 270 on Clear
6312	Gry /Air1/LoE 270 Clr 3	2.31	0.41	0.41	0.36	0.24	0.24	0.48	0.08	104	3.1	Generic Grey Glass	Air	6.3	2026	3.0	LoE 270 on Clear
6313	Versalux Gry/Air1/LoE 270 Clr 6	2.28	0.40	0.34	0.30	0.17	0.15	0.35	0.06	1334	5.7	Versalux Grey	Air	6.3	2029	6.0	LoE 270 on Clear
6314	Gry /Air/LoE 270 Clr 3	1.67	0.29	0.40	0.35	0.24	0.24	0.48	0.08	104	3.1	Generic Grey Glass	Air	12.7	2026	3.0	LoE 270 on Clear
6315	Versalux Gry/Air/LoE 270 Clr 6	1.65	0.29	0.33	0.28	0.17	0.15	0.35	0.06	1334	5.7	Versalux Grey	Air	12.7	2029	6.0	LoE 270 on Clear
6316	Grn Float /Air1/LoE 270 Clr 3	2.31	0.41	0.46	0.40	0.28	0.18	0.64	0.11	3023	3.0	Green Float Glass	Air	6.3	2026	3.0	LoE 270 on Clear
6317	Grn Float /Air1/LoE 270 Clr 6	2.28	0.40	0.41	0.36	0.23	0.10	0.58	0.10	3026	5.6	Green Float Glass	Air	6.3	2029	6.0	LoE 270 on Clear
6318	Grn Float /Air/LoE 270 Clr 3	1.67	0.29	0.45	0.39	0.28	0.18	0.64	0.11	3023	3.0	Green Float Glass	Air	12.7	2026	3.0	LoE 270 on Clear
6319	Grn Float /Air/LoE 270 Clr 6	1.65	0.29	0.39	0.34	0.23	0.10	0.58	0.10	3026	5.6	Green Float Glass	Air	12.7	2029	6.0	LoE 270 on Clear
6360	LoE 178 Clr/Air1/Clr 3	2.38	0.42	0.67	0.59	0.53	0.24	0.78	0.12	2006	3.0	LoE 178 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6361	LoE 178 Clr/Air1/Clr 6	2.35	0.41	0.63	0.55	0.47	0.20	0.76	0.11	2009	5.7	LoE 178 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6362	LoE 178 Clr/Air/Clr 3	1.77	0.31	0.67	0.58	0.53	0.24	0.78	0.12	2006	3.0	LoE 178 on Clear	Air	12.7	102	3.0	Generic Clear Glass
6363	LoE 178 Clr/Air/Clr 6	1.75	0.31	0.63	0.55	0.47	0.20	0.76	0.11	2009	5.7	LoE 178 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6364	LoE 178 Clr/Arg/Clr 3	1.51	0.27	0.67	0.58	0.53	0.24	0.78	0.12	2006	3.0	LoE 178 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6365	LoE 178 Clr/Arg/Clr 6	1.5	0.26	0.63	0.55	0.47	0.20	0.76	0.11	2009	5.7	LoE 178 on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6366	LoE-272 Clr/Air1/Clr 3	2.32	0.41	0.49	0.42	0.38	0.35	0.72	0.11	2011	3.0	LoE-272 on 3 mm Clear	Air	6.3	102	3.0	Generic Clear Glass
6367	LoE-272 Clr/Air1/Clr 6	2.29	0.40	0.47	0.41	0.34	0.29	0.69	0.11	2014	5.7	LoE-272 on 6 mm Clear	Air	6.3	103	5.7	Generic Clear Glass
6368	LoE-272 Clr/Air/Clr 3	1.68	0.30	0.48	0.42	0.38	0.35	0.72	0.11	2011	3.0	LoE-272 on 3 mm Clear	Air	12.7	102	3.0	Generic Clear Glass
6369	LoE-272 Clr/Air/Clr 6	1.67	0.29	0.46	0.40	0.34	0.29	0.69	0.11	2014	5.7	LoE-272 on 6 mm Clear	Air	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double Cardinal (cont.)																	
6370	LoE-272 Clr/Arg/Clr 3	1.42	0.25	0.47	0.41	0.38	0.35	0.72	0.11	2011	3.0	LoE-272 on 3 mm Clear	Arg	12.7	102	3.0	Generic Clear Glass
6371	LoE-272 Clr/Arg/Clr 6	1.41	0.25	0.46	0.40	0.34	0.29	0.69	0.11	2014	5.7	LoE-272 on 6 mm Clear	Arg	12.7	103	5.7	Generic Clear Glass
6375	LoE 270 Clr/Air1/Clr 3	2.31	0.41	0.43	0.38	0.34	0.39	0.70	0.12	2026	3.0	LoE 270 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6376	LoE 270 Clr/Air1/Clr 6	2.28	0.40	0.43	0.37	0.31	0.32	0.67	0.12	2029	6.0	LoE 270 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6377	LoE 270 Clr/Air/Clr 3	1.68	0.30	0.48	0.42	0.38	0.35	0.72	0.11	2011	3.0	LoE-272 on 3 mm Clear	Air	12.7	102	3.0	Generic Clear Glass
6378	LoE 270 Clr/Air/Clr 6	1.65	0.29	0.41	0.36	0.31	0.32	0.67	0.12	2029	6.0	LoE 270 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6379	LoE 270 Clr/Arg/Clr 3	1.41	0.25	0.42	0.37	0.34	0.39	0.70	0.12	2026	3.0	LoE 270 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6380	LoE 270 Clr/Arg/Clr 6	1.39	0.25	0.41	0.36	0.31	0.32	0.67	0.12	2029	6.0	LoE 270 on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6381	LoE 240 Clr/Air1/Clr 3	2.34	0.41	0.32	0.27	0.21	0.31	0.40	0.14	2044	3.0	LoE 240 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6382	LoE 240 Clr/Air1/Clr 6	2.31	0.41	0.30	0.27	0.19	0.27	0.37	0.13	2047	5.7	LoE 240 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6383	LoE 240 Clr/Air/Clr 3	1.71	0.30	0.30	0.26	0.21	0.31	0.40	0.14	2044	3.0	LoE 240 on Clear	Air	12.7	102	3.0	Generic Clear Glass
6384	LoE 240 Clr/Air/Clr 6	1.69	0.30	0.28	0.25	0.19	0.27	0.37	0.13	2047	5.7	LoE 240 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6385	LoE 240 Clr/Arg/Clr 3	1.45	0.26	0.29	0.25	0.21	0.31	0.40	0.14	2044	3.0	LoE 240 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6386	LoE 240 Clr/Arg/Clr 6	1.44	0.25	0.28	0.24	0.19	0.27	0.37	0.13	2047	5.7	LoE 240 on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6390	LoE2-138 Clr/Air1/Clr 3	2.33	0.41	0.30	0.26	0.20	0.31	0.38	0.13	2092	3.0	LoE2-138 on 3 mm clear	Air	6.3	102	3.0	Generic Clear Glass
6391	LoE2-138 Clr/Air1/Clr 6	2.3	0.41	0.30	0.26	0.18	0.26	0.37	0.12	2095	5.7	LoE2-138 on 6 mm clear	Air	6.3	103	5.7	Generic Clear Glass
6392	LoE2-138 Clr/Air/Clr 3	1.7	0.30	0.28	0.24	0.20	0.31	0.38	0.13	2092	3.0	LoE2-138 on 3 mm clear	Air	12.7	102	3.0	Generic Clear Glass
6393	LoE2-138 Clr/Air/Clr 6	1.68	0.30	0.28	0.24	0.18	0.26	0.37	0.12	2095	5.7	LoE2-138 on 6 mm clear	Air	12.7	103	5.7	Generic Clear Glass
6394	LoE2-138 Clr/Arg/Clr 3	1.44	0.25	0.27	0.24	0.20	0.31	0.38	0.13	2092	3.0	LoE2-138 on 3 mm clear	Arg	12.7	102	3.0	Generic Clear Glass
6395	LoE2-138 Clr/Arg/Clr 6	1.42	0.25	0.27	0.23	0.18	0.26	0.37	0.12	2095	5.7	LoE2-138 on 6 mm clear	Arg	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1		Pane #1 IGDB Glass Name	Gap #1		Pane #2		Pane #2 IGDB Glass Name
										Id	Wid		Gas	Wid	Id	Wid	
Double Guardian																	
6450	Sun-Guard SN-68 Clr/Air/Clr 6	1.66	0.29	0.43	0.37	0.32	0.30	0.67	0.10	3110	5.6	Sun-Guard SN-68 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6451	Sun-Guard LE63 Clr/Air/Clr 6	1.97	0.35	0.58	0.51	0.42	0.14	0.62	0.13	3122	5.6	Sun-Guard LE63 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6452	Sun-Guard LE63/Air/Clr 6	1.97	0.35	0.39	0.34	0.25	0.08	0.52	0.11	3123	5.6	Sun-Guard LE63 on Green	Air	12.7	103	5.7	Generic Clear Glass
6453	Sun-Guard NP-61 Clr/Air/Clr 6	1.74	0.31	0.46	0.40	0.34	0.29	0.60	0.21	3124	5.6	Sun-Guard NP-61 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6454	Sun-Guard LE-50 Clr/Air/Clr 6	1.9	0.33	0.45	0.39	0.31	0.19	0.50	0.15	3128	5.6	Sun-Guard LE-50 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6455	Sun-Guard LE-50/Air/Clr 6	1.9	0.33	0.33	0.29	0.20	0.09	0.42	0.12	3129	5.6	Sun-Guard LE-50 on Green	Air	12.7	103	5.7	Generic Clear Glass
6456	Sun-Guard AG-43 Clr/Air/Clr 6	1.72	0.30	0.34	0.30	0.24	0.35	0.43	0.31	3130	5.6	Sun-Guard AG-43 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6457	Sun-Guard AG-43/Air/Clr 6	1.72	0.30	0.27	0.23	0.16	0.15	0.37	0.24	3131	5.6	Sun-Guard AG-43 on Green	Air	12.7	103	5.7	Generic Clear Glass
6458	Sun-Guard LE-40 Clr/Air/Clr 6	1.88	0.33	0.36	0.32	0.24	0.22	0.40	0.18	3132	5.6	Sun-Guard LE-40 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6459	Sun-Guard LE-40/Air/Clr 6	1.88	0.33	0.28	0.24	0.16	0.10	0.34	0.15	3133	5.6	Sun-Guard LE-40 on Green	Air	12.7	103	5.7	Generic Clear Glass
6460	Sun-Guard Silver-32/Air/Clr 6	2.4	0.42	0.34	0.30	0.19	0.18	0.28	0.22	3136	5.6	Sun-Guard Silver-32 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6461	Sun-Guard Silver-20/Air/Clr 6	2.26	0.40	0.24	0.21	0.12	0.28	0.18	0.32	3138	5.6	Sun-Guard Silver-20 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6470	Perf Plus II Clr/Air1/Clr 3	2.32	0.41	0.48	0.42	0.37	0.39	0.69	0.19	3213	3.0	Performance Plus II on Clear	Air	6.3	102	3.0	Generic Clear Glass
6471	Perf Plus II Clr/Air1/Clr 6	2.29	0.40	0.46	0.40	0.34	0.33	0.67	0.18	3216	5.6	Performance Plus II on Clear	Air	6.3	103	5.7	Generic Clear Glass
6472	Perf Plus II Clr/Air/Clr 3	1.69	0.30	0.47	0.41	0.37	0.39	0.69	0.19	3213	3.0	Performance Plus II on Clear	Air	12.7	102	3.0	Generic Clear Glass
6473	Perf Plus II Clr/Air/Clr 6	1.67	0.29	0.45	0.40	0.34	0.33	0.67	0.18	3216	5.6	Performance Plus II on Clear	Air	12.7	103	5.7	Generic Clear Glass
6474	Perf Plus II Clr/Arg/Clr 3	1.42	0.25	0.47	0.41	0.37	0.39	0.69	0.19	3213	3.0	Performance Plus II on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6475	Perf Plus II Clr/Arg/Clr 6	1.41	0.25	0.45	0.39	0.34	0.33	0.67	0.18	3216	5.6	Performance Plus II on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6480	Perf Plus II Grn/Air1/Clr 3	2.32	0.41	0.42	0.36	0.29	0.19	0.63	0.16	3223	3.0	Performance Plus II Green	Air	6.3	102	3.0	Generic Clear Glass
6481	Perf Plus II Grn/Air1/Clr 6	2.29	0.40	0.37	0.32	0.23	0.12	0.56	0.14	3226	5.6	Performance Plus II Green	Air	6.3	103	5.7	Generic Clear Glass
6482	Perf Plus II Grn/Air/Clr 3	1.69	0.30	0.40	0.35	0.29	0.19	0.63	0.16	3223	3.0	Performance Plus II Green	Air	12.7	102	3.0	Generic Clear Glass
6483	Perf Plus II Grn/Air/Clr 6	1.67	0.29	0.34	0.30	0.23	0.12	0.56	0.14	3226	5.6	Performance Plus II Green	Air	12.7	103	5.7	Generic Clear Glass
6484	Perf Plus II Grn/Arg/Clr 3	1.42	0.25	0.39	0.34	0.29	0.19	0.63	0.16	3223	3.0	Performance Plus II Green	Arg	12.7	102	3.0	Generic Clear Glass
6485	Perf Plus II Grn/Arg/Clr 6	1.41	0.25	0.33	0.29	0.23	0.12	0.56	0.14	3226	5.6	Performance Plus II Green	Arg	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double PPG																	
6501	Starphire/Air/Clr 6	2.69	0.47	0.90	0.78	0.69	0.14	0.81	0.15	5004	5.7	Starphire	Air	12.7	103	5.7	Generic Clear Glass
6502	SB 60 on Starphire/Air/Clr 6	1.65	0.29	0.45	0.40	0.35	0.43	0.72	0.11	5349	5.7	Solarban 60 on Starphire	Air	12.7	103	5.7	Generic Clear Glass
6503	SB 70XL on Starphire/Air/Clr 6	1.64	0.29	0.32	0.28	0.24	0.51	0.64	0.11	5000	5.7	Solarban 70XL on Starphire	Air	12.7	103	5.7	Generic Clear Glass
6511	Solarcool SolarBrz/Air/Clr 6	2.69	0.47	0.35	0.30	0.21	0.31	0.18	0.37	5108	5.7	Solarcool Solarbronze	Air	12.7	103	5.7	Generic Clear Glass
6521	Solargray/Air/Clr 6	2.69	0.47	0.52	0.45	0.33	0.07	0.40	0.07	5052	5.7	Solargray	Air	12.7	103	5.7	Generic Clear Glass
6522	Graylite/Air/Clr 6	2.69	0.47	0.39	0.34	0.19	0.05	0.12	0.05	5057	5.7	Graylite	Air	12.7	103	5.7	Generic Clear Glass
6523	Solarcool Solargray/Air/Clr 6	2.69	0.47	0.31	0.27	0.17	0.30	0.15	0.37	5120	5.7	Solarcool Solargray	Air	12.7	103	5.7	Generic Clear Glass
6524	Optigray/Air/Clr 6	2.69	0.47	0.34	0.29	0.15	0.05	0.21	0.05	5294	5.7	Optigray 23	Air	12.7	103	5.7	Generic Clear Glass
6525	SB 60 on Solargray/Air/Clr 3	1.66	0.29	0.34	0.30	0.23	0.20	0.48	0.08	5286	3.3	Solarban 60 on Solargray	Air	12.7	103	5.7	Generic Clear Glass
6531	SolarGrn/Air/Clr 6	2.69	0.47	0.46	0.40	0.29	0.06	0.60	0.11	5028	5.7	Solargreen	Air	12.7	103	5.7	Generic Clear Glass
6541	Azurlite/Air/Clr 6	2.69	0.47	0.41	0.36	0.19	0.06	0.48	0.10	5036	5.7	Azurlite	Air	12.7	5036	5.7	Azurlite
6542	Caribia/Air/Clr 6	2.69	0.47	0.41	0.36	0.18	0.06	0.47	0.10	5326	5.7	Caribia	Air	12.7	5036	5.7	Azurlite
6544	Solarcool Caribia/Air/Clr 6	2.69	0.47	0.25	0.21	0.12	0.30	0.23	0.37	5336	5.7	Solarcool Caribia	Air	12.7	103	5.7	Generic Clear Glass
6560	Sungate 100 Clr/Air1/Clr 3	3.09	0.54	0.64	0.55	0.49	0.29	0.75	0.10	5142	3.3	Sungate 100 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6561	Sungate 100 Clr/Air1/Clr 6	3.04	0.54	0.60	0.52	0.44	0.29	0.73	0.10	5148	5.7	Sungate 100 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6562	Sungate 100 Clr/Air/Clr 3	2.7	0.48	0.63	0.55	0.49	0.29	0.75	0.10	5142	3.3	Sungate 100 on Clear	Air	12.7	102	3.0	Generic Clear Glass
6563	Sungate 100 Clr/Air/Clr 6	2.67	0.47	0.60	0.52	0.44	0.29	0.73	0.10	5148	5.7	Sungate 100 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6564	Sungate 100 Clr/Arg/Clr 3	2.56	0.45	0.63	0.55	0.49	0.29	0.75	0.10	5142	3.3	Sungate 100 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6565	Sungate 100 Clr/Arg/Clr 6	2.53	0.45	0.60	0.52	0.44	0.29	0.73	0.10	5148	5.7	Sungate 100 on Clear	Arg	12.7	103	5.7	Generic Clear Glass

Double PPG (cont.)

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
6570	Sungate 500 Clr/Air1/Clr 3	2.55	0.45	0.76	0.66	0.60	0.15	0.76	0.17	5242	3.3	Sungate 500 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6571	Sungate 500 Clr/Air1/Clr 6	2.52	0.44	0.71	0.62	0.52	0.13	0.73	0.16	5248	5.7	Sungate 500 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6572	Sungate 500 Clr/Air/Clr 3	1.99	0.35	0.76	0.66	0.60	0.15	0.76	0.17	5242	3.3	Sungate 500 on Clear	Air	12.7	102	3.0	Generic Clear Glass
6573	Sungate 500 Clr/Air/Clr 6	1.97	0.35	0.71	0.62	0.52	0.13	0.73	0.16	5248	5.7	Sungate 500 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6574	Sungate 500 Clr/Arg/Clr 3	1.77	0.31	0.76	0.66	0.60	0.15	0.76	0.17	5242	3.3	Sungate 500 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6575	Sungate 500 Clr/Arg/Clr 6	1.76	0.31	0.71	0.62	0.52	0.13	0.73	0.16	5248	5.7	Sungate 500 on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6576	Clr/Air/Sungate 500 Clr 3	1.99	0.35	0.81	0.71	0.60	0.17	0.76	0.18	102	3.0	Generic Clear Glass	Air	12.7	5242	3.3	Sungate 500 on Clear
6577	Clr/Air/Sungate 500 Clr 6	1.97	0.35	0.75	0.66	0.52	0.15	0.73	0.17	103	5.7	Generic Clear Glass	Air	12.7	5248	5.7	Sungate 500 on Clear
6578	Clr/Arg/Sungate 500 Clr 3	1.77	0.31	0.82	0.71	0.60	0.17	0.76	0.18	102	3.0	Generic Clear Glass	Arg	12.7	5242	3.3	Sungate 500 on Clear
6579	Clr/Arg/Sungate 500 Clr 6	1.76	0.31	0.76	0.66	0.52	0.15	0.73	0.17	103	5.7	Generic Clear Glass	Arg	12.7	5248	5.7	Sungate 500 on Clear
6580	Solarban 60 Clr/Air1/Clr 3	2.3	0.41	0.46	0.40	0.35	0.35	0.72	0.11	5281	3.3	Solarban 60 on Clear	Air	6.3	102	3.0	Generic Clear Glass
6581	Solarban 60 Clr/Air1/Clr 6	2.28	0.40	0.45	0.39	0.33	0.29	0.70	0.11	5284	5.7	Solarban 60 on Clear	Air	6.3	103	5.7	Generic Clear Glass
6582	Solarban 60 Clr/Air/Clr 3	1.67	0.29	0.45	0.39	0.35	0.35	0.72	0.11	5281	3.3	Solarban 60 on Clear	Air	12.7	102	3.0	Generic Clear Glass
6583	Solarban 60 Clr/Air/Clr 6	1.65	0.29	0.44	0.38	0.33	0.29	0.70	0.11	5284	5.7	Solarban 60 on Clear	Air	12.7	103	5.7	Generic Clear Glass
6584	Solarban 60 Clr/Arg/Clr 3	1.4	0.25	0.44	0.39	0.35	0.35	0.72	0.11	5281	3.3	Solarban 60 on Clear	Arg	12.7	102	3.0	Generic Clear Glass
6585	Solarban 60 Clr/Arg/Clr 6	1.39	0.25	0.43	0.38	0.33	0.29	0.70	0.11	5284	5.7	Solarban 60 on Clear	Arg	12.7	103	5.7	Generic Clear Glass
6590	Solarban 80 Clr/Air1/Clr 3	2.29	0.40	0.29	0.25	0.21	0.44	0.49	0.33	5313	3.3	SOLARBAN 80 on clear	Air	6.3	102	3.0	Generic Clear Glass
6591	Solarban 80 Clr/Air1/Clr 6	2.26	0.40	0.29	0.25	0.19	0.38	0.47	0.33	5316	5.7	SOLARBAN 80 on clear	Air	6.3	103	5.7	Generic Clear Glass
6592	Solarban 80 Clr/Air/Clr 3	1.65	0.29	0.28	0.24	0.21	0.44	0.49	0.33	5313	3.3	SOLARBAN 80 on clear	Air	12.7	102	3.0	Generic Clear Glass
6593	Solarban 80 Clr/Air/Clr 6	1.63	0.29	0.27	0.24	0.19	0.38	0.47	0.33	5316	5.7	SOLARBAN 80 on clear	Air	12.7	103	5.7	Generic Clear Glass
6594	Solarban 80 Clr/Arg/Clr 3	1.38	0.24	0.27	0.23	0.21	0.44	0.49	0.33	5313	3.3	SOLARBAN 80 on clear	Arg	12.7	102	3.0	Generic Clear Glass
6595	Solarban 80 Clr/Arg/Clr 6	1.37	0.24	0.27	0.23	0.19	0.38	0.47	0.33	5316	5.7	SOLARBAN 80 on clear	Arg	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double Viracon																	
6600	VE12M Clr/Air/Clr 6	1.66	0.29	0.43	0.38	0.33	0.31	0.70	0.11	6046	5.7	LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6601	VE140 Clr/Air/Clr 6	1.76	0.31	0.32	0.28	0.21	0.25	0.36	0.15	6047	5.7	LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6602	VE152/Air/Clr 6	1.78	0.31	0.46	0.40	0.32	0.20	0.50	0.16	6048	5.7	LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6603	VE155 Clr/Air/Clr 6	1.76	0.31	0.40	0.35	0.28	0.22	0.47	0.11	6049	5.7	LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6604	VE185 Clr/Air/Clr 6	1.75	0.31	0.62	0.54	0.47	0.21	0.76	0.12	6050	5.7	LowE on Clear	Air	12.7	103	5.7	Generic Clear Glass
6610	VE42M Brz/Air/Clr 6	1.66	0.29	0.30	0.27	0.20	0.15	0.41	0.07	6061	5.7	LowE on Bronze	Air	12.7	103	5.7	Generic Clear Glass
6611	VE440 Brz/Air/Clr 6	1.76	0.31	0.24	0.21	0.13	0.13	0.22	0.08	6062	5.7	LowE on Bronze	Air	12.7	103	5.7	Generic Clear Glass
6612	VE452 Brz/Air/Clr 6	1.78	0.31	0.32	0.28	0.20	0.11	0.30	0.08	6063	5.7	LowE on Bronze	Air	12.7	103	5.7	Generic Clear Glass
6613	VE455 Brz/Air/Clr 6	1.76	0.31	0.29	0.25	0.17	0.12	0.27	0.07	6064	5.7	LowE on Bronze	Air	12.7	103	5.7	Generic Clear Glass
6614	VE485 Brz/Air/Clr 6	1.75	0.31	0.43	0.37	0.28	0.11	0.45	0.07	6065	5.7	LowE on Bronze	Air	12.7	103	5.7	Generic Clear Glass
6620	VE32M Gry/Air/Clr 6	1.66	0.29	0.28	0.24	0.17	0.12	0.35	0.06	6056	5.7	LowE on Gray	Air	12.7	103	5.7	Generic Clear Glass
6621	VE340 Gry/Air/Clr 6	1.76	0.31	0.22	0.19	0.11	0.11	0.18	0.07	6057	5.7	LowE on Gray	Air	12.7	103	5.7	Generic Clear Glass
6622	VE352 Gry/Air/Clr 6	1.78	0.31	0.29	0.26	0.17	0.09	0.25	0.07	6058	5.7	LowE on Gray	Air	12.7	103	5.7	Generic Clear Glass
6623	VE355 Gry/Air/Clr 6	1.76	0.31	0.26	0.23	0.14	0.10	0.23	0.06	6059	5.7	LowE on Gray	Air	12.7	103	5.7	Generic Clear Glass
6624	VE385 Gry/Air/Clr 6	1.75	0.31	0.38	0.33	0.25	0.10	0.38	0.07	6060	5.7	LowE on Gray	Air	12.7	103	5.7	Generic Clear Glass
6630	VE22M Grn/Air/Clr 6	1.66	0.29	0.36	0.31	0.24	0.10	0.60	0.09	6051	5.7	LowE on Green	Air	12.7	103	5.7	Generic Clear Glass
6631	VE240 Grn/Air/Clr 6	1.76	0.31	0.26	0.22	0.14	0.10	0.32	0.12	6052	5.7	LowE on Green	Air	12.7	103	5.7	Generic Clear Glass
6632	VE252 Grn/Air/Clr 6	1.78	0.31	0.34	0.29	0.21	0.09	0.43	0.12	6053	5.7	LowE on Green	Air	12.7	103	5.7	Generic Clear Glass
6633	VE255 Grn/Air/Clr 6	1.76	0.31	0.30	0.26	0.18	0.09	0.40	0.10	6054	5.7	LowE on Green	Air	12.7	103	5.7	Generic Clear Glass
6634	VE285 Grn/Air/Clr 6	1.75	0.31	0.45	0.39	0.31	0.09	0.65	0.10	6055	5.7	LowE on Green	Air	12.7	103	5.7	Generic Clear Glass

| | | | | | | | | | Pane #1 | | Pane #1 IGDB | Gap #1 | | Pane #2 | | Pane #2 IGDB |
G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Id	Wid	Glass Name	Gas	Wid	Id	Wid	Glass Name
Double Pilkington																	
6820	SuperGry/Air1/Clr 3	3.12	0.55	0.38	0.33	0.19	0.05	0.23	0.05	9891	3.2	SuperGrey	Air	6.3	102	3.0	Generic Clear Glass
6821	SuperGry/Air1/Clr 6	3.07	0.54	0.26	0.22	0.06	0.04	0.08	0.04	9894	5.7	SuperGrey	Air	6.3	103	5.7	Generic Clear Glass
6822	SuperGry/Air/Clr 3	2.72	0.48	0.37	0.32	0.19	0.05	0.23	0.05	9891	3.2	SuperGrey	Air	12.7	102	3.0	Generic Clear Glass
6823	SuperGry/Air/Clr 6	2.69	0.47	0.24	0.21	0.06	0.04	0.08	0.04	9894	5.7	SuperGrey	Air	12.7	103	5.7	Generic Clear Glass
6824	SuperGry/Air1/Energy Adv LowE 3	2.48	0.44	0.33	0.28	0.16	0.05	0.21	0.05	9891	3.2	SuperGrey	Air	6.3	9921	3.0	Energy AdvantageLow-E
6825	SuperGry/Air1/Energy Adv LowE 6	2.45	0.43	0.21	0.18	0.05	0.04	0.07	0.04	9894	5.7	SuperGrey	Air	6.3	9924	5.6	Energy AdvantageLow-E
6826	SuperGry/Air/Energy Adv LowE 3	1.9	0.33	0.30	0.26	0.16	0.05	0.21	0.05	9891	3.2	SuperGrey	Air	12.7	9921	3.0	Energy AdvantageLow-E
6827	SuperGry/Air/Energy Adv LowE 6	1.88	0.33	0.18	0.15	0.05	0.04	0.07	0.04	9894	5.7	SuperGrey	Air	12.7	9924	5.6	Energy AdvantageLow-E
6828	SuperGry/Arg/Energy Adv LowE 3	1.66	0.29	0.29	0.25	0.16	0.05	0.21	0.05	9891	3.2	SuperGrey	Arg	12.7	9921	3.0	Energy AdvantageLow-E
6829	SuperGry/Arg/Energy Adv LowE 6	1.65	0.29	0.16	0.14	0.05	0.04	0.07	0.04	9894	5.7	SuperGrey	Arg	12.7	9924	5.6	Energy AdvantageLow-E
6830	EverGrn/Air1/Clr 3	3.12	0.55	0.59	0.52	0.42	0.08	0.69	0.12	9881	3.2	EverGreen	Air	6.3	102	3.0	Generic Clear Glass
6831	EverGrn/Air1/Clr 6	3.06	0.54	0.47	0.41	0.28	0.06	0.58	0.10	9889	5.9	EverGreen	Air	6.3	103	5.7	Generic Clear Glass
6832	EverGrn/Air/Clr 3	2.72	0.48	0.59	0.51	0.42	0.08	0.69	0.12	9881	3.2	EverGreen	Air	12.7	102	3.0	Generic Clear Glass
6833	EverGrn/Air/Clr 6	2.68	0.47	0.46	0.40	0.28	0.06	0.58	0.10	9889	5.9	EverGreen	Air	12.7	103	5.7	Generic Clear Glass
6834	EverGrn/Air1/Energy Adv LowE 3	2.48	0.44	0.53	0.47	0.35	0.09	0.64	0.14	9881	3.2	EverGreen	Air	6.3	9921	3.0	Energy AdvantageLow-E
6835	EverGrn/Air1/Energy Adv LowE 6	2.45	0.43	0.42	0.36	0.24	0.07	0.54	0.11	9889	5.9	EverGreen	Air	6.3	9924	5.6	Energy AdvantageLow-E
6836	EverGrn/Air/Energy Adv LowE 3	1.9	0.33	0.52	0.46	0.35	0.09	0.64	0.14	9881	3.2	EverGreen	Air	12.7	9921	3.0	Energy AdvantageLow-E
6837	EverGrn/Air/Energy Adv LowE 6	1.88	0.33	0.40	0.35	0.24	0.07	0.54	0.11	9889	5.9	EverGreen	Air	12.7	9924	5.6	Energy AdvantageLow-E
6838	EverGrn/Arg/Energy Adv LowE 3	1.66	0.29	0.52	0.45	0.35	0.09	0.64	0.14	9881	3.2	EverGreen	Arg	12.7	9921	3.0	Energy AdvantageLow-E
6839	EverGrn/Arg/Energy Adv LowE 6	1.65	0.29	0.39	0.34	0.24	0.07	0.54	0.11	9889	5.9	EverGreen	Arg	12.7	9924	5.6	Energy AdvantageLow-E

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double Pilkington (cont.)																	
6840	Arctic Blu/Air1/Clr 6	3.06	0.54	0.46	0.40	0.27	0.06	0.47	0.08	9989	5.9	Arctic Blue	Air	6.3	103	5.7	Generic Clear Glass
6841	Arctic Blu/Air/Clr 6	2.68	0.47	0.45	0.39	0.27	0.06	0.47	0.08	9989	5.9	Arctic Blue	Air	12.7	103	5.7	Generic Clear Glass
6842	Arctic Blu/Air1/Energy Adv LoE 6	2.45	0.43	0.41	0.36	0.23	0.07	0.43	0.09	9989	5.9	Arctic Blue	Air	6.3	9924	5.6	Energy AdvantageLow-E
6843	Arctic Blu/Air/Energy Adv LowE 6	1.88	0.33	0.39	0.34	0.23	0.07	0.43	0.09	9989	5.9	Arctic Blue	Air	12.7	9924	5.6	Energy AdvantageLow-E
6844	Arctic Blu/Arg/Energy Adv LowE 6	1.65	0.29	0.38	0.33	0.23	0.07	0.43	0.09	9989	5.9	Arctic Blue	Arg	12.7	9924	5.6	Energy AdvantageLow-E
6845	Optifloat Blu-Grn/Air1/Clr 6	3.06	0.54	0.58	0.51	0.39	0.08	0.67	0.12	9879	5.9	Optifloat Blue-Green	Air	6.3	103	5.7	Generic Clear Glass
6846	Optifloat Blu-Grn/Air/Clr 6	2.68	0.47	0.58	0.50	0.39	0.08	0.67	0.12	9879	5.9	Optifloat Blue-Green	Air	12.7	103	5.7	Generic Clear Glass
6847	Opti BluGrn/Air1/EnergyAdv LoE 6	2.45	0.43	0.53	0.46	0.34	0.09	0.62	0.13	9879	5.9	Optifloat Blue-Green	Air	6.3	9924	5.6	Energy AdvantageLow-E
6848	Opti BluGrn/Air/EnergyAdv LowE 6	1.88	0.33	0.52	0.45	0.34	0.09	0.62	0.13	9879	5.9	Optifloat Blue-Green	Air	12.7	9924	5.6	Energy AdvantageLow-E
6849	Opti BluGrn/Arg/EnergyAdv LowE 6	1.65	0.29	0.52	0.45	0.34	0.09	0.62	0.13	9879	5.9	Optifloat Blue-Green	Arg	12.7	9924	5.6	Energy AdvantageLow-E
6850	Eclipse AdvClr/Air/Clr 6	1.96	0.35	0.63	0.55	0.46	0.21	0.60	0.29	9909	5.9	Eclipse AdvantageClear	Air	12.7	103	5.7	Generic Clear Glass
6851	Eclipse AdvBrz/Air/Clr 6	1.96	0.35	0.43	0.38	0.28	0.11	0.34	0.13	9908	5.9	Eclipse AdvantageBronze	Air	12.7	103	5.7	Generic Clear Glass
6852	Eclipse AdvGry/Air/Clr 6	1.96	0.35	0.38	0.33	0.23	0.09	0.29	0.11	9911	5.9	Eclipse AdvantageGrey	Air	12.7	103	5.7	Generic Clear Glass
6853	Eclipse AdvEverGrn/Air/Clr 6	1.96	0.35	0.33	0.29	0.20	0.09	0.43	0.17	9910	5.9	Eclipse AdvantageEverGreen	Air	12.7	103	5.7	Generic Clear Glass
6854	Eclipse AdvArctic Blu/Air/Clr 6	1.96	0.35	0.33	0.29	0.19	0.09	0.35	0.13	9906	5.9	Eclipse Advantagerctic Blue	Air	12.7	103	5.7	Generic Clear Glass
6855	Eclipse AdvBlu-Grn/Air/Clr 6	1.96	0.35	0.44	0.38	0.29	0.12	0.51	0.21	9907	5.9	Eclipse AdvantageBlue-Green	Air	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name
Double Pilkington (cont.)																	
6860	Energy Adv Low-E/Air1/Clr 3	2.48	0.44	0.75	0.65	0.59	0.15	0.75	0.17	9921	3.0	Energy AdvantageLow-E	Air	6.3	102	3.0	Generic Clear Glass
6861	Energy Adv Low-E/Air1/Clr 6	2.45	0.43	0.71	0.62	0.52	0.13	0.73	0.16	9924	5.6	Energy AdvantageLow-E	Air	6.3	103	5.7	Generic Clear Glass
6862	Energy Adv Low-E/Air/Clr 3	1.9	0.33	0.75	0.65	0.59	0.15	0.75	0.17	9921	3.0	Energy AdvantageLow-E	Air	12.7	102	3.0	Generic Clear Glass
6863	Energy Adv Low-E/Air/Clr 6	1.88	0.33	0.71	0.62	0.52	0.13	0.73	0.16	9924	5.6	Energy AdvantageLow-E	Air	12.7	103	5.7	Generic Clear Glass
6864	Energy Adv Low-E/Arg/Clr 3	1.66	0.29	0.75	0.65	0.59	0.15	0.75	0.17	9921	3.0	Energy AdvantageLow-E	Arg	12.7	102	3.0	Generic Clear Glass
6865	Energy Adv Low-E/Arg/Clr 6	1.65	0.29	0.71	0.62	0.52	0.13	0.73	0.16	9924	5.6	Energy AdvantageLow-E	Arg	12.7	103	5.7	Generic Clear Glass
6866	Clr/Air1/Energy Adv LowE 3	2.48	0.44	0.80	0.70	0.59	0.16	0.75	0.18	102	3.0	Generic Clear Glass	Air	6.3	9921	3.0	Energy AdvantageLow-E
6867	Clr/Air1/Energy Adv LowE 6	2.45	0.43	0.75	0.65	0.52	0.14	0.73	0.17	103	5.7	Generic Clear Glass	Air	6.3	9924	5.6	Energy AdvantageLow-E
6868	Clr/Air/Energy Adv LowE 3	1.9	0.33	0.81	0.71	0.59	0.16	0.75	0.18	102	3.0	Generic Clear Glass	Air	12.7	9921	3.0	Energy AdvantageLow-E
6869	Clr/Air/Energy Adv LowE 6	1.88	0.33	0.76	0.66	0.52	0.14	0.73	0.17	103	5.7	Generic Clear Glass	Air	12.7	9924	5.6	Energy AdvantageLow-E
6870	Clr/Arg/Energy Adv LowE 3	1.66	0.29	0.82	0.71	0.59	0.16	0.75	0.18	102	3.0	Generic Clear Glass	Arg	12.7	9921	3.0	Energy AdvantageLow-E
6871	Clr/Arg/Energy Adv LowE 6	1.65	0.29	0.77	0.67	0.52	0.14	0.73	0.17	103	5.7	Generic Clear Glass	Arg	12.7	9924	5.6	Energy AdvantageLow-E
6875	Solar E/Air1/Clr 3	2.47	0.44	0.57	0.49	0.41	0.10	0.54	0.11	9931	3.0	Solar E	Air	6.3	102	3.0	Generic Clear Glass
6876	Solar E/Air1/Clr 6	2.45	0.43	0.54	0.47	0.36	0.09	0.54	0.10	9935	5.7	Solar E	Air	6.3	103	5.7	Generic Clear Glass
6877	Solar E/Air/Clr 3	1.89	0.33	0.55	0.48	0.41	0.10	0.54	0.11	9931	3.0	Solar E	Air	12.7	102	3.0	Generic Clear Glass
6878	Solar E/Air/Clr 6	1.88	0.33	0.53	0.46	0.36	0.09	0.54	0.10	9935	5.7	Solar E	Air	12.7	103	5.7	Generic Clear Glass
6879	Solar E/Arg/Clr 3	1.66	0.29	0.55	0.48	0.41	0.10	0.54	0.11	9931	3.0	Solar E	Arg	12.7	102	3.0	Generic Clear Glass
6880	Solar E/Arg/Clr 6	1.66	0.29	0.52	0.45	0.36	0.09	0.54	0.10	9935	5.7	Solar E	Arg	12.7	103	5.7	Generic Clear Glass
6890	Activ Clr/Air/Clr 3	2.73	0.48	0.84	0.73	0.68	0.17	0.76	0.21	9937	3.0	Activon Clear	Air	12.7	102	3.0	Generic Clear Glass
6891	Activ Clr/Air/Clr 6	2.69	0.47	0.78	0.68	0.59	0.16	0.74	0.21	9941	5.6	Activon Clear	Air	12.7	103	5.7	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name	Gap #2 Gas	Gap #2 Wid	Pane #3 Id	Pane #3 Wid	Pane #3 IGDB Glass Name
Triple Clr/Tint New																						
7000	Clr/Air1/Clr /Air1/Clr 3	2.14	0.38	0.78	0.68	0.60	0.17	0.74	0.21	102	3.0	Generic Clear Glass	Air	6.3	102	3.0	Generic Clear Glass	Air	6.3	102	3.0	Generic Clear Glass
7001	Clr/Air/Clr /Air/Clr 3	1.77	0.31	0.78	0.68	0.60	0.17	0.74	0.21	102	3.0	Generic Clear Glass	Air	12.7	102	3.0	Generic Clear Glass	Air	12.7	102	3.0	Generic Clear Glass
7002	Clr/Arg/Clr /Arg/Clr 3	1.64	0.29	0.79	0.68	0.60	0.17	0.74	0.21	102	3.0	Generic Clear Glass	Arg	-0.1	102	3.0	Generic Clear Glass	Arg	-0.1	102	3.0	Generic Clear Glass

G-T-C	Name	U-SI	U-IP	SC	SHGC	Tsol	Rfsol	Tvis	Rfvis	Pane #1 Id	Pane #1 Wid	Pane #1 IGDB Glass Name	Gap #1 Gas	Gap #1 Wid	Pane #2 Id	Pane #2 Wid	Pane #2 IGDB Glass Name	Gap #2 Gas	Gap #2 Wid	Pane #3 Id	Pane #3 Wid	Pane #3 IGDB Glass Name
Triple Southwall																						
7054	Clr/Air1/HM44 Susp/Air1/Clr 6	1.71	0.30	0.28	0.24	0.17	0.50	0.37	0.48	103	5.7	Generic Clear Glass	Air	6.3	1502	0.1	Heat Mirror44 Susp Film	Air	6.3	103	5.7	Generic Clear Glass
7055	Clr/Air/HM44 Susp/Air/Clr 6	1.36	0.24	0.28	0.24	0.17	0.50	0.37	0.48	103	5.7	Generic Clear Glass	Air	9.5	1502	0.1	Heat Mirror44 Susp Film	Air	9.5	103	5.7	Generic Clear Glass
7056	Clr/Air1/HM55 Susp/Air1/Clr 6	1.71	0.30	0.34	0.29	0.21	0.45	0.45	0.39	103	5.7	Generic Clear Glass	Air	6.3	1503	0.1	Heat Mirror55 Susp Film	Air	6.3	103	5.7	Generic Clear Glass
7057	Clr/Air/HM55 Susp/Air/Clr 6	1.37	0.24	0.34	0.29	0.21	0.45	0.45	0.39	103	5.7	Generic Clear Glass	Air	9.5	1503	0.1	Heat Mirror55 Susp Film	Air	9.5	103	5.7	Generic Clear Glass
7058	Clr/Air1/HM66 Susp/Air1/Clr 6	1.72	0.30	0.39	0.34	0.26	0.40	0.53	0.32	103	5.7	Generic Clear Glass	Air	6.3	1504	0.1	Heat Mirror66 Susp Film	Air	6.3	103	5.7	Generic Clear Glass
7059	Clr/Air/HM66 Susp/Air/Clr 6	1.38	0.24	0.39	0.34	0.26	0.40	0.53	0.32	103	5.7	Generic Clear Glass	Air	9.5	1504	0.1	Heat Mirror66 Susp Film	Air	9.5	103	5.7	Generic Clear Glass
7060	Clr/Air1/HM77 Susp/Air1/Clr 6	1.74	0.31	0.49	0.43	0.33	0.32	0.63	0.22	103	5.7	Generic Clear Glass	Air	6.3	1505	0.1	Heat Mirror77 Susp Film	Air	6.3	103	5.7	Generic Clear Glass
7061	Clr/Air/HM77 Susp/Air/Clr 6	1.41	0.25	0.50	0.43	0.33	0.32	0.63	0.22	103	5.7	Generic Clear Glass	Air	9.5	1505	0.1	Heat Mirror77 Susp Film	Air	9.5	103	5.7	Generic Clear Glass
7062	Clr/Air1/HM88 Susp/Air1/Clr 6	1.78	0.31	0.62	0.54	0.43	0.22	0.70	0.18	103	5.7	Generic Clear Glass	Air	6.3	1506	0.1	Heat Mirror88 Susp Film	Air	6.3	103	5.7	Generic Clear Glass
7063	Clr/Air/HM88 Susp/Air/Clr 6	1.46	0.26	0.62	0.54	0.43	0.22	0.70	0.18	103	5.7	Generic Clear Glass	Air	9.5	1506	0.1	Heat Mirror88 Susp Film	Air	9.5	103	5.7	Generic Clear Glass
7064	Clr/Air1/SC75 Susp/Air1/Clr 6	1.7	0.30	0.41	0.36	0.28	0.34	0.60	0.22	103	5.7	Generic Clear Glass	Air	6.3	1510	0.1	Heat MirrorSingle Coat 75 Susp	Air	6.3	103	5.7	Generic Clear Glass
7065	Clr/Air/SC75 Susp/Air/Clr 6	1.36	0.24	0.40	0.35	0.28	0.34	0.60	0.22	103	5.7	Generic Clear Glass	Air	9.5	1510	0.1	Heat MirrorSingle Coat 75 Susp	Air	9.5	103	5.7	Generic Clear Glass
7066	Clr/Air1/TC88 Susp/Air1/Clr 6	1.53	0.27	0.55	0.48	0.35	0.22	0.63	0.13	103	5.7	Generic Clear Glass	Air	6.3	1511	0.1	Heat MirrorTwin Coat 88 Susp	Air	6.3	103	5.7	Generic Clear Glass
7067	Clr/Air/TC88 Susp/Air/Clr 6	1.19	0.21	0.55	0.48	0.35	0.22	0.63	0.13	103	5.7	Generic Clear Glass	Air	9.5	1511	0.1	Heat MirrorTwin Coat 88 Susp	Air	9.5	103	5.7	Generic Clear Glass

WINDOW LAYERS LIBRARY

The following is a list of the window layers in the Library. The meaning of each entry is as follows.

The bold-faced text is the U-name of the window layer to be used as value of the keyword WINDOW-LAYERS in the WINDOW command. For example, to construct a double-pane window with both panes equal to the first glass layer in the library (which has U-name Clear-3mm) and with the gap between the glass layers equal to the first gap in the library (which has U-name Air-6.3) your input would look like:

```
WIN-1 = WINDOW
    WIN-SPEC-METHOD    = LAYERS-INPUT
    WINDOW-LAYERS      = (Clear-3mm,Air-6.3,Clear-3mm)
    ....
```

On the far right, on the same line as the U-name, is the layer category. There are four categories: glass layer, gap layer, blind layer and pull-down shade. Note that the pull-down shades are actually blind layers with the slats closed.

The next one or two lines, beginning with $, give a brief description of the layer. The glass and gap layers in this library were used with the WINDOW 4 program to produce the windows in the "Window Library" in this document. For glass layers, the ID number shown in the description corresponds to values labeled "Id"in the Window Library.

The remaining lines give the value of keywords (in English units) for this layer. The program will use these values in the window calculation. For a description of these keywords, see "WINDOW-LAYER Command" in the *Command/Keyword Dictionary*.

Table 13 Window Layers Library

```
Clear-3mm                                        Glass Layer
$Clear, 3mm
$ID=2
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.837  REFL-SOL-BB = 0.075    BACKREFL-SOL-BB = 0.075
TRANS-VIS-BB = 0.898  REFL-VIS-BB = 0.081    BACKREFL-VIS-BB = 0.081
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Clear-6mm                                        Glass Layer
$Clear, 6mm
$ID=3
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.775  REFL-SOL-BB = 0.071    BACKREFL-SOL-BB = 0.071
TRANS-VIS-BB = 0.881  REFL-VIS-BB = 0.080    BACKREFL-VIS-BB = 0.080
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Clear-12mm                                       Glass Layer
$Clear, 12mm
$ID=4
TYPE = GLASS          THICKNESS   = 0.03937  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.653  REFL-SOL-BB = 0.064    BACKREFL-SOL-BB = 0.064
TRANS-VIS-BB = 0.841  REFL-VIS-BB = 0.077    BACKREFL-VIS-BB = 0.077
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Bronze-3mm                                       Glass Layer
$Bronze, 3mm
$ID=5
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.645  REFL-SOL-BB = 0.062    BACKREFL-SOL-BB = 0.062
TRANS-VIS-BB = 0.685  REFL-VIS-BB = 0.065    BACKREFL-VIS-BB = 0.065
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Bronze-6mm                                       Glass Layer
$Bronze, 6mm
$ID=6
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.482  REFL-SOL-BB = 0.054    BACKREFL-SOL-BB = 0.054
TRANS-VIS-BB = 0.534  REFL-VIS-BB = 0.057    BACKREFL-VIS-BB = 0.057
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Bronze-10mm                                      Glass Layer
$Bronze, 10mm
$ID=7
TYPE = GLASS          THICKNESS   = 0.03282  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.326  REFL-SOL-BB = 0.048    BACKREFL-SOL-BB = 0.048
TRANS-VIS-BB = 0.379  REFL-VIS-BB = 0.050    BACKREFL-VIS-BB = 0.050
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Grey-3mm                                         Glass Layer
$Grey, 3mm
$ID=8
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.626  REFL-SOL-BB = 0.061    BACKREFL-SOL-BB = 0.061
TRANS-VIS-BB = 0.611  REFL-VIS-BB = 0.061    BACKREFL-VIS-BB = 0.061
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Grey-6mm                                         Glass Layer
$Grey, 6mm
$ID=9
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY      = 0.52
TRANS-SOL-BB = 0.455  REFL-SOL-BB = 0.053    BACKREFL-SOL-BB = 0.053
TRANS-VIS-BB = 0.431  REFL-VIS-BB = 0.052    BACKREFL-VIS-BB = 0.052
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.84 ..

Grey-12mm                                        Glass Layer
$Grey, 12mm
$ID=10
TYPE = GLASS          THICKNESS   = 0.03937  CONDUCTIVITY      = 0.52
```

```
TRANS-SOL-BB = 0.217  REFL-SOL-BB = 0.044   BACKREFL-SOL-BB = 0.044
TRANS-VIS-BB = 0.187  REFL-VIS-BB = 0.045   BACKREFL-VIS-BB = 0.045
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Green-3mm   Glass Layer
```
$Green, 3mm
$ID=11
TYPE = GLASS          THICKNESS   = 0.00984 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.635  REFL-SOL-BB = 0.063   BACKREFL-SOL-BB = 0.063
TRANS-VIS-BB = 0.822  REFL-VIS-BB = 0.075   BACKREFL-VIS-BB = 0.075
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Green-6mm   Glass Layer
```
$Green, 6mm
$ID=12
TYPE = GLASS          THICKNESS   = 0.01969 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.487  REFL-SOL-BB = 0.056   BACKREFL-SOL-BB = 0.056
TRANS-VIS-BB = 0.749  REFL-VIS-BB = 0.070   BACKREFL-VIS-BB = 0.070
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Low-Iron-2.5mm   Glass Layer
```
$Low Iron, 2.5mm
$ID=13
TYPE = GLASS          THICKNESS   = 0.00820 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.904  REFL-SOL-BB = 0.080   BACKREFL-SOL-BB = 0.080
TRANS-VIS-BB = 0.914  REFL-VIS-BB = 0.083   BACKREFL-VIS-BB = 0.083
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Low-Iron-3mm   Glass Layer
```
$Low Iron, 3mm
$ID=14
TYPE = GLASS          THICKNESS   = 0.00984 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.899  REFL-SOL-BB = 0.079   BACKREFL-SOL-BB = 0.079
TRANS-VIS-BB = 0.913  REFL-VIS-BB = 0.082   BACKREFL-VIS-BB = 0.082
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Low-Iron-4mm   Glass Layer
```
$Low Iron, 4mm
$ID=15
TYPE = GLASS          THICKNESS   = 0.01312 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.894  REFL-SOL-BB = 0.079   BACKREFL-SOL-BB = 0.079
TRANS-VIS-BB = 0.911  REFL-VIS-BB = 0.082   BACKREFL-VIS-BB = 0.082
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Low-Iron-5mm   Glass Layer
```
$Low Iron, 5mm
$ID=16
TYPE = GLASS          THICKNESS   = 0.01640 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.889  REFL-SOL-BB = 0.079   BACKREFL-SOL-BB = 0.079
TRANS-VIS-BB = 0.910  REFL-VIS-BB = 0.082   BACKREFL-VIS-BB = 0.082
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Blue-6mm   Glass Layer
```
$Blue, 6mm
$ID=17
TYPE = GLASS          THICKNESS   = 0.01969 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.480  REFL-SOL-BB = 0.050   BACKREFL-SOL-BB = 0.050
TRANS-VIS-BB = 0.570  REFL-VIS-BB = 0.060   BACKREFL-VIS-BB = 0.060
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.84 ..
```

Ref-Steel-Clear-Lo-6mm   Glass Layer
```
$Reflective low-trans steel coating
$Clear glass, 6mm, ID=200
TYPE = GLASS          THICKNESS   = 0.01969 CONDUCTIVITY    = 0.52
TRANS-SOL-BB = 0.066  REFL-SOL-BB = 0.341   BACKREFL-SOL-BB = 0.493
TRANS-VIS-BB = 0.080  REFL-VIS-BB = 0.410   BACKREFL-VIS-BB = 0.370
 TRANS-IR    = 0.0    EMIS-IR     = 0.84    BACKEMIS-IR     = 0.40 ..
```

Ref-Steel-Clear-Mid-6mm   Glass Layer
```
$Reflective mid-trans steel coating
$Clear glass, 6mm, ID=201
```

```
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.110  REFL-SOL-BB = 0.270    BACKREFL-SOL-BB = 0.430
TRANS-VIS-BB = 0.140  REFL-VIS-BB = 0.310    BACKREFL-VIS-BB = 0.350
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.47 ..
```

Ref-Steel-Clear-Hi-6mm   Glass Layer
```
$Reflective hi-trans steel coating
$Clear glass, 6mm, ID=202
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.159  REFL-SOL-BB = 0.220    BACKREFL-SOL-BB = 0.370
TRANS-VIS-BB = 0.200  REFL-VIS-BB = 0.250    BACKREFL-VIS-BB = 0.320
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.57 ..
```

Ref-Steel-Tint-Lo-6mm   Glass Layer
```
$Refl low-trans steel coating
$Tinted glass, 6mm, ID=210
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.040  REFL-SOL-BB = 0.150    BACKREFL-SOL-BB = 0.470
TRANS-VIS-BB = 0.050  REFL-VIS-BB = 0.170    BACKREFL-VIS-BB = 0.370
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.41 ..
```

Ref-Steel-Tint-Mid-6mm   Glass Layer
```
$Refl mid-trans steel coating
$Tinted glass, 6mm, ID=211
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.060  REFL-SOL-BB = 0.130    BACKREFL-SOL-BB = 0.420
TRANS-VIS-BB = 0.090  REFL-VIS-BB = 0.140    BACKREFL-VIS-BB = 0.350
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.47 ..
```

Ref-Steel-Tint-Hi-6mm   Glass Layer
```
$Refl hi-trans steel coating
$Tinted glass, 6mm, ID=212
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.100  REFL-SOL-BB = 0.110    BACKREFL-SOL-BB = 0.380
TRANS-VIS-BB = 0.100  REFL-VIS-BB = 0.110    BACKREFL-VIS-BB = 0.320
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.53 ..
```

Ref-Titanium-Clear-Lo-6mm   Glass Layer
```
$Reflective low-trans titanium coating
$Clear glass, 6mm, ID=220
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.150  REFL-SOL-BB = 0.220    BACKREFL-SOL-BB = 0.380
TRANS-VIS-BB = 0.200  REFL-VIS-BB = 0.230    BACKREFL-VIS-BB = 0.330
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.58 ..
```

Ref-Titanium-Clear-Hi-6mm   Glass Layer
```
$Reflective hi-trans titanium coating
$Clear glass, 6mm, ID=221
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.240  REFL-SOL-BB = 0.160    BACKREFL-SOL-BB = 0.290
TRANS-VIS-BB = 0.300  REFL-VIS-BB = 0.160    BACKREFL-VIS-BB = 0.290
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.60 ..
```

Ref-Titanium-Tint-Lo-6mm   Glass Layer
```
$Reflective lo-trans titanium coating
$Tinted glass, 6mm, ID=230
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.040  REFL-SOL-BB = 0.130    BACKREFL-SOL-BB = 0.420
TRANS-VIS-BB = 0.050  REFL-VIS-BB = 0.090    BACKREFL-VIS-BB = 0.280
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.41 ..
```

Ref-Titanium-Tint-Mid-6mm   Glass Layer
```
$Reflective mid-trans titanium coating
$Tinted glass, 6mm, ID=231
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.100  REFL-SOL-BB = 0.110    BACKREFL-SOL-BB = 0.410
TRANS-VIS-BB = 0.130  REFL-VIS-BB = 0.100    BACKREFL-VIS-BB = 0.320
 TRANS-IR   = 0.0     EMIS-IR     = 0.84     BACKEMIS-IR    = 0.45 ..
```

Ref-Titanium-Tint-Hi-6mm   Glass Layer
```
$Reflective hi-trans titanium coating
```

```
$Tinted glass, 6mm, ID=232
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.150  REFL-SOL-BB = 0.090    BACKREFL-SOL-BB = 0.330
TRANS-VIS-BB = 0.180  REFL-VIS-BB = 0.080    BACKREFL-VIS-BB = 0.280
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.60 ..
```

Ref-Pewter-Clear-Lo-6mm   Glass Layer
```
$Reflective low-trans pewter coating
$Clear glass, 6mm, ID=240
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.110  REFL-SOL-BB = 0.250    BACKREFL-SOL-BB = 0.490
TRANS-VIS-BB = 0.130  REFL-VIS-BB = 0.280    BACKREFL-VIS-BB = 0.420
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.43 ..
```

Ref-Pewter-Clear-Mid-6mm   Glass Layer
```
$Reflective mid-trans pewter coating
$Clear glass, 6mm, ID=241
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.170  REFL-SOL-BB = 0.200    BACKREFL-SOL-BB = 0.420
TRANS-VIS-BB = 0.190  REFL-VIS-BB = 0.210    BACKREFL-VIS-BB = 0.380
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.51 ..
```

Ref-Pewter-Clear-Hi-6mm   Glass Layer
```
$Reflective hi-trans pewter coating
$Clear glass, 6mm, ID=242
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.200  REFL-SOL-BB = 0.160    BACKREFL-SOL-BB = 0.390
TRANS-VIS-BB = 0.220  REFL-VIS-BB = 0.170    BACKREFL-VIS-BB = 0.350
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.55 ..
```

Ref-Pewter-Tint-Lo-6mm   Glass Layer
```
$Reflective lo-trans pewter coating
$Tinted glass, 6mm, ID=250
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.070  REFL-SOL-BB = 0.130    BACKREFL-SOL-BB = 0.490
TRANS-VIS-BB = 0.080  REFL-VIS-BB = 0.130    BACKREFL-VIS-BB = 0.420
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.43 ..
```

Ref-Pewter-Tint-Mid-6mm   Glass Layer
```
$Reflective mid-trans pewter coating
$Tinted glass, 6mm, ID=251
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.100  REFL-SOL-BB = 0.100    BACKREFL-SOL-BB = 0.420
TRANS-VIS-BB = 0.110  REFL-VIS-BB = 0.100    BACKREFL-VIS-BB = 0.380
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.51 ..
```

Ref-Pewter-Tint-Hi-6mm   Glass Layer
```
$Reflective hi-trans pewter coating
$Tinted glass, 6mm, ID=252
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.120  REFL-SOL-BB = 0.090    BACKREFL-SOL-BB = 0.390
TRANS-VIS-BB = 0.130  REFL-VIS-BB = 0.090    BACKREFL-VIS-BB = 0.350
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.55 ..
```

Ref-Tin-Oxide-Clear-6mm   Glass Layer
```
$Reflective tin-oxide coating
$Clear glass, 6mm, ID=260
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.429  REFL-SOL-BB = 0.308    BACKREFL-SOL-BB = 0.379
TRANS-VIS-BB = 0.334  REFL-VIS-BB = 0.453    BACKREFL-VIS-BB = 0.505
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.82 ..
```

Ref-Tin-Oxide-Tint-6mm   Glass Layer
```
$Reflective tin-oxide coating
$Tinted glass, 6mm, ID=270
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.300  REFL-SOL-BB = 0.140    BACKREFL-SOL-BB = 0.360
TRANS-VIS-BB = 0.250  REFL-VIS-BB = 0.180    BACKREFL-VIS-BB = 0.450
 TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR     = 0.82 ..
```

Pyrolytic-A-Clear-3mm   Glass Layer

```
$Pyrolytic A coating
$Clear glass, 3mm, ID=300
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.750  REFL-SOL-BB = 0.100    BACKREFL-SOL-BB = 0.100
TRANS-VIS-BB = 0.850  REFL-VIS-BB = 0.120    BACKREFL-VIS-BB = 0.120
 TRANS-IR   = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.40 ..
```

Pyrolytic-B-Clear-3mm   Glass Layer
```
$Pyrolytic B coating
$Clear glass, 3mm, ID=350
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.740  REFL-SOL-BB = 0.090    BACKREFL-SOL-BB = 0.100
TRANS-VIS-BB = 0.820  REFL-VIS-BB = 0.110    BACKREFL-VIS-BB = 0.120
 TRANS-IR   = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.20 ..
```

Pyrolytic-B-Clear-6mm   Glass Layer
```
$Pyrolytic B coating
$Clear glass, 6mm, ID=351
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.680  REFL-SOL-BB = 0.090    BACKREFL-SOL-BB = 0.100
$TRANS-VIS-BB = 0.810  REFL-VIS-BB = 0.110    BACKREFL-VIS-BB = 0.120
 TRANS-IR   = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.20 ..
```

Pyrolytic-Low-E-Clear-3mm   Glass Layer
```
$Pyrolytic Low-E coating
$Clear glass, 3mm, ID=400
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.630  REFL-SOL-BB = 0.190    BACKREFL-SOL-BB = 0.220
TRANS-VIS-BB = 0.850  REFL-VIS-BB = 0.079    BACKREFL-VIS-BB = 0.056
 TRANS-IR   = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.10 ..
```

Pyrolytic-Low-E-Clear-6mm   Glass Layer
```
$Pyrolytic Low-E coating
$Clear glass, 6mm, ID=401
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.600  REFL-SOL-BB = 0.170    BACKREFL-SOL-BB = 0.220
TRANS-VIS-BB = 0.840  REFL-VIS-BB = 0.055    BACKREFL-VIS-BB = 0.078
 TRANS-IR   = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.10 ..
```

Pyrolytic-Low-E-Tint-6mm   Glass Layer
```
$Pyrolytic Low-E coating
$Tinted glass, 6mm, ID=451
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.360  REFL-SOL-BB = 0.093    BACKREFL-SOL-BB = 0.200
TRANS-VIS-BB = 0.500  REFL-VIS-BB = 0.035    BACKREFL-VIS-BB = 0.054
TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.10 ..
```

Spectral-Selective-Clear-3mm   Glass Layer
```
$Spectrally selective coating
$Clear glass, 3mm, ID=500
TYPE = GLASS          THICKNESS   = 0.00984  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.450  REFL-SOL-BB = 0.340    BACKREFL-SOL-BB = 0.370
TRANS-VIS-BB = 0.780  REFL-VIS-BB = 0.070    BACKREFL-VIS-BB = 0.050
TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.04 ..
```

Spectral-Selective-Clear-6mm   Glass Layer
```
$Spectrally selective coating
$Clear glass, 6mm, ID=501
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.430  REFL-SOL-BB = 0.300    BACKREFL-SOL-BB = 0.420
TRANS-VIS-BB = 0.770  REFL-VIS-BB = 0.070    BACKREFL-VIS-BB = 0.060
TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.03 ..
```

Spectral-Selective-Tint-6mm   Glass Layer
```
$Spectrally selective coating
$Tinted glass, 6mm, ID=550
TYPE = GLASS          THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.260  REFL-SOL-BB = 0.140    BACKREFL-SOL-BB = 0.410
TRANS-VIS-BB = 0.460  REFL-VIS-BB = 0.060    BACKREFL-VIS-BB = 0.040
TRANS-IR    = 0.0    EMIS-IR     = 0.84     BACKEMIS-IR    = 0.03 ..
```

```
Spectral-Selective-Low-E-6mm                    Glass Layer
$Spectrally selective
$Low-E coating, 6mm, ID=708
TYPE = GLASS            THICKNESS   = 0.01969  CONDUCTIVITY   = 0.52
TRANS-SOL-BB = 0.406   REFL-SOL-BB = 0.288     BACKREFL-SOL-BB = 0.353
TRANS-VIS-BB = 0.780   REFL-VIS-BB = 0.060     BACKREFL-VIS-BB = 0.050
TRANS-IR     = 0.0     EMIS-IR     = 0.84      BACKEMIS-IR     = 0.04 ..

Heat-Mirror-Film-88                             Glass Layer
$Heat mirror 88
$Low-E film, ID=600
TYPE = GLASS            THICKNESS   = 0.00017  CONDUCTIVITY   = 0.081
TRANS-SOL-BB = 0.656   REFL-SOL-BB = 0.249     BACKREFL-SOL-BB = 0.227
TRANS-VIS-BB = 0.868   REFL-VIS-BB = 0.064     BACKREFL-VIS-BB = 0.060
TRANS-IR     = 0.0     EMIS-IR     = 0.136     BACKEMIS-IR     = 0.720 ..

Heat-Mirror-Film-77                             Glass Layer
$Heat mirror 77
$Low-E film, ID=601
TYPE = GLASS            THICKNESS   = 0.00017  CONDUCTIVITY   = 0.081
TRANS-SOL-BB = 0.504   REFL-SOL-BB = 0.402     BACKREFL-SOL-BB = 0.398
TRANS-VIS-BB = 0.766   REFL-VIS-BB = 0.147     BACKREFL-VIS-BB = 0.167
TRANS-IR     = 0.0     EMIS-IR     = 0.075     BACKEMIS-IR     = 0.720 ..

Heat-Mirror-Film-66                             Glass Layer
$Heat mirror 66
$Low-E film, ID=602
TYPE = GLASS            THICKNESS   = 0.00017  CONDUCTIVITY   = 0.081
TRANS-SOL-BB = 0.403   REFL-SOL-BB = 0.514     BACKREFL-SOL-BB = 0.515
TRANS-VIS-BB = 0.658   REFL-VIS-BB = 0.256     BACKREFL-VIS-BB = 0.279
TRANS-IR     = 0.0     EMIS-IR     = 0.057     BACKEMIS-IR     = 0.720 ..

Heat-Mirror-Film-55                             Glass Layer
$Heat mirror 55
$Low-E film, ID=603
TYPE = GLASS            THICKNESS   = 0.00017  CONDUCTIVITY   = 0.081
TRANS-SOL-BB = 0.320   REFL-SOL-BB = 0.582     BACKREFL-SOL-BB = 0.593
TRANS-VIS-BB = 0.551   REFL-VIS-BB = 0.336     BACKREFL-VIS-BB = 0.375
TRANS-IR     = 0.0     EMIS-IR     = 0.046     BACKEMIS-IR     = 0.720 ..

Heat-Mirror-Film-44                             Glass Layer
$Heat mirror 44
$Low-E film, ID=604
TYPE = GLASS            THICKNESS   = 0.00017  CONDUCTIVITY   = 0.081
TRANS-SOL-BB = 0.245   REFL-SOL-BB = 0.626     BACKREFL-SOL-BB = 0.641
TRANS-VIS-BB = 0.439   REFL-VIS-BB = 0.397     BACKREFL-VIS-BB = 0.453
TRANS-IR     = 0.0     EMIS-IR     = 0.037     BACKEMIS-IR     = 0.720 ..

Air-6.3mm                                       Gap
$Air, 6.3mm (1/4-in)
TYPE = GAP             THICKNESS       = 0.02067
CONDUCTIVITY = 0.013934 D-CONDUCTIVITY = 2.43954
VISCOSITY    = 1.16251 D-VISCOSITY     = 3.7332
DENSITY      = 0.08053 D-DENSITY       = -.0001526
PRANDTL-NUMB = 0.72    D-PRANDTL-NUMB = 0.001 ..

Air-12.7mm                                      Gap
$Air, 12.7mm (1/2-in)
TYPE = GAP             THICKNESS       = 0.04167
CONDUCTIVITY = 0.013934 D-CONDUCTIVITY = 2.43954
VISCOSITY    = 1.16251 D-VISCOSITY     = 3.7332
DENSITY      = 0.08053 D-DENSITY       = -.0001526
PRANDTL-NUMB = 0.72    D-PRANDTL-NUMB = 0.001 ..

Argon-6.3mm                                     Gap
$Argon, 6.3mm (1/4-in)
TYPE = GAP             THICKNESS       = 0.02067
CONDUCTIVITY = 0.00936 D-CONDUCTIVITY = 1.6049
VISCOSITY    = 1.41786 D-VISCOSITY     = 2.35189
DENSITY      = 0.10612 D-DENSITY       = -.000208
PRANDTL-NUMB = 0.68    D-PRANDTL-NUMB = 0.0003667 ..
```

```
Argon-12.7mm                              Gap
$Argon, 12.7mm (1/2-in)
TYPE = GAP              THICKNESS       = 0.04167
CONDUCTIVITY = 0.00936  D-CONDUCTIVITY = 1.6049
VISCOSITY    = 1.41786  D-VISCOSITY    = 2.35189
DENSITY      = 0.10612  D-DENSITY      = -.000208
PRANDTL-NUMB = 0.68     D-PRANDTL-NUMB = 0.0003667 ..


Krypton-6.3mm                             Gap
$Krypton, 6.3mm (1/4-in)
TYPE = GAP              THICKNESS       = 0.02067
CONDUCTIVITY = 0.0497   D-CONDUCTIVITY = 0.89874
VISCOSITY    = 1.53209  D-VISCOSITY    = 2.7999
DENSITY      = 0.23345  D-DENSITY      = -.00047
PRANDTL-NUMB = 0.66     D-PRANDTL-NUMB = 0.000011  ..


Krypton-12.7mm                            Gap
$Krypton, 12.7mm (1/2-in)
TYPE = GAP              THICKNESS       = 0.04167
CONDUCTIVITY = 0.0497   D-CONDUCTIVITY = 0.89874
VISCOSITY    = 1.53209  D-VISCOSITY    = 2.7999
DENSITY      = 0.23345  D-DENSITY      = -.00047
PRANDTL-NUMB = 0.66     D-PRANDTL-NUMB = 0.000011  ..


Metal-1in-Lt                              Blind
$Metal, 1.0in, light color
$Horizontal
TYPE = BLIND           THICKNESS   = 0.00066  CONDUCTIVITY    = 0.52
SLAT-ANGLE = 45        SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0833    SLAT-SEPARATION = 0.0625
TRANS-SOL-BB = 0.0     TRANS-SOL-BH = 0.0     TRANS-SOL-HH    = 0.0
TRANS-VIS-BB = 0.0     TRANS-VIS-BH = 0.0     TRANS-VIS-HH    = 0.0
REFL-SOL-BH  = 0.7     REFL-SOL-HH  = 0.7     BACKREFL-SOL-BH = 0.7
REFL-VIS-BH  = 0.7     REFL-VIS-HH  = 0.7     BACKREFL-VIS-BH = 0.7
BACKREFL-SOL-HH = 0.7 BACKREFL-VIS-HH = 0.7
 TRANS-IR    = 0.0     EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..


Metal-1in-Med                             Blind
$Metal, 1.0in, medium color
$Horizontal
TYPE = BLIND           THICKNESS   = 0.00066  CONDUCTIVITY    = 0.52
SLAT-ANGLE = 45        SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0833    SLAT-SEPARATION = 0.0625
TRANS-SOL-BB = 0.0     TRANS-SOL-BH = 0.0     TRANS-SOL-HH    = 0.0
TRANS-VIS-BB = 0.0     TRANS-VIS-BH = 0.0     TRANS-VIS-HH    = 0.0
REFL-SOL-BH  = 0.5     REFL-SOL-HH  = 0.5     BACKREFL-SOL-BH = 0.5
REFL-VIS-BH  = 0.5     REFL-VIS-HH  = 0.5     BACKREFL-VIS-BH = 0.5
BACKREFL-SOL-HH = 0.5 BACKREFL-VIS-HH = 0.5
 TRANS-IR    = 0.0     EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..


Metal-1in-Dark                            Blind
$Metal, 1.0in, dark color
$Horizontal
TYPE = BLIND           THICKNESS   = 0.00066  CONDUCTIVITY    = 0.52
SLAT-ANGLE = 45        SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0833    SLAT-SEPARATION = 0.0625
TRANS-SOL-BB = 0.0     TRANS-SOL-BH = 0.0     TRANS-SOL-HH    = 0.0
TRANS-VIS-BB = 0.0     TRANS-VIS-BH = 0.0     TRANS-VIS-HH    = 0.0
REFL-SOL-BH  = 0.3     REFL-SOL-HH  = 0.3     BACKREFL-SOL-BH = 0.3
REFL-VIS-BH  = 0.3     REFL-VIS-HH  = 0.3     BACKREFL-VIS-BH = 0.3
BACKREFL-SOL-HH = 0.3 BACKREFL-VIS-HH = 0.3
 TRANS-IR    = 0.0     EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..


Shade-Thin-T05-R10                        Pull-down shade
$Pull-down shade, thin, fabric
$5% transmittance, 10% reflectance
TYPE = BLIND           THICKNESS   = 0.00066  CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0     TRANS-SOL-BH = 0.05    TRANS-SOL-HH    = 0.05
```

```
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.05   TRANS-VIS-HH   = 0.05
REFL-SOL-BH  = 0.10   REFL-SOL-HH  = 0.10   BACKREFL-SOL-BH = 0.10
REFL-VIS-BH  = 0.10   REFL-VIS-HH  = 0.10   BACKREFL-VIS-BH = 0.10
BACKREFL-SOL-HH = 0.10 BACKREFL-VIS-HH = 0.10
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T05-R30   Pull-down shade
```
$Pull-down shade, thin, fabric
$5% transmittance, 30% reflectance
TYPE = BLIND          THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95    SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.05   TRANS-SOL-HH   = 0.05
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.05   TRANS-VIS-HH   = 0.05
REFL-SOL-BH  = 0.30   REFL-SOL-HH  = 0.30   BACKREFL-SOL-BH = 0.30
REFL-VIS-BH  = 0.30   REFL-VIS-HH  = 0.30   BACKREFL-VIS-BH = 0.30
BACKREFL-SOL-HH = 0.30 BACKREFL-VIS-HH = 0.30
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T05-R50   Pull-down shade
```
$Pull-down shade, thin, fabric
$5% transmittance, 50% reflectance
TYPE = BLIND          THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95    SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.05   TRANS-SOL-HH   = 0.05
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.05   TRANS-VIS-HH   = 0.05
REFL-SOL-BH  = 0.50   REFL-SOL-HH  = 0.50   BACKREFL-SOL-BH = 0.50
REFL-VIS-BH  = 0.50   REFL-VIS-HH  = 0.50   BACKREFL-VIS-BH = 0.50
BACKREFL-SOL-HH = 0.50 BACKREFL-VIS-HH = 0.50
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T05-R70   Pull-down shade
```
$Pull-down shade, thin, fabric
$5% transmittance, 70% reflectance
TYPE = BLIND          THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95    SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.05   TRANS-SOL-HH   = 0.05
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.05   TRANS-VIS-HH   = 0.05
REFL-SOL-BH  = 0.70   REFL-SOL-HH  = 0.70   BACKREFL-SOL-BH = 0.70
REFL-VIS-BH  = 0.70   REFL-VIS-HH  = 0.70   BACKREFL-VIS-BH = 0.70
BACKREFL-SOL-HH = 0.70 BACKREFL-VIS-HH = 0.70
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T05-R90   Pull-down shade
```
$Pull-down shade, thin, fabric
$5% transmittance, 90% reflectance
TYPE = BLIND          THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95    SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.05   TRANS-SOL-HH   = 0.05
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.05   TRANS-VIS-HH   = 0.05
REFL-SOL-BH  = 0.90   REFL-SOL-HH  = 0.90   BACKREFL-SOL-BH = 0.90
REFL-VIS-BH  = 0.90   REFL-VIS-HH  = 0.90   BACKREFL-VIS-BH = 0.90
BACKREFL-SOL-HH = 0.90 BACKREFL-VIS-HH = 0.90
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T10-R10   Pull-down shade
```
$Pull-down shade, thin, fabric
$10% transmittance, 10% reflectance
TYPE = BLIND          THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95    SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.10   TRANS-SOL-HH   = 0.10
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.10   TRANS-VIS-HH   = 0.10
REFL-SOL-BH  = 0.10   REFL-SOL-HH  = 0.10   BACKREFL-SOL-BH = 0.10
REFL-VIS-BH  = 0.10   REFL-VIS-HH  = 0.10   BACKREFL-VIS-BH = 0.10
BACKREFL-SOL-HH = 0.10 BACKREFL-VIS-HH = 0.10
 TRANS-IR    = 0.0    EMIS-IR      = 0.9    BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T10-R30   Pull-down shade
$Pull-down shade, thin, fabric
$10% transmittance, 30% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.10   TRANS-SOL-HH   = 0.10
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.10   TRANS-VIS-HH   = 0.10
REFL-SOL-BH = 0.30   REFL-SOL-HH = 0.30   BACKREFL-SOL-BH = 0.30
REFL-VIS-BH = 0.30   REFL-VIS-HH = 0.30   BACKREFL-VIS-BH = 0.30
BACKREFL-SOL-HH = 0.30 BACKREFL-VIS-HH = 0.30
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

Shade-Thin-T10-R50   Pull-down shade
$Pull-down shade, thin, fabric
$10% transmittance, 50% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.10   TRANS-SOL-HH   = 0.10
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.10   TRANS-VIS-HH   = 0.10
REFL-SOL-BH = 0.50   REFL-SOL-HH = 0.50   BACKREFL-SOL-BH = 0.50
REFL-VIS-BH = 0.50   REFL-VIS-HH = 0.50   BACKREFL-VIS-BH = 0.50
BACKREFL-SOL-HH = 0.50 BACKREFL-VIS-HH = 0.50
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

Shade-Thin-T10-R70   Pull-down shade
$Pull-down shade, thin, fabric
$10% transmittance, 70% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.10   TRANS-SOL-HH   = 0.10
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.10   TRANS-VIS-HH   = 0.10
REFL-SOL-BH = 0.70   REFL-SOL-HH = 0.70   BACKREFL-SOL-BH = 0.70
REFL-VIS-BH = 0.70   REFL-VIS-HH = 0.70   BACKREFL-VIS-BH = 0.70
BACKREFL-SOL-HH = 0.70 BACKREFL-VIS-HH = 0.70
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

Shade-Thin-T10-R80   Pull-down shade
$Pull-down shade, thin, fabric
$10% transmittance, 80% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.10   TRANS-SOL-HH   = 0.10
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.10   TRANS-VIS-HH   = 0.10
REFL-SOL-BH = 0.80   REFL-SOL-HH = 0.80   BACKREFL-SOL-BH = 0.80
REFL-VIS-BH = 0.80   REFL-VIS-HH = 0.80   BACKREFL-VIS-BH = 0.80
BACKREFL-SOL-HH = 0.80 BACKREFL-VIS-HH = 0.80
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

Shade-Thin-T20-R10   Pull-down shade
$Pull-down shade, thin, fabric
$20% transmittance, 10% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.20   TRANS-SOL-HH   = 0.20
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.20   TRANS-VIS-HH   = 0.20
REFL-SOL-BH = 0.10   REFL-SOL-HH = 0.10   BACKREFL-SOL-BH = 0.10
REFL-VIS-BH = 0.10   REFL-VIS-HH = 0.10   BACKREFL-VIS-BH = 0.10
BACKREFL-SOL-HH = 0.10 BACKREFL-VIS-HH = 0.10
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

Shade-Thin-T20-R30   Pull-down shade
$Pull-down shade, thin, fabric
$20% transmittance, 30% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90

```
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.20    TRANS-SOL-HH   = 0.20
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.20    TRANS-VIS-HH   = 0.20
REFL-SOL-BH  = 0.30   REFL-SOL-HH  = 0.30    BACKREFL-SOL-BH = 0.30
REFL-VIS-BH  = 0.30   REFL-VIS-HH  = 0.30    BACKREFL-VIS-BH = 0.30
BACKREFL-SOL-HH = 0.30 BACKREFL-VIS-HH = 0.30
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T20-R50   Pull-down shade
```
$Pull-down shade, thin, fabric
$20% transmittance, 50% reflectance
TYPE = BLIND           THICKNESS    = 0.00066 CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.20    TRANS-SOL-HH   = 0.20
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.20    TRANS-VIS-HH   = 0.20
REFL-SOL-BH  = 0.50   REFL-SOL-HH  = 0.50    BACKREFL-SOL-BH = 0.50
REFL-VIS-BH  = 0.50   REFL-VIS-HH  = 0.50    BACKREFL-VIS-BH = 0.50
BACKREFL-SOL-HH = 0.50 BACKREFL-VIS-HH = 0.50
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T20-R70   Pull-down shade
```
$Pull-down shade, thin, fabric
$20% transmittance, 70% reflectance
TYPE = BLIND           THICKNESS    = 0.00066 CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.20    TRANS-SOL-HH   = 0.20
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.20    TRANS-VIS-HH   = 0.20
REFL-SOL-BH  = 0.70   REFL-SOL-HH  = 0.70    BACKREFL-SOL-BH = 0.70
REFL-VIS-BH  = 0.70   REFL-VIS-HH  = 0.70    BACKREFL-VIS-BH = 0.70
BACKREFL-SOL-HH = 0.70 BACKREFL-VIS-HH = 0.70
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T30-R10   Pull-down shade
```
$Pull-down shade, thin, fabric
$30% transmittance, 10% reflectance
TYPE = BLIND           THICKNESS    = 0.00066 CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.30    TRANS-SOL-HH   = 0.30
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.30    TRANS-VIS-HH   = 0.30
REFL-SOL-BH  = 0.10   REFL-SOL-HH  = 0.10    BACKREFL-SOL-BH = 0.10
REFL-VIS-BH  = 0.10   REFL-VIS-HH  = 0.10    BACKREFL-VIS-BH = 0.10
BACKREFL-SOL-HH = 0.10 BACKREFL-VIS-HH = 0.10
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T30-R30   Pull-down shade
```
$Pull-down shade, thin, fabric
$30% transmittance, 30% reflectance
TYPE = BLIND           THICKNESS    = 0.00066 CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.30    TRANS-SOL-HH   = 0.30
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.30    TRANS-VIS-HH   = 0.30
REFL-SOL-BH  = 0.30   REFL-SOL-HH  = 0.30    BACKREFL-SOL-BH = 0.30
REFL-VIS-BH  = 0.30   REFL-VIS-HH  = 0.30    BACKREFL-VIS-BH = 0.30
BACKREFL-SOL-HH = 0.30 BACKREFL-VIS-HH = 0.30
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T30-R50   Pull-down shade
```
$Pull-down shade, thin, fabric
$30% transmittance, 50% reflectance
TYPE = BLIND           THICKNESS    = 0.00066 CONDUCTIVITY    = 0.0667
SLAT-ANGLE = 89.95     SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840    SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0    TRANS-SOL-BH = 0.30    TRANS-SOL-HH   = 0.30
TRANS-VIS-BB = 0.0    TRANS-VIS-BH = 0.30    TRANS-VIS-HH   = 0.30
REFL-SOL-BH  = 0.50   REFL-SOL-HH  = 0.50    BACKREFL-SOL-BH = 0.50
REFL-VIS-BH  = 0.50   REFL-VIS-HH  = 0.50    BACKREFL-VIS-BH = 0.50
BACKREFL-SOL-HH = 0.50 BACKREFL-VIS-HH = 0.50
 TRANS-IR    = 0.0    EMIS-IR      = 0.9     BACKEMIS-IR     = 0.9 ..
```

Shade-Thin-T30-R60   Pull-down shade
$Pull-down shade, thin, fabric
$30% transmittance, 60% reflectance
TYPE = BLIND   THICKNESS   = 0.00066 CONDUCTIVITY   = 0.0667
SLAT-ANGLE = 89.95   SLAT-ORIENTATION = HORIZONTAL
SLAT-WIDTH = 0.0840   SLAT-SEPARATION = 0.0833 SLAT-ANGLE-MAX = 90
TRANS-SOL-BB = 0.0   TRANS-SOL-BH = 0.30   TRANS-SOL-HH   = 0.30
TRANS-VIS-BB = 0.0   TRANS-VIS-BH = 0.30   TRANS-VIS-HH   = 0.30
REFL-SOL-BH = 0.60   REFL-SOL-HH = 0.60   BACKREFL-SOL-BH = 0.60
REFL-VIS-BH = 0.60   REFL-VIS-HH = 0.60   BACKREFL-VIS-BH = 0.60
BACKREFL-SOL-HH = 0.60 BACKREFL-VIS-HH = 0.60
 TRANS-IR   = 0.0   EMIS-IR   = 0.9   BACKEMIS-IR   = 0.9 ..

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Section

2
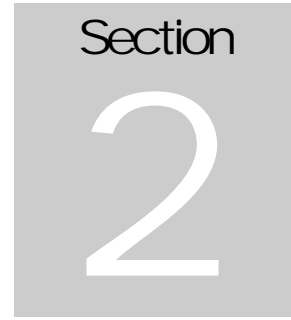
Lighting Libraries

This section contains libraries for lamps and luminaires

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LAMP LIBRARY

The following is a list of the lamp types in the Library. The meaning of each entry is as follows. The bold-faced text is the U-name of the lamp type to be used as the value of the keyword LAMP-TYPE in the LIGHTING-SYSTEM command. For example, to choose the first lamp in the library, which has the U-name **F17T8/ES-Rap**, your input would look like:

```
LS-1 = LIGHTING-SYSTEM
    LIGHTING-CALC-METHOD = LUMINAIRE-LAMP
    LAMP-TYPE           = F17T8/ES-Rap
    ....
```

Following the U-name is the lamp classification, such as "T8 ES Fluor." Here, the following abbreviations are used: Tn = tube diameter in eighths of an inch, ES = energy saving, Fluor = fluorescent, CFL = compact fluorescent lamp, Incand = incandescent, and Press = pressure.

The second line of an entry gives a description of the lamp type. The remaining lines give the value of the CATEGORY through LUMEN-DEPREC keywords for this lamp type. The program will use the indicated keyword values in the lighting system calculation. For a description of these keywords, see "LAMP-TYPE Command" in the *Command/Keyword Dictionary*.

Table 14 Lamp Library

```
F17T8/ES-Rap                                   T8 ES Fluor
*24" Fluor, Energy Saving, Rapid Start, 78 lum/watt           *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 17   INIT-LUMEN-OUT = 1325   LUMEN-DEPREC = .77


F25T8/ES-Rap                                   T8 ES Fluor
*36" Fluor, Energy Saving, Rapid Start, 85 lum/watt           *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-36-IN
 POWER-INPUT = 25   INIT-LUMEN-OUT = 2125   LUMEN-DEPREC = .81


F32T8/ES-Rap                                   T8 ES Fluor
*48" Fluor, Energy Saving, Rapid Start, 89 lum/watt           *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 32   INIT-LUMEN-OUT = 2850   LUMEN-DEPREC = .84


F40T12/ES-Rap                                  T12 ES Fluor
*48" Fluor, Energy Saving, Rapid Start, 76 lum/watt           *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 34   INIT-LUMEN-OUT = 2670   LUMEN-DEPREC = .82


F48T12/ES-HO-Rap                               T12 ES Fluor
*48" Fluor, Energy Saving, High Output, Rapid Start, 70 lum/watt *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 55   INIT-LUMEN-OUT = 3850   LUMEN-DEPREC = .82


F96T12/ES-HO-Rap                               T12 ES Fluor
*96" Fluor, Energy Saving, High Output, Rapid Start, 84 lum/watt *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-96-IN
 POWER-INPUT = 95   INIT-LUMEN-OUT = 8020   LUMEN-DEPREC = .82


F48T12/ES-Ins                                  T12 ES Fluor
*48" Fluor, Energy Saving, Instant Start, 82 lum/watt         *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 32   INIT-LUMEN-OUT = 2610   LUMEN-DEPREC = .82


F96T8/ES-Ins                                   T8 ES Fluor
*96" Fluor, Energy Saving, Instant Start, 86 lum/watt         *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-96-IN
 POWER-INPUT = 40   INIT-LUMEN-OUT = 3450   LUMEN-DEPREC = .82


F96T12/ES-Ins                                  T12 ES Fluor
*96" Fluor, Energy Saving, Instant Start, 91 lum/watt         *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-96-IN
 POWER-INPUT = 60   INIT-LUMEN-OUT = 5430   LUMEN-DEPREC = .82


F40T12/ES-Ins                                  T12 ES Fluor
*48" Fluor, Energy Saving, Instant Start, 80 lum/watt         *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 35   INIT-LUMEN-OUT = 2800   LUMEN-DEPREC = .82


F40T12/ES-Rap                                  T12 ES Fluor
*48" Fluor, Energy Saving, Rapid Start, 80 lum/watt           *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 35   INIT-LUMEN-OUT = 2800   LUMEN-DEPREC = .82


F40T12/U/6-ES-Rap                              T12 ES Fluor
*24" U-Tube Fluor, Energy Saving, Rapid Start, 82 lum/watt    *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 34   INIT-LUMEN-OUT = 2800   LUMEN-DEPREC = .77


F30T12/Rap                                     T12 Fluor
*36" Fluor, Rapid Start, 78 lum/watt                          *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-36-IN
 POWER-INPUT = 30   INIT-LUMEN-OUT = 2350   LUMEN-DEPREC = .81


F40T12/Rap                                     T12 Fluor
*48" Fluor, Rapid Start, 76 lum/watt                          *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
```

```
 POWER-INPUT = 40  INIT-LUMEN-OUT = 3050  LUMEN-DEPREC = .84
```

F40T10/Rap   T10 Fluor
```
*48" Fluor, Rapid Start, 78 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-48-IN
 POWER-INPUT = 40  INIT-LUMEN-OUT = 3100  LUMEN-DEPREC = .84
```

F24T12/HO-Rap   T12 Fluor
```
*24" Fluor, High Output, Rapid Start, 47 lum/watt        *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-24-IN
 POWER-INPUT = 35  INIT-LUMEN-OUT = 1640  LUMEN-DEPREC = .77
```

F36T12/HO-Rap   T12 Fluor
```
*36" Fluor, High Output, Rapid Start, 60 lum/watt        *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-36-IN
 POWER-INPUT = 47  INIT-LUMEN-OUT = 2815  LUMEN-DEPREC = .77
```

F48T12/HO-Rap   T12 Fluor
```
*48" Fluor, High Output, Rapid Start, 68 lum/watt        *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-48-IN
 POWER-INPUT = 60  INIT-LUMEN-OUT = 4067  LUMEN-DEPREC = .82
```

F72T12/HO-Rap   T12 Fluor
```
*72" Fluor, High Output, Rapid Start, 75 lum/watt        *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-72-IN
 POWER-INPUT = 85  INIT-LUMEN-OUT = 6367  LUMEN-DEPREC = .82
```

F96T12/HO-Rap   T12 Fluor
```
*96" Fluor, High Output, Rapid Start, 80 lum/watt        *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-96-IN
 POWER-INPUT = 110  INIT-LUMEN-OUT = 8830  LUMEN-DEPREC = .82
```

F48T10/Rap   T10 Fluor
```
*48" Fluor, Rapid Start, 56 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-48-IN
 POWER-INPUT = 110  INIT-LUMEN-OUT = 6200  LUMEN-DEPREC = .66
```

F72T10/Rap   T10 Fluor
```
*72" Fluor, Rapid Start, 61 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-72-IN
 POWER-INPUT = 160  INIT-LUMEN-OUT = 9700  LUMEN-DEPREC = .66
```

F96T10/VHO-Rap   T10 Fluor
```
*96" Fluor, Very High Output, Rapid Start, 69 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-96-IN
 POWER-INPUT = 195  INIT-LUMEN-OUT = 13500  LUMEN-DEPREC = .66
```

F48T12/Rap   T12 Fluor
```
*48" Fluor, Rapid Start, 60 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-48-IN
 POWER-INPUT = 110  INIT-LUMEN-OUT = 6617  LUMEN-DEPREC = .69
```

F72T12/Rap   T12 Fluor
```
*72" Fluor, Rapid Start, 64 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-72-IN
 POWER-INPUT = 165  INIT-LUMEN-OUT = 10617  LUMEN-DEPREC = .72
```

F96T12/Rap   T12 Fluor
```
*96" Fluor, Rapid Start, 66 lum/watt                    *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-96-IN
 POWER-INPUT = 217  INIT-LUMEN-OUT = 14400  LUMEN-DEPREC = .72
```

F24T12/Ins   T12 Fluor
```
*24" Fluor, Instant Start, 58 lum/watt                  *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-24-IN
 POWER-INPUT = 20  INIT-LUMEN-OUT = 1150  LUMEN-DEPREC = .81
```

F36T12/Ins   T12 Fluor
```
*36" Fluor, Instant Start, 65 lum/watt                  *
CATEGORY = FULL-SIZE-FLUOR  SIZE = T-36-IN
 POWER-INPUT = 30  INIT-LUMEN-OUT = 1940  LUMEN-DEPREC = .81
```

F48T12/Ins   T12 Fluor
*48" Fluor, Instant Start, 74 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-48-IN
 POWER-INPUT = 39   INIT-LUMEN-OUT = 2890   LUMEN-DEPREC = .82

F72T12/Ins   T12 Fluor
*72" Fluor, Instant Start, 81 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-72-IN
 POWER-INPUT = 55   INIT-LUMEN-OUT = 4480   LUMEN-DEPREC = .89

F96T12/Ins   T12 Fluor
*96" Fluor, Instant Start, 88 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-96-IN
 POWER-INPUT = 75   INIT-LUMEN-OUT = 6620   LUMEN-DEPREC = .89

F72T8/Ins   T8 Fluor
*72" Fluor, Instant Start, 82 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-72-IN
 POWER-INPUT = 37   INIT-LUMEN-OUT = 3025   LUMEN-DEPREC = .83

F96T8/Ins   T8 Fluor
*96" Fluor, Instant Start, 81 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-96-IN
 POWER-INPUT = 50   INIT-LUMEN-OUT = 4025   LUMEN-DEPREC = .89

FB16T8/Rap   T8 U-Tube Fluor
*12" U-Tube Fluor, Rapid Start, 78 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-12-IN
 POWER-INPUT = 16   INIT-LUMEN-OUT = 1250   LUMEN-DEPREC = .80

FB24T8/Rap   T8 U-Tube Fluor
*18" U-Tube Fluor, Rapid Start, 85 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-18-IN
 POWER-INPUT = 24   INIT-LUMEN-OUT = 2050   LUMEN-DEPREC = .80

FB31T8/Rap   T8 U-Tube Fluor
*24" U-Tube Fluor, Rapid Start, 90 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 31   INIT-LUMEN-OUT = 2800   LUMEN-DEPREC = .80

FB35T12/Rap   T12 U-Tube Fluor
*22.5" U-Tube Fluor, Rapid Start, 67 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 35   INIT-LUMEN-OUT = 2350   LUMEN-DEPREC = .80

FB40T12/Rap   T12 U-Tube Fluor
*22.5" U-Tube Fluor, Rapid Start, 75 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 40   INIT-LUMEN-OUT = 3000   LUMEN-DEPREC = .80

FT18W/2G11-Rap   Twin-Tube Fluor
*11" U-Tube Fluor, Rapid Start, 69 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-12-IN
 POWER-INPUT = 18   INIT-LUMEN-OUT = 1250   LUMEN-DEPREC = .80

FT39W/2G11-Rap   Twin-Tube Fluor
*17" U-Tube Fluor, Rapid Start, 73 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-18-IN
 POWER-INPUT = 39   INIT-LUMEN-OUT = 2850   LUMEN-DEPREC = .80

FT40W/2G11-Rap   Twin-Tube Fluor
*11" U-Tube Fluor, Rapid Start, 79 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 40   INIT-LUMEN-OUT = 3150   LUMEN-DEPREC = .80

FT50W/2G11-Rap   Twin-Tube Fluor
*23" U-Tube Fluor, Rapid Start, 80 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 50   INIT-LUMEN-OUT = 4000   LUMEN-DEPREC = .80

FT55W/2G11-Rap   Twin-Tube Fluor
*21" U-Tube Fluor, Rapid Start, 87 lum/watt   *
CATEGORY = FULL-SIZE-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 55   INIT-LUMEN-OUT = 4800   LUMEN-DEPREC = .80

CFT5W/G23   Twin-Tube CFL
*5-Watt Twin-Tube Compact T4 Fluorescent, 50 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 5   INIT-LUMEN-OUT = 250   LUMEN-DEPREC = .80

CFT7W/G23   Twin-Tube CFL
*7-Watt Twin-Tube Compact T4 Fluorescent, 57 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 7   INIT-LUMEN-OUT = 400   LUMEN-DEPREC = .80

CFT9W/G23   Twin-Tube CFL
*9-Watt Twin-Tube Compact T4 Fluorescent, 67 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 9   INIT-LUMEN-OUT = 600   LUMEN-DEPREC = .80

CFT13W/GX23   Twin-Tube CFL
*13-Watt Twin-Tube Compact T4 Fluorescent, 69 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 13   INIT-LUMEN-OUT = 900   LUMEN-DEPREC = .80

CFT18W   Twin-Tube CFL
*18-Watt Twin-Tube Compact T5 Fluorescent, 10.5", 69 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 18   INIT-LUMEN-OUT = 1250   LUMEN-DEPREC = .83

CFT27W   Twin-Tube CFL
*27-Watt Twin-Tube Compact T5 Fluorescent, 12.8", 67 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-12-IN
 POWER-INPUT = 27   INIT-LUMEN-OUT = 1800   LUMEN-DEPREC = .83

CFT39W   Twin-Tube CFL
*39-Watt Twin-Tube Compact T5 Fluorescent, 16.5", 73 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-18-IN
 POWER-INPUT = 39   INIT-LUMEN-OUT = 2850   LUMEN-DEPREC = .80

CFT50W   Twin-Tube CFL
*39-Watt Twin-Tube Compact T5 Fluorescent, 22.5", 80 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-24-IN
 POWER-INPUT = 50   INIT-LUMEN-OUT = 4000   LUMEN-DEPREC = .74

CFQ9W/G23   Quad-Tube CFL
*9-Watt Quad-Tube Compact T4 Fluorescent, 67 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 9   INIT-LUMEN-OUT = 600   LUMEN-DEPREC = .80

CFQ13W/GX23   Quad-Tube CFL
*13-Watt Quad-Tube Compact T4 Fluorescent, 66 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 13   INIT-LUMEN-OUT = 860   LUMEN-DEPREC = .80

CFQ15W/GX32D   Quad-Tube CFL
*15-Watt Quad-Tube Compact T4 Fluorescent, 60 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 15   INIT-LUMEN-OUT = 900   LUMEN-DEPREC = .80

CFQ18W/G24D   Quad-Tube CFL
*18-Watt Quad-Tube Compact T4 Fluorescent, 69 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 18   INIT-LUMEN-OUT = 1250   LUMEN-DEPREC = .80

CFQ20W/GX32D   Quad-Tube CFL
*20-Watt Quad-Tube Compact T4 Fluorescent, 60 lum/watt   *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 20   INIT-LUMEN-OUT = 1200   LUMEN-DEPREC = .80

CFQ26W/G24D   Quad-Tube CFL

```
*26-Watt Quad-Tube Compact T4 Fluorescent, 69 lum/watt          *
CATEGORY = COMPACT-FLUOR   SIZE = T-6-12-IN
 POWER-INPUT = 26  INIT-LUMEN-OUT = 1800  LUMEN-DEPREC = .80


CFH13W                                    Hex-Tube CFL
*13-Watt Hex-Tube Compact T4 Fluorescent, 4.2", 65 lum/watt     *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 13  INIT-LUMEN-OUT = 840  LUMEN-DEPREC = .73


CFH18W                                    Hex-Tube CFL
*18-Watt Hex-Tube Compact T4 Fluorescent, 4.6", 62 lum/watt     *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 18  INIT-LUMEN-OUT = 1120  LUMEN-DEPREC = .73


CFH26W                                    Hex-Tube CFL
*26-Watt Hex-Tube Compact T4 Fluorescent, 5.2", 62 lum/watt     *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 26  INIT-LUMEN-OUT = 1610  LUMEN-DEPREC = .74


CFH32W                                    Hex-Tube CFL
*32-Watt Hex-Tube Compact T4 Fluorescent, 5.8", 69 lum/watt     *
CATEGORY = COMPACT-FLUOR   SIZE = T-0-6-IN
 POWER-INPUT = 32  INIT-LUMEN-OUT = 2200  LUMEN-DEPREC = .74


Incand50W/A19                             Incand Frosted
*50-Watt INCANDESCENT, Inside Frosted, A19, 14 lum/watt         *
CATEGORY = INCANDESCENT   SIZE = ALPHA-0-21
 POWER-INPUT = 50  INIT-LUMEN-OUT = 680  LUMEN-DEPREC = .88


Incand75W/A19                             Incand Frosted
*75-Watt INCANDESCENT, Inside Frosted, A19, 16 lum/watt         *
CATEGORY = INCANDESCENT   SIZE = ALPHA-0-21
 POWER-INPUT = 75  INIT-LUMEN-OUT = 1190  LUMEN-DEPREC = .92


Incand100W/A19                            Incand Frosted
*100-Watt INCANDESCENT, Inside Frosted, A19, 17 lum/watt        *
CATEGORY = INCANDESCENT   SIZE = ALPHA-0-21
 POWER-INPUT = 100  INIT-LUMEN-OUT = 1740  LUMEN-DEPREC = .91


Incand150W/A21                            Incand Frosted
*150-Watt INCANDESCENT, Inside Frosted, A21, 19 lum/watt        *
CATEGORY = INCANDESCENT   SIZE = ALPHA-0-21
 POWER-INPUT = 150  INIT-LUMEN-OUT = 2873  LUMEN-DEPREC = .89


Incand200W/A23                            Incand Frosted
*200-Watt INCANDESCENT, Inside Frosted, A23, 20 lum/watt        *
CATEGORY = INCANDESCENT   SIZE = ALPHA-22-30
 POWER-INPUT = 200  INIT-LUMEN-OUT = 4003  LUMEN-DEPREC = .89


Incand300W/PS30                           Incand Frosted
*300-Watt INCANDESCENT, Inside Frosted, PS30, 20 lum/watt       *
CATEGORY = INCANDESCENT   SIZE = ALPHA-22-30
 POWER-INPUT = 300  INIT-LUMEN-OUT = 6103  LUMEN-DEPREC = .83


Incand500W/PS40                           Incand Frosted
*500-Watt INCANDESCENT, Inside Frosted, PS40, 20 lum/watt       *
CATEGORY = INCANDESCENT   SIZE = ALPHA-31-50
 POWER-INPUT = 500  INIT-LUMEN-OUT = 10035  LUMEN-DEPREC = .89


Incand1000W/PS52                          Incand Frosted
*1000-Watt INCANDESCENT, Inside Frosted, PS52, 24 lum/watt      *
CATEGORY = INCANDESCENT   SIZE = ALPHA-31-50
 POWER-INPUT = 1000  INIT-LUMEN-OUT = 23510  LUMEN-DEPREC = .89


Incand1500W/PS52                          Incand Frosted
*1500-Watt INCANDESCENT, Inside Frosted, PS52, 23 lum/watt      *
CATEGORY = INCANDESCENT   SIZE = ALPHA-31-50
 POWER-INPUT = 1500  INIT-LUMEN-OUT = 33850  LUMEN-DEPREC = .78


Incand45W/PAR38                           Incand Flood
*45-Watt INCANDESCENT Parabolic Reflector, PAR38, 12 lum/watt   *
```

```
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 45  INIT-LUMEN-OUT = 540  LUMEN-DEPREC = .88
```

Incand75W/PAR38   Incand Flood
```
*75-Watt INCANDESCENT Parabolic Reflector, PAR38, 12 lum/watt    *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 75  INIT-LUMEN-OUT = 900  LUMEN-DEPREC = .88
```

Incand100W/PAR38   Incand Flood
```
*100-Watt INCANDESCENT Parabolic Reflector, PAR38, 13 lum/watt   *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 100  INIT-LUMEN-OUT = 1250  LUMEN-DEPREC = .91
```

Incand150W/PAR38   Incand Flood
```
*150-Watt INCANDESCENT Parabolic Reflector, PAR38, 12 lum/watt   *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 150  INIT-LUMEN-OUT = 1735  LUMEN-DEPREC = .89
```

Incand250W/PAR38   Incand Flood
```
*250-Watt INCANDESCENT Parabolic Reflector, PAR38, 13 lum/watt   *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 250  INIT-LUMEN-OUT = 3200  LUMEN-DEPREC = .89
```

Incand500W/PAR64   Incand Flood
```
*500-Watt INCANDESCENT Parabolic Reflector, PAR64, 13 lum/watt   *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 500  INIT-LUMEN-OUT = 6500  LUMEN-DEPREC = .89
```

Incand1000W/PAR64   Incand Flood
```
*1000-Watt INCANDESCENT Parabolic Reflector, PAR64, 18 lum/watt  *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 1000  INIT-LUMEN-OUT = 17700  LUMEN-DEPREC = .89
```

Incand50W/R20   Incand Flood
```
*50-Watt INCANDESCENT Reflector, R20, 8 lum/watt                 *
CATEGORY = INCANDESCENT  SIZE = REFL-0-21
 POWER-INPUT = 50    INIT-LUMEN-OUT = 415    LUMEN-DEPREC = .89
```

Incand75W/R30   Incand Flood
```
*75-Watt INCANDESCENT Reflector, R30, 12 lum/watt                *
CATEGORY = INCANDESCENT  SIZE = REFL-22-30
 POWER-INPUT = 75    INIT-LUMEN-OUT = 865    LUMEN-DEPREC = .89
```

Incand120W/R40   Incand Flood
```
*120-Watt INCANDESCENT Reflector, R40, 13 lum/watt               *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 120   INIT-LUMEN-OUT = 1600   LUMEN-DEPREC = .89
```

Incand300W/R40   Incand Flood
```
*300-Watt INCANDESCENT Reflector, R40, 14 lum/watt               *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 300   INIT-LUMEN-OUT = 4250   LUMEN-DEPREC = .89
```

Incand500W/R40   Incand Flood
```
*500-Watt INCANDESCENT Reflector, R40, 13 lum/watt               *
CATEGORY = INCANDESCENT  SIZE = REFL-31-50
 POWER-INPUT = 500   INIT-LUMEN-OUT = 6500   LUMEN-DEPREC = .89
```

MetalHalide32W/E17   Metal Halide
```
*32-Watt Metal Halide, Vertical, Screw Base, E17, 78 lum/watt    *
CATEGORY = HID-MET-HALIDE  SIZE = ALPHA-0-21
 POWER-INPUT = 32  INIT-LUMEN-OUT = 2500    LUMEN-DEPREC = .89
```

MetalHalide75W/ED17   Metal Halide
```
*75-Watt Metal Halide, Vertical, Screw Base, ED17, 75 lum/watt   *
CATEGORY = HID-MET-HALIDE  SIZE = ALPHA-0-21
 POWER-INPUT = 75  INIT-LUMEN-OUT = 5600    LUMEN-DEPREC = .89
```

MetalHalide150W/ED17   Metal Halide
```
*150-Watt Metal Halide, Vertical, Screw Base, ED17, 83 lum/watt  *
CATEGORY = HID-MET-HALIDE  SIZE = ALPHA-0-21
```

```
 POWER-INPUT = 150   INIT-LUMEN-OUT = 12500    LUMEN-DEPREC = .89
```

MetalHalide250W/ED28   Metal Halide
```
*250-Watt Metal Halide, Vertical, Screw Base, ED28, 92 lum/watt  *
CATEGORY = HID-MET-HALIDE  SIZE = ALPHA-22-30
 POWER-INPUT = 250   INIT-LUMEN-OUT = 23000    LUMEN-DEPREC = .89
```

MetalHalide400W/ED37   Metal Halide
```
*400-Watt Metal Halide, Vertical, Screw Base, ED37, 100 lum/watt *
CATEGORY = HID-MET-HALIDE  SIZE = ALPHA-31-50
 POWER-INPUT = 400   INIT-LUMEN-OUT = 40000    LUMEN-DEPREC = .89
```

MetalHalide70W/T6.5   Metal Halide
```
*75-Watt Metal Halide, Horizont, Double End, T6.5, 79 lum/watt   *
CATEGORY = HID-MET-HALIDE  SIZE = T-6-12-IN
 POWER-INPUT = 70   INIT-LUMEN-OUT = 5500    LUMEN-DEPREC = .89
```

MetalHalide100W/T7.5   Metal Halide
```
*100-Watt Metal Halide, Horizont, Double End, T7.5, 68 lum/watt  *
CATEGORY = HID-MET-HALIDE  SIZE = T-6-12-IN
 POWER-INPUT = 100   INIT-LUMEN-OUT = 6800    LUMEN-DEPREC = .89
```

MetalHalide150W/T7.5   Metal Halide
```
*150-Watt Metal Halide, Horizont, Double End, T7.5, 80 lum/watt  *
CATEGORY = HID-MET-HALIDE  SIZE = T-6-12-IN
 POWER-INPUT = 150   INIT-LUMEN-OUT = 12000    LUMEN-DEPREC = .89
```

MetalHalide250W/T9.5   Metal Halide
```
*150-Watt Metal Halide, Horizont, Double End, T9.5, 80 lum/watt  *
CATEGORY = HID-MET-HALIDE  SIZE = T-6-12-IN
 POWER-INPUT = 250   INIT-LUMEN-OUT = 20000    LUMEN-DEPREC = .89
```

MetalHalide400W/T10   Metal Halide
```
*400-Watt Metal Halide, Horizont, Double End, T10, 85 lum/watt   *
CATEGORY = HID-MET-HALIDE  SIZE = T-6-12-IN
 POWER-INPUT = 400   INIT-LUMEN-OUT = 34000    LUMEN-DEPREC = .89
```

HPS35W/E17   Hi Press Sodium
```
*35-Watt HPS, Universal Position, Screw Base, E17, 64 lum/watt   *
CATEGORY = HID-HI-PR-SODIUM  SIZE = ALPHA-0-21
 POWER-INPUT = 35   INIT-LUMEN-OUT = 2250     LUMEN-DEPREC = .89
```

HPS70W/E17   Hi Press Sodium
```
*70-Watt HPS, Universal Position, Screw Base, E17, 90 lum/watt   *
CATEGORY = HID-HI-PR-SODIUM  SIZE = ALPHA-0-21
 POWER-INPUT = 70   INIT-LUMEN-OUT = 6300     LUMEN-DEPREC = .89
```

HPS150W/B17   Hi Press Sodium
```
*150-Watt HPS, Universal Position, Screw Base, B17, 107 lum/watt *
CATEGORY = HID-HI-PR-SODIUM  SIZE = ALPHA-0-21
 POWER-INPUT = 150   INIT-LUMEN-OUT = 16000     LUMEN-DEPREC = .89
```

HPS250W/ED18   Hi Press Sodium
```
*250-Watt HPS, Universal Position, Screw Base, ED18, 110 lum/watt*
CATEGORY = HID-HI-PR-SODIUM  SIZE = ALPHA-0-21
 POWER-INPUT = 250   INIT-LUMEN-OUT = 27500     LUMEN-DEPREC = .89
```

HPS400W/ED18   Hi Press Sodium
```
*400-Watt HPS, Universal Position, Screw Base, ED18, 125 lum/watt*
CATEGORY = HID-HI-PR-SODIUM  SIZE = ALPHA-0-21
 POWER-INPUT = 400   INIT-LUMEN-OUT = 50000     LUMEN-DEPREC = .89
```

TungHal75W/T3   Tungsten Halogen
```
*75-Watt Tungsten Halogen, Single Ended, T3, 19 lum/watt         *
CATEGORY = TUNGSTEN-HALOGEN  SIZE = T-0-6-IN
 POWER-INPUT = 75   INIT-LUMEN-OUT = 1400     LUMEN-DEPREC = .96
```

TungHal100W/T4   Tungsten Halogen
```
*100-Watt Tungsten Halogen, Single Ended, T4, 18 lum/watt        *
CATEGORY = TUNGSTEN-HALOGEN  SIZE = T-0-6-IN
 POWER-INPUT = 100   INIT-LUMEN-OUT = 1800     LUMEN-DEPREC = .96
```

```
TungHal150W/T4                                Tungsten Halogen
*150-Watt Tungsten Halogen, Single Ended, T4, 19 lum/watt        *
CATEGORY = TUNGSTEN-HALOGEN  SIZE = T-0-6-IN
 POWER-INPUT = 150  INIT-LUMEN-OUT = 2900    LUMEN-DEPREC = .96


TungHal250W/T4                                Tungsten Halogen
*250-Watt Tungsten Halogen, Single Ended, T4, 19 lum/watt        *
CATEGORY = TUNGSTEN-HALOGEN  SIZE = T-0-6-IN
 POWER-INPUT = 250  INIT-LUMEN-OUT = 4850    LUMEN-DEPREC = .96


TungHal500W/T4                                Tungsten Halogen
*500-Watt Tungsten Halogen, Single Ended, T4, 23 lum/watt        *
CATEGORY = TUNGSTEN-HALOGEN  SIZE = T-0-6-IN
 POWER-INPUT = 500  INIT-LUMEN-OUT = 11500    LUMEN-DEPREC = .96
```

LUMINAIRE LIBRARY

The following is a list of the luminaire types in the Library. The meaning of each entry is as follows.

The bold-faced text is the U-name of the luminaire type to be used as the value of the keyword LUMINAIRE-TYPE in the LIGHTING-SYSTEM command. For example, to choose the first luminaire in the library, which has the U-name Troffer-2X4-2-Lamp, your input would look like:

```
LS-1 = LIGHTING-SYSTEM
    LIGHTING-CALC-METHOD = LUMINAIRE-LAMP
    LUMINAIRE-TYPE     = Troffer-2X4-2-Lamp
    ....
```

Following the U-name is the luminaire category, such as "Full-size Fluor."

The second line of an entry gives a description of the luminaire type. The remaining lines give the value of the CU-RCR-1 through ACCEPT-CONFIG keywords for this luminaire type. The program will use the indicated keyword values in the lighting system calculation. For a description of these keywords, see "LUMINAIRE-TYPE Command" in the *Command/Keyword Dictionary*.

Table 15 Luminaire Library

```
Troffer-2X4-2-Lamp                                 Full-Size Fluor
*Troffer, 2'x4', 2 Lamps, Pattern Acrylic Diffuser          *
CU-RCR-1  = (.69,.71,.72,.71,.73,.75,.72,.77,.80)
CU-RCR-5  = (.41,.45,.49,.41,.45,.50,.42,.46,.52)
CU-RCR-10 = (.22,.25,.30,.22,.25,.30,.22,.26,.32)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-STATIC)

Troffer-2X4-3-Lamp                                 Full-Size Fluor
*Troffer, 2'x4', 3 Lamps, Pattern Acrylic Diffuser          *
CU-RCR-1  = (.65,.66,.67,.67,.68,.70,.68,.72,.75)
CU-RCR-5  = (.39,.42,.46,.39,.42,.47,.39,.44,.49)
CU-RCR-10 = (.20,.24,.26,.21,.24,.29,.21,.24,.30)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-STATIC)

Troffer-2X4-4-Lamp                                 Full-Size Fluor
*Troffer, 2'x4', 4 Lamps, Pattern Acrylic Diffuser          *
CU-RCR-1  = (.62,.64,.65,.64,.66,.68,.65,.69,.72)
CU-RCR-5  = (.37,.40,.44,.37,.41,.45,.38,.42,.47)
CU-RCR-10 = (.20,.23,.27,.20,.23,.27,.20,.23,.28)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-STATIC)

Air-Handling-Troffer-2X4-2-Lamp                    Full-Size Fluor
*Air Handling Troffer, 2'x4', 2 Lamps, Pattern Acrylic Diffuser  *
CU-RCR-1  = (.66,.67,.69,.68,.70,.72,.71,.74,.76)
CU-RCR-5  = (.38,.41,.45,.38,.42,.47,.39,.43,.49)
CU-RCR-10 = (.20,.23,.26,.20,.23,.28,.20,.24,.29)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-VENTED)

Air-Handling-Troffer-2X4-3-Lamp                    Full-Size Fluor
*Air Handling Troffer, 2'x4', 3 Lamps, Pattern Acrylic Diffuser  *
CU-RCR-1  = (.60,.62,.63,.62,.64,.66,.65,.68,.70)
CU-RCR-5  = (.35,.38,.42,.35,.38,.43,.36,.40,.45)
CU-RCR-10 = (.18,.21,.25,.18,.22,.26,.19,.22,.27)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-VENTED)

Air-Handling-Troffer-2X4-4-Lamp                    Full-Size Fluor
*Air Handling Troffer, 2'x4', 4 Lamps, Acrylic Diffuser          *
CU-RCR-1  = (.58,.59,.61,.60,.62,.63,.63,.65,.67)
CU-RCR-5  = (.33,.36,.40,.34,.37,.41,.34,.38,.43)
CU-RCR-10 = (.18,.21,.25,.18,.21,.25,.18,.21,.26)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-VENTED)

Parabolic-Troffer-2X4-2-Lamp                       Full-Size Fluor
*Parabolic Troffer, 2'x4', 2 Lamps, Louvered                *
CU-RCR-1  = (.72,.74,.75,.75,.76,.78,.75,.81,.83)
CU-RCR-5  = (.41,.44,.49,.41,.45,.50,.42,.46,.53)
CU-RCR-10 = (.20,.23,.28,.20,.24,.29,.20,.24,.30)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

Parabolic-Troffer-2X4-3-Lamp                       Full-Size Fluor
*Parabolic Troffer, 2'x4', 3 Lamps, Louvered                *
CU-RCR-1  = (.67,.68,.69,.69,.70,.72,.70,.74,.76)
CU-RCR-5  = (.40,.43,.47,.40,.44,.48,.41,.45,.50)
CU-RCR-10 = (.21,.24,.28,.21,.24,.29,.21,.24,.30)
```

```
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)


Parabolic-Troffer-2X4-4-Lamp                Full-Size Fluor
*Parabolic Troffer, 2'x4', 4 Lamps, Louvered               *
CU-RCR-1  = (.59,.60,.60,.60,.62,.63,.61,.65,.67)
CU-RCR-5  = (.36,.39,.42,.36,.39,.43,.37,.40,.45)
CU-RCR-10 = (.19,.22,.26,.19,.22,.26,.19,.22,.27)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)


Surf/Susp-Parabolic-2X4-2-Lamp              Full-Size Fluor
*Surface or Suspended Parabolic, 2'x4', 2 Lamps, Louvered     *
CU-RCR-1  = (.72,.74,.75,.75,.76,.78,.75,.81,.83)
CU-RCR-5  = (.41,.44,.49,.41,.45,.50,.42,.46,.53)
CU-RCR-10 = (.20,.23,.28,.20,.24,.29,.20,.24,.30)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Surf/Susp-Parabolic-2X4-3-Lamp              Full-Size Fluor
*Surface or Suspended Parabolic, 2'x4', 3 Lamps, Louvered     *
CU-RCR-1  = (.67,.68,.69,.69,.70,.72,.70,.74,.76)
CU-RCR-5  = (.40,.43,.47,.40,.44,.48,.41,.45,.50)
CU-RCR-10 = (.21,.24,.28,.21,.24,.29,.21,.24,.30)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE =T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Surf/Susp-Parabolic-2X4-4-Lamp              Full-Size Fluor
*Surface or Suspended Parabolic, 2'x4', 4 Lamps, Louvered     *
CU-RCR-1  = (.59,.60,.60,.60,.62,.63,.61,.65,.67)
CU-RCR-5  = (.36,.39,.42,.36,.39,.43,.37,.40,.45)
CU-RCR-10 = (.19,.22,.26,.19,.22,.26,.19,.22,.27)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Air-Handling-Troffer-2X4-4-Lamp             Full-Size Fluor
*Air Handling Troffer, 2'x4', 4 Lamps, Floating Louver       *
CU-RCR-1  = (.52,.53,.53,.53,.54,.55,.56,.57,.59)
CU-RCR-5  = (.33,.35,.38,.34,.36,.39,.34,.37,.41)
CU-RCR-10 = (.18,.20,.23,.18,.20,.24,.18,.21,.25)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-VENTED)


Air-Handling-Troffer-2X2-2-Lamp             Full-Size Fluor
*Air Handling Troffer, 2'x2', 2 Lamps, Floating Louver       *
CU-RCR-1  = (.46,.47,.48,.48,.49,.50,.50,.52,.53)
CU-RCR-5  = (.30,.32,.34,.30,.32,.35,.31,.33,.37)
CU-RCR-10 = (.16,.18,.21,.16,.18,.21,.16,.18,.22)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-24-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-VENTED)


Air-Handling-Troffer-1X4-2-Lamp             Full-Size Fluor
*Air Handling Troffer, 1'x4', 2 Lamps, Floating Louver       *
CU-RCR-1  = (.46,.47,.48,.48,.49,.50,.50,.51,.53)
CU-RCR-5  = (.31,.32,.35,.31,.33,.36,.31,.34,.37)
CU-RCR-10 = (.17,.19,.22,.17,.19,.22,.17,.20,.23)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-VENTED)


Sur/Susp-Wraparound-1.3X4-4-Lamp            Full-Size Fluor
*Surf or Suspend Wraparound, 16''x4', 4 Lamps, Acrylic Prism Dif *
CU-RCR-1  = (.55,.57,.58,.59,.59,.61,.62,.64,.66)
CU-RCR-5  = (.33,.36,.39,.34,.37,.41,.35,.38,.43)
```

```
CU-RCR-10 =  (.18,.20,.24,.18,.21,.25,.19,.22,.26)
NO-OF-LAMPS = 4    ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-0.8X4-2-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 11''x4', 2 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.57,.58,.60,.60,.62,.63,.65,.67,.69)
CU-RCR-5  =  (.34,.37,.40,.35,.38,.42,.36,.40,.45)
CU-RCR-10 =  (.18,.21,.24,.19,.22,.26,.19,.23,.26)
NO-OF-LAMPS = 2    ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-1.5X4-2-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 18''x4', 2 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.68,.69,.71,.70,.72,.75,.75,.78,.81)
CU-RCR-5  =  (.38,.42,.46,.39,.43,.48,.40,.45,.51)
CU-RCR-10 =  (.19,.22,.27,.19,.23,.28,.20,.24,.30)
NO-OF-LAMPS = 2    ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-1.5X4-4-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 18''x4', 4 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.63,.65,.66,.66,.68,.70,.70,.73,.76)
CU-RCR-5  =  (.35,.38,.43,.36,.39,.44,.36,.41,.47)
CU-RCR-10 =  (.18,.21,.25,.18,.21,.26,.18,.22,.28)
NO-OF-LAMPS = 4    ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-1.3X8-4-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 16''x8', 4 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.55,.57,.58,.59,.59,.61,.62,.64,.66)
CU-RCR-5  =  (.33,.36,.39,.34,.37,.41,.35,.38,.43)
CU-RCR-10 =  (.18,.20,.24,.18,.21,.25,.19,.22,.26)
NO-OF-LAMPS = 4    ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-0.8X8-2-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 11''x8', 2 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.57,.58,.60,.60,.62,.63,.65,.67,.69)
CU-RCR-5  =  (.34,.37,.40,.35,.38,.42,.36,.40,.45)
CU-RCR-10 =  (.18,.21,.24,.19,.22,.26,.19,.23,.26)
NO-OF-LAMPS = 2    ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-1.5X8-2-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 18''x8', 2 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.68,.69,.71,.70,.72,.75,.75,.78,.81)
CU-RCR-5  =  (.38,.42,.46,.39,.43,.48,.40,.45,.51)
CU-RCR-10 =  (.19,.22,.27,.19,.23,.28,.20,.24,.30)
NO-OF-LAMPS = 2    ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Sur/Susp-Wraparound-1.5X8-4-Lamp                Full-Size Fluor
*Surf or Suspend Wraparound, 18''x8', 4 Lamps, Acrylic Prism Dif *
CU-RCR-1  =  (.63,.65,.66,.66,.68,.70,.70,.73,.76)
CU-RCR-5  =  (.35,.38,.43,.36,.39,.44,.36,.41,.47)
CU-RCR-10 =  (.18,.21,.25,.18,.21,.26,.18,.22,.28)
NO-OF-LAMPS = 4    ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Corridor-Wraparound-0.6X4-1-Lamp                Full-Size Fluor
*Corridor Wraparound, 7''x4', 1 Lamp, Acrylic Prismatic Dif      *
CU-RCR-1  =  (.61,.63,.65,.67,.69,.72,.76,.79,.83)
```

```
CU-RCR-5  =  (.32,.36,.41,.35,.39,.45,.38,.44,.51)
CU-RCR-10 =  (.16,.20,.24,.17,.21,.27,.19,.23,.30)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Corridor-Wraparound-0.6X4-2-Lamp            Full-Size Fluor
*Corridor Wraparound, 7''x4', 2 Lamps, Acrylic Prismatic Dif     *
CU-RCR-1  =  (.54,.56,.58,.59,.61,.63,.66,.69,.71)
CU-RCR-5  =  (.29,.32,.36,.30,.34,.39,.33,.38,.44)
CU-RCR-10 =  (.15,.17,.22,.15,.19,.23,.16,.20,.26)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (SURFACE-CLOSED,SUSPEND-CLOSED)


Louvered-Commercial-1.1X4-2-Lamp            Full-Size Fluor
*Commercial, 13''x4', 2 Lamps, Louvered                          *
CU-RCR-1  =  (.52,.53,.54,.62,.64,.65,.78,.81,.84)
CU-RCR-5  =  (.29,.32,.35,.33,.37,.42,.40,.46,.53)
CU-RCR-10 =  (.15,.18,.21,.17,.20,.25,.20,.25,.31)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-II
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Louvered-Commercial-1.5X4-4-Lamp            Full-Size Fluor
*Commercial, 17''x4', 4 Lamps, Louvered                          *
CU-RCR-1  =  (.45,.46,.48,.55,.57,.58,.71,.74,.77)
CU-RCR-5  =  (.26,.28,.31,.30,.33,.37,.37,.42,.48)
CU-RCR-10 =  (.14,.16,.19,.16,.19,.23,.19,.23,.29)
NO-OF-LAMPS = 4   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-II
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Turret-Industrial-1.1X4-3-Lamp              Full-Size Fluor
*Turret Industrial, 13''x6', 3 Lamps, No Diffuser or Louver      *
CU-RCR-1  =  (.68,.70,.71,.73,.75,.77,.81,.84,.87)
CU-RCR-5  =  (.36,.39,.44,.37,.42,.48,.40,.46,.53)
CU-RCR-10 =  (.17,.21,.26,.18,.22,.28,.19,.24,.31)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-72-IN
LUM-MAINT-CAT = LUM-MAINT-III
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Turret-Industrial-1.1X8-3-Lamp              Full-Size Fluor
*Turret Industrial, 13''x8', 3 Lamps, No Diffuser or Louver      *
CU-RCR-1  =  (.68,.70,.71,.73,.75,.77,.81,.84,.87)
CU-RCR-5  =  (.36,.39,.44,.37,.42,.48,.40,.46,.53)
CU-RCR-10 =  (.17,.21,.26,.18,.22,.28,.19,.24,.31)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-III
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Parabol-Industrial-1.1X4-2-Lamp             Full-Size Fluor
*Parabolic Industrial, 13''x4', 2 Lamps, No Diffuser or Louver   *
CU-RCR-1  =  (.69,.70,.72,.74,.76,.78,.83,.86,.89)
CU-RCR-5  =  (.39,.43,.47,.41,.45,.50,.44,.49,.56)
CU-RCR-10 =  (.20,.24,.28,.21,.25,.30,.22,.27,.33)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-III
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Parabol-Industrial-1.1X6-2-Lamp             Full-Size Fluor
*Parabolic Industrial, 13''x6', 2 Lamps, No Diffuser or Louver   *
CU-RCR-1  =  (.69,.70,.72,.74,.76,.78,.83,.86,.89)
CU-RCR-5  =  (.39,.43,.47,.41,.45,.50,.44,.49,.56)
CU-RCR-10 =  (.20,.24,.28,.21,.25,.30,.22,.27,.33)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-72-IN
LUM-MAINT-CAT = LUM-MAINT-III
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Parabol-Industrial-1.1X8-2-Lamp             Full-Size Fluor
*Parabolic Industrial, 13''x8', 2 Lamps, No Diffuser or Louver   *
```

```
CU-RCR-1  =  (.69,.70,.72,.74,.76,.78,.83,.86,.89)
CU-RCR-5  =  (.39,.43,.47,.41,.45,.50,.44,.49,.56)
CU-RCR-10 =  (.20,.24,.28,.21,.25,.30,.22,.27,.33)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-III
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X1.5-1-Lamp                Full-Size Fluor
*Strip Light, 3''x1.5', 1 Lamp, No Diffuser or Louver      *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-18-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X2-1-Lamp                  Full-Size Fluor
*Strip Light, 3''x2', 1 Lamp, No Diffuser or Louver        *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-24-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X3-1-Lamp                  Full-Size Fluor
*Strip Light, 3''x3', 1 Lamp, No Diffuser or Louver        *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-36-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X4-1-Lamp                  Full-Size Fluor
*Strip Light, 3''x4', 1 Lamp, No Diffuser or Louver        *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X6-1-Lamp                  Full-Size Fluor
*Strip Light, 3''x6', 1 Lamp, No Diffuser or Louver        *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-72-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Strip-Light-0.25X8-1-Lamp                  Full-Size Fluor
*Strip Light, 3''x8', 1 Lamp, No Diffuser or Louver        *
CU-RCR-1  =  (.62,.65,.68,.69,.72,.76,.79,.84,.89)
CU-RCR-5  =  (.28,.32,.38,.30,.36,.43,.34,.41,.50)
CU-RCR-10 =  (.13,.17,.23,.14,.19,.25,.16,.21,.29)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Channel-0.7X4-3-Lamp                       Full-Size Fluor
*General Purpose Channel, 9''x4', 3 Lamps, No Diffuser or Louver *
CU-RCR-1  =  (.69,.72,.74,.73,.76,.79,.80,.84,.88)
CU-RCR-5  =  (.33,.37,.43,.34,.39,.46,.36,.42,.51)
CU-RCR-10 =  (.16,.20,.25,.16,.20,.27,.17,.22,.29)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Channel-0.7X6-3-Lamp                       Full-Size Fluor
```

```
*General Purpose Channel, 9''x6', 3 Lamps, No Diffuser or Louver *
CU-RCR-1  = (.69,.72,.74,.73,.76,.79,.80,.84,.88)
CU-RCR-5  = (.33,.37,.43,.34,.39,.46,.36,.42,.51)
CU-RCR-10 = (.16,.20,.25,.16,.20,.27,.17,.22,.29)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-72-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Channel-0.7X8-3-Lamp                          Full-Size Fluor
*General Purpose Channel, 9''x8', 3 Lamps, No Diffuser or Louver *
CU-RCR-1  = (.69,.72,.74,.73,.76,.79,.80,.84,.88)
CU-RCR-5  = (.33,.37,.43,.34,.39,.46,.36,.42,.51)
CU-RCR-10 = (.16,.20,.25,.16,.20,.27,.17,.22,.29)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Turret-Channel-0.7X4-3-Lamp                   Full-Size Fluor
*Turret Channel, 9''x4', 3 Lamps, No Diffuser or Louver      *
CU-RCR-1  = (.64,.66,.68,.70,.73,.76,.81,.84,.89)
CU-RCR-5  = (.31,.35,.41,.34,.39,.45,.38,.44,.52)
CU-RCR-10 = (.15,.19,.24,.16,.21,.26,.18,.23,.30)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-48-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Turret-Channel-0.7X6-3-Lamp                   Full-Size Fluor
*Turret Channel, 9''x6', 3 Lamps, No Diffuser or Louver      *
CU-RCR-1  = (.64,.66,.68,.70,.73,.76,.81,.84,.89)
CU-RCR-5  = (.31,.35,.41,.34,.39,.45,.38,.44,.52)
CU-RCR-10 = (.15,.19,.24,.16,.21,.26,.18,.23,.30)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-72-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Turret-Channel-0.7X8-3-Lamp                   Full-Size Fluor
*Turret Channel, 9''x8', 3 Lamps, No Diffuser or Louver      *
CU-RCR-1  = (.64,.66,.68,.70,.73,.76,.81,.84,.89)
CU-RCR-5  = (.31,.35,.41,.34,.39,.45,.38,.44,.52)
CU-RCR-10 = (.15,.19,.24,.16,.21,.26,.18,.23,.30)
NO-OF-LAMPS = 3   ACCEPT-LAMP-SIZE = T-96-IN
LUM-MAINT-CAT = LUM-MAINT-I
  ACCEPT-CONFIG = (SURFACE-OPEN,SUSPEND-OPEN)


Parabolic-Troffer-1X1-2-Lamp                  Compact T Lamp
*Parabolic Troffer, 1'x1', 2 Compact T Lamps, Louvered       *
CU-RCR-1  = (.55,.56,.57,.56,.58,.59,.59,.61,.62)
CU-RCR-5  = (.35,.37,.40,.35,.38,.41,.36,.39,.43)
CU-RCR-10 = (.19,.21,.25,.19,.22,.25,.19,.22,.26)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-6-12-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)


4-In-Black-Baffle                             Compact Refl Lmp
*Black Baffle, 4" Round, 1 Reflector Lamp, No Diffuser or Louver *
CU-RCR-1  = (.70,.73,.74,.75,.76,.77,.78,.80,.81)
CU-RCR-5  = (.54,.57,.60,.55,.58,.61,.56,.59,.63)
CU-RCR-10 = (.39,.43,.47,.41,.44,.47,.41,.44,.48)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = REFL-0-21
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)


4-In-Reflector-Cone                           Compact Refl Lmp
*Refl Cone, 4" Round, 1 Reflector Lamp, No Diffuser or Louver    *
CU-RCR-1  = (.87,.88,.89,.90,.91,.92,.94,.96,.98)
CU-RCR-5  = (.65,.68,.71,.65,.69,.73,.67,.70,.75)
CU-RCR-10 = (.48,.52,.56,.48,.52,.56,.49,.52,.57)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = REFL-0-21
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)
```

6-In-Black-Baffle-1   Compact Refl Lmp
Black Baffle, 6" Round
*Black Baffle, 6" Round, 1 Reflector Lamp, No Diffuser or Louver *
CU-RCR-1 = (.60,.61,.62,.62,.63,.64,.65,.66,.68)
CU-RCR-5 = (.42,.45,.48,.43,.46,.49,.44,.47,.51)
CU-RCR-10 = (.29,.32,.35,.30,.33,.36,.30,.33,.37)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = REFL-22-30
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

6-In-Black-Baffle-2   Compact Refl Lmp
*Black Baffle, 6" Round, 1 Reflector Lamp, No Diffuser or Louver *
CU-RCR-1 = (.6970,.71,.70,.72,.74,.74,.76,.78)
CU-RCR-5 = (.48,.51,.54,.47,.51,.55,.49,.53,.57)
CU-RCR-10 = (.32,.36,.40,.32,.36,.40,.34,.37,.41)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = REFL-31-50
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

6-In-Reflector-Cone   Compact Refl Lmp
*Refl Cone, 6" Round, 1 Reflector **Lamp**, No Diffuser or Louver   *
CU-RCR-1 = (.85,.86,.87,.88,.89,.90,.92,.94,.96)
CU-RCR-5 = (.61,.65,.69,.62,.66,.70,.64,.68,.73)
CU-RCR-10 = (.45,.49,.53,.45,.49,.53,.46,.50,.55)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = REFL-22-30
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

6-In-Ellipsoid-Reflect-Baffled   Cmpct A-Like Lmp
Refl Ellipse, Black Baffle, 6", 1 A-Like Lamp, No Diff or Louver
CU-RCR-1 = (.57,.58,.59,.59,.60,.61,.62,.63,.65)
CU-RCR-5 = (.39,.42,.45,.40,.43,.46,.41,.44,.48)
CU-RCR-10 = (.27,.30,.33,.27,.30,.33,.28,.30,.34)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-0-21
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

6-In-Ellipsoid-Reflect-Open   Cmpct A-Like Lmp
*Refl Ellipse, 6", 1 A-Like Lamp, No Diffuser or Louver   *
CU-RCR-1 = (.59,.60,.61,.61,.62,.63,.64,.65,.67)
CU-RCR-5 = (.44,.46,.48,.43,.46,.49,.45,.47,.51)
CU-RCR-10 = (.31,.34,.37,.31,.34,.37,.32,.34,.38)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-0-21
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

8-In-Ellipsoid-Reflect-Baffled   Cmpct A-Like Lmp
Reflctr Ellipse, Black Baffle, 8"
Refl Ellipse, Black Baffle, 8", 1 A-Like Lamp, No Diff or Louver
CU-RCR-1 = (.59,.60,.60,.61,.62,.63,.64,.65,.66)
CU-RCR-5 = (.44,.47,.50,.45,.48,.51,.47,.49,.52)
CU-RCR-10 = (.35,.37,.39,.34,.37,.40,.35,.37,.40)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-22-30
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

8-In-Ellipsoid-Reflect-Open   Cmpct A-Like Lmp
*Refl Ellipse, Open, 8", 1 A-Like Lamp, No Diffuser or Louver   *
CU-RCR-1 = (.62,.63,.64,.65,.66,.67,.68,.69,.71)
CU-RCR-5 = (.48,.50,.52,.47,.50,.53,.49,.51,.55)
CU-RCR-10 = (.35,.38,.41,.35,.38,.41,.36,.38,.42)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-22-30
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)

8-In-Reflector-Lens   Cmpct A-Like Lmp
*Reflector, 8" Round, 1 A-Like Lamp, Prismatic Glass Diffuser   *
CU-RCR-1 = (.46,.47,.48,.48,.49,.50,.50,.52,.53)
CU-RCR-5 = (.29,.32,.35,.30,.33,.36,.31,.34,.37)
CU-RCR-10 = (.20,.22,.24,.19,.22,.25,.20,.22,.25)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-0-21

```
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-STATIC)
```

10-In-Reflector-Lens   Cmpct A-Like Lmp
```
*Reflector, 10" Round, 1 A-Like Lamp, Prismatic Glass Diffuser   *
CU-RCR-1  =  (.47,.48,.49,.48,.49,.50,.51,.52,.53)
CU-RCR-5  =  (.32,.34,.36,.31,.34,.37,.33,.35,.38)
CU-RCR-10 =  (.22,.24,2.6,.21,.24,.27,.22,.24,.27)
NO-OF-LAMPS = 1   ACCEPT-LAMP-SIZE = ALPHA-22-30
LUM-MAINT-CAT = LUM-MAINT-V
  ACCEPT-CONFIG = (RECESS-STATIC)
```

6-In-Reflector-Open-T   Cmpct T-Type Lmp
```
*Reflector, 6" Round, 2 T-Type Lamps, No Diffuser or Louver      *
CU-RCR-1  =  (.41,.42,.42,.42,.43,.44,.44,.45,.47)
CU-RCR-5  =  (.27,.29,.31,.28,.30,.32,.28,.30,.33)
CU-RCR-10 =  (.18,.20,.22,.18,.20,.22,.18,.20,.23)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-0-6-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)
```

8-In-Reflector-Open-T   Cmpct T-Type Lmp
```
*Reflector, 8" Round, 2 T-Type Lamps, No Diffuser or Louver      *
CU-RCR-1  =  (.65,.66,.67,.67,.68,.69,.70,.71,.73)
CU-RCR-5  =  (.44,.47,.50,.43,.47,.51,.45,.49,.53)
CU-RCR-10 =  (.29,.32,.35,.28,.32,.36,.30,.33,.37)
NO-OF-LAMPS = 2   ACCEPT-LAMP-SIZE = T-6-12-IN
LUM-MAINT-CAT = LUM-MAINT-IV
  ACCEPT-CONFIG = (RECESS-STATIC)
```

Section

3
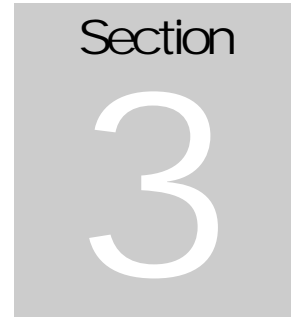
Mechanical Equipment Libraries

This section is a place holder for future libraries of mechanical equipment.

Section

4

Reports

Reports fall into three main categories:

1. Verification reports – summarize the model input, as well as design values calculated by the program

2. Summary reports – present the results of the program simulation

3. Hourly reports – tabulate the hourly values of a user-selected set of simulation variables.

The following sections present a map of the reports to reference for sumulation results, verification and summary reports, and hourly reports. The sample reports in this section are in English units. For metric runs the corresponding units can be determined from Report LV-M, Units Table.

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REPORT MAP

This section consists of four tables, one each for LOADS, SYSTEMS, PLANT and EONOMICS, that show in which reports you can find various calculated quantities, like space loads, cooling peaks, temperatures, etc.

LOADS SUMMARY REPORTS

		Space Peak Loads	Space Peak Load Components	Bldg Peak Load Components	Building Monthly Loads	Space Monthly Load Components	Bldg Monthly Load Components	Space Daylighting Summary
Bldg Level Info		LS-A		LS-C	LS-D		LS-F	
Space Level Info		LS-A	LS-B			LS-E		LS-G
THERMAL LOAD	Total (Sens&Lat) Heat/Cool Space Load		P	P		T	T	
	Sensible Heat/Cool Space Load	P	P	P	P/T	T	T	
	Latent Cooling Space Load		P	P		T	T	
	Heat/Cool Space Load Components		P	P		T	T	
	Heat/Cool Peak Hour, Date, OA	n	n	n				
ELECTRIC ENERGY	Total (Lights/Plugs/Process)				P/T			
	Lights							
	Equipment / Plugs							
	Process Electric							
OTHER ENERGY	Process Fuel							
	Domestic Hot Water							
	Solar Gain							
DAYLIGHTING	% Lighting Reduction							n
	% Lighting Reduction Scatter Plot							
	Ave. Daylight Illuminance							n
	Ave. Glare Index							n
	% Hrs. Glare Too High							n
	Frequenceny of Illuminance Levels							
OTHER	Floor Area & Volume		n	n				
	Weather File Name	n	n	n	n	n	n	n
	DESIGN-DAY reports provided ①	n	n	n	n	n	n	n

NOTES:

T = Total energy or Total load reported for these items

P = Peak demand or Peak load reported for these items

① Duplicate reports are provided for each LOADS report (if DESIGN-DAYs are used) where the first set of reports provides results for the design day conditions. A complete second set reports the annual simulation results.

left-to-right order of report columns above corresponds to top-down order of reports printed in DOE2 output files

SYSTEMS SUMMARY REPORTS

Column reports by level:

BUILDING: SS-D (Building HVAC Load Summary), SS-E (Building HVAC Load Hours), SS-M (Building HVAC Fan Electric), SS-P① (Bldg HVAC Equip. Performance)

AIR HANDLER: SS-A (System Loads Summary), SS-B (System Loads Summary), SS-C (System Load Hours), SS-H (System Utility Energy Use), SS-I (Sensible/Latent Summary), SS-J (Peak Heating & Cooling), SS-K (Space Temperature Summary), SS-R (Zone Performance Summary), SS-L (Fan Electric Energy Use), SS-N (Relative Humidity Summary), SS-P② (System Heat/Cool Performance), SS-Q (HP Heat/Cool Performance)

ZONE: SS-G (Zone Loads Summary), SS-F (Zone Demand Summary)

Category / Item	SS-D	SS-E	SS-M	SS-P①	SS-A	SS-B	SS-C	SS-H	SS-I	SS-J	SS-K	SS-R	SS-L	SS-N	SS-P②	SS-Q	SS-G	SS-F
THERMAL ENERGY																		
Total (Sens&Lat) Heat/Cool Coil Load	P/T			P/T	P/T				P	P					P/T	T	P/T	
Sensible Heat/Cool Coil Load									T									
Latent Heat/Cool Coil Load									T									
Zone Coil Heat/Cool Load						P/T												
Baseboard Heat						P/T												P/T
Pre-heat						P/T												
Heat/Cool Addition/Extraction																		T
Cooling Peak Hour, Date, OA	n		n		n				n	n					n		n	
Heating Peak Hour, Date, OA	n		n		n					n					n		n	
Heat/Cool Peak Load Hourly Profile										P								
Max Daily Integrated Cooling Load	P									P								
Heat Coincident w Cool Peak		P					P											
Natural Ventilation Cooling③					P/T													
ELECTRIC ENERGY																		
Total Elec (LOADS + Fans, DX, Reheat)	P/T			T	P/T										T		P/T	
Total Elec Coincident w Cool Peak		P					P											
Heating/Cooling Elec Use			P/T					P/T							P/T			
Fan Total Elec			P/T					P/T							P/T	T		
Fan Elec for H/C/Coincident/Float			T										T					
Fan Elec for Supply/Return/Hot Deck													T					
Auxiliary/Fan/Pump Elec			P/T		P/T										P/T	T		
OTHER ENERGY																		
Heating/Cooling Fuel Use			T					P/T							T			
Waste Heat															T			
HOURS																		
Hours Heat/Cool/Float/Available		n						n							n			
Fan Hours		n						n					n					
Hours Night Venting/Night Cycle On		n						n										
Hours Loads Not Met												n						n
Zone Hrs at Max Demand												n						n
Hours at RH ranges														n				n
SPACE TEMPERATURE																		
Average (H/C/Fans On/Off)											n							
Min / Max																		n
Indoor/Outdoor Temp. Delta											n							
Scatter Plot																		
OTHER																		
Air Flow			n							P					n			
Heat/Cool Capacity			n												n			
Heat/Cool E-I-R			n												n	n		
Relative Humidity Scatter Plot														n				
Sensible Heat Ratio									n	n								
Delta Humidity Ratio										n								
Equipment Part Load Ratio				n									n	n	n			
Weather File Name	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
DESIGN-DAY report provided										n								

NOTES:

T = Total energy or Total load reported for these items

P = Peak demand or Peak load reported for these items

① SS-P at building level is provided for DHW tanks, water loop heat pumps and hydronic economizers used with unitary systems

② SS-P at air handler level is provided for unitary systems

③ Ventilative Cooling is provided only for system types: RESYS, PSZ

left-to-right order of report columns above corresponds to top-down order of reports printed in DOE2 output files

PLANT SUMMARY REPORTS

			Plant Energy Utilization	Utility & Fuel Use Summary	Equipment Loads & Energy Use	Circulation Loop Loads	Energy End-Use, by Utility Type	Energy End-Use, by Utility Meter	Building Energy Performance
			PS-A	PS-B	PS-C	PS-D	PS-E ②	PS-F ③	BEPS
THERMAL LOAD	**by Total Plant**	Cooling & Heating	*T*						
		Waste Heat Recovery	*T*						
	by Plant Equipment ①	Circulation Loop Loads				*P/T*			
		Boilers, Chillers, Pumps, Towers, etc. Loads			*P/T*				
		Equipment Capacity							
		Equipment Part Load Ratio			n	n			
		Loads Not Satisfied (Loops only)				*P/T*			
		Thermal Losses (Loops & Pumps only)				*P/T*			
UTILITY ENERGY	**by Total Plant, Site**	Annual	*T*						*T*
		Monthly	*T*						
		Energy Use Intensity (EUI)							*T*
		Total Electric & Total Fuel Use	*T*				*T*		
		Electric Generation Fuel Use	*T*						
	by Total Plant, Source	Annual	*T*						*T*
		Monthly							
	by Utility Type ②	Annual		*P/T*			*P/p/T*		
		Monthly		*P/T*			*P/p/T*		
	by Utility Meter ③	Annual		*P/T*				*P/p/T*	*T*
		Monthly		*P/T*				*P/p/T*	
	by End Use	Annual, by utility type					*P/p/T*		
		Monthly, by utility type					*P/p/T*		
		Annual, by utility meter						*P/p/T*	*T*
		Monthly, by utility meter						*P/p/T*	
		Cooling & Heating (only) Input	*T*						
	by Plant Equipment ①	Boilers, Chillers, Pumps, Towers, etc.			*P/T*				
HOURS		Hour & Date of Peak		n	n	n	n	n	
		Equipment Operations Hours			n	n			
		% Hours Outside Throttling Range							n
		% Hours Loads Not Met							n

NOTES:

T = *Total load or Total energy reported for these items*

P = *Peak load or Peak demand (COINCIDENT) reported for these items*

p = *NON-COINCIDENT Peak demand reported for these items*

① *One copy of the PS-H report is produced for each plant component, i.e., for each circulation loop, pump, chiller, etc.*

② *One copy of the PS-E report is produced for each utility type, i.e., for all electric use and for all fuel use.*

③ *One copy of the PS-F report is produced for each utility meter, i.e., one report for each electric or fuel meter.*

left-to-right order of report columns above corresponds to top-down order of reports printed in DOE2 output files

ECONOMICS SUMMARY REPORTS

					Annual Operations Costs & Savings (ES-A)	Life-Cycle Non-Energy Costs (ES-B)	Energy Savings & Life-Cycle Costs (ES-C)	Energy Cost Summary (ES-D)	Utility Rate Summary (ES-E ①)	Block Charges & Ratchets, by Utility Rate (ES-F ②)	Summary of Pollutants (ES-G)	Pollutant Production, by Block Charge (ES-H)
ANNUAL Results	**by Utility Rate ①**	Energy Use						T			
		Total Utility Costs ($)						T	T		
		Total Utility Costs ($/sqft)						T			
		Total Utility Costs (ave $/billing unit)						T			
		Component Charges						P/T			
		Metered & Billing Use						P/T			
	by Block or TOU Charge ②	Total Utility Costs ($)							T		
		Component Charges							P/T		
		Pollutant Production								T	T
MONTHLY Results	**by Utility Rate ①**	Total Utility Costs ($)						T			
		Component Charges						P/T			
	by Block or TOU Charge ②	Total Utility Costs ($)							T		
		Component Charges							P/T		
		Pollutant Production								T	T
LIFE-CYCLE Results	**Costs**	Installation, Repair, Replacement		T	T					
		Energy	T		T					
		Operations	T		T					
	Savings	Energy	T		T					
		Operations	T		T					
		Energy + Operations	T		T					
	Investment Statistics	Discounted Payback			T					
		S-I-R, cost			T					
		S-I-R, energy			T					

NOTES:

T = Total energy or Total costs reported for these items

P = Peak demand or Peak demand costs reported for these items

① *One copy of the ES-E report is produced for each utility rate.*

② *One copy of the ES-F report is produced for each utility rate that includes at least one BLOCK-CHARGE.*

left-to-right order of report columns above corresponds to top-down order of reports printed in DOE2 output files

LOADS REPORTS

LV-A General Project Parameters

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum     DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- LV-A  General Project and Building Input                                      WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------


PERIOD OF STUDY

    STARTING DATE    ENDING DATE    NUMBER OF DAYS


       7 JAN 1997     7 JAN 1997                1
       5 AUG 1997     5 AUG 1997                1
       1 JAN 1997    31 DEC 1997              365


SITE CHARACTERISTIC DATA

                                                             BUILDING
       STATION       LATITUDE  LONGITUDE   ALTITUDE     TIME   AZIMUTH
       NAME            (DEG)     (DEG)       (FT)        ZONE    (DEG)


TRY  CHICAGO            42.0      88.0       610.     6  CST      30.0
```

LV-B Summary of Spaces

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-B  Summary of Spaces Occurring in the Project                               WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------


NUMBER OF SPACES    6          EXTERIOR    5    INTERIOR    1


                                                LIGHTS          EQUIP
                         SPACE*FLOOR SPACE     (WATT /         (WATT /  INFILTRATION             AREA      VOLUME
 SPACE                   MULTIPLIER  TYPE   AZIM SQFT ) PEOPLE  SQFT )    METHOD    ACH        (SQFT )    (CUFT )


Spaces on floor: Building-Floor

 PLENUM-1                     1.0    EXT    0.0  0.00    0.0    0.00   NO-INFILT.  0.00        5000.0    10000.0
 SPACE1-1                     1.0    EXT    0.0  1.50   11.0    1.00   AIR-CHANGE  0.25        1056.0     8448.0
 SPACE2-1                     1.0    EXT  -90.0  1.50    5.0    1.00   AIR-CHANGE  0.25         456.0     3648.0
 SPACE3-1                     1.0    EXT  180.0  1.50   11.0    1.00   AIR-CHANGE  0.25        1056.0     8448.0
 SPACE4-1                     1.0    EXT   90.0  1.50    5.0    1.00   AIR-CHANGE  0.25         456.0     3648.0
 SPACE5-1                     1.0    INT    0.0  1.50   20.0    1.00   AIR-CHANGE  0.25        1976.0    15808.0
                                                       ------                               ---------  ----------
 BUILDING TOTALS                                        52.0                                 10000.0    50000.0
```

LV-C Details of Space <space name>

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-C Details of Space          SPACE1-1                                WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------

DATA FOR SPACE    SPACE1-1                          IN FLOOR    Building-Floor


LOCATION OF ORIGIN IN
BUILDING COORDINATES             SPACE
                                AZIMUTH       SPACE*FLOOR           HEIGHT           AREA              VOLUME
 XB (FT)  YB (FT)  ZB (FT)       (DEG)        MULTIPLIER            (FT)            (SQFT )            (CUFT )

  0.00     0.00     0.00         0.00             1.0              8.00            1056.00            8448.00


        TOTAL     NUMBER OF   NUMBER OF    NUMBER OF
        NUMBER    EXTERIOR    INTERIOR    UNDERGROUND
     OF SURFACES  SURFACES    SURFACES     SURFACES         DAYLIGHTING    SUNSPACE

          6           1           4            1                NO           NO


NUMBER OF SUBSURFACES

          EXTERIOR              INTERIOR
 TOTAL    WINDOWS     DOORS     WINDOWS

   2         2          0          0


                              CALCULATION
 FLOOR WEIGHT                  TEMPERATURE
  (LB/SQFT  )                    (F    )

     0.0                         70.0


INFILTRATION

                           INFILTRATION
                           CALCULATION         FLOW RATE        AIR CHANGES
        SCHEDULE           METHOD             (CFM/SQFT)        PER HOUR

     INFIL-SCH             AIR-CHANGE            0.033             0.25


PEOPLE

                                               AREA PER          PEOPLE            PEOPLE
                                               PERSON           SENSIBLE           LATENT
        SCHEDULE                    NUMBER      (SQFT )          (BTU/HR )         (BTU/HR )

     OCCUPY-1                        11.0        96.0             252.2             130.3
```

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum         DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-C Details of Space          SPACE1-1                               WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------(CONTINUED)--------
```

LIGHTING

| | LIGHTING | LOAD (WATTS/ | LOAD | FRACTION OF LOAD |
SCHEDULE	TYPE	SQFT)	(KW)	TO SPACE
LIGHTS-1	REC-FLUOR-RV	1.50	1.58	0.80

ELECTRICAL EQUIPMENT

| | ELEC LOAD (WATTS/ | ELEC LOAD | FRACTION OF LOAD TO SPACE | |
SCHEDULE	SQFT)	(KW)	SENSIBLE	LATENT
EQUIP-1	1.00	1.06	1.00	0.00

INTERIOR SURFACES (U-VALUE INCLUDES BOTH AIR FILMS)

| | AREA | | U-VALUE |
SURFACE	(SQFT)	CONSTRUCTION	(BTU/HR-SQFT-F)
C1-1	1056.00	CLNG-1	0.270
SB12	135.76	SB-U	1.500
SB14	135.76	SB-U	1.500
SB15	608.00	SB-U	1.500

SURFACE	SURFACE-TYPE		ADJACENT SPACE
C1-1	QUICK	STANDARD	PLENUM-1
SB12	QUICK	AIR	SPACE2-1
SB14	QUICK	AIR	SPACE4-1
SB15	QUICK	AIR	SPACE5-1

EXTERIOR SURFACES (U-VALUE EXCLUDES OUTSIDE AIR FILM)

| | | AREA | | U-VALUE | SURFACE |
SURFACE	MULTIPLIER	(SQFT)	CONSTRUCTION	(BTU/HR-SQFT-F)	TYPE
FRONT-1	1.0	800.00	WALL-1	0.069	DELAYED

| | | | LOCATION OF ORIGIN IN BUILDING COORDINATES | | | LOCATION OF ORIGIN IN SPACE COORDINATES | | |
| | AZIMUTH | TILT | | | | | | |
SURFACE	(DEG)	(DEG)	XB (FT)	YB (FT)	ZB (FT)	X (FT)	Y (FT)	Z (FT)
FRONT-1	-180.0	90.0	0.00	0.00	0.00	0.00	0.00	0.00

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum      DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system      Show All Reports
REPORT- LV-C Details of Space          SPACE1-1                               WEATHER FILE- TRY  CHICAGO
------------------------------------------------------------------------------------------------------(CONTINUED)--------
```

```
     UNDERGROUND SURFACES (U-VALUE INCLUDES INSIDE AIR FILM)


                                           AREA                                   U-VALUE
       SURFACE              MULTIPLIER     (SQFT )    CONSTRUCTION             (BTU/HR-SQFT-F)

       F1-1                    1.0         1056.00    FLOOR-1                       0.45


     EXTERIOR WINDOWS (U-VALUE INCLUDES OUTSIDE AIR FILM)

                                        GLASS   GLASS   GLASS   SET-  NUMBER      CENTER-OF-    GLASS   GLASS   GLASS
                                        AREA    WIDTH   HEIGHT  BACK    OF       GLASS U-VALUE  SHADING VISIBLE SOLAR
       WINDOW               MULTIPLIER  (SQFT )  (FT)    (FT)    (FT)  PANES    (BTU/HR-SQFT-F)   COEFF   TRANS   TRANS

       WF-1                    1.0      180.00  45.00    4.00    0.00    2           0.447        0.89   0.812   0.705
       DF-1                    1.0       64.00   8.00    8.00    0.00    1           1.003        0.83   0.611   0.626


                                                                     LOCATION OF ORIGIN IN        LOCATION OF ORIGIN IN
                                                                     BUILDING COORDINATES          SURFACE COORDINATES
                                          LOCATED IN
       WINDOW                             SURFACE                    XB (FT)  YB (FT)  ZB (FT)      X (FT)    Y (FT)

       WF-1                               FRONT-1                     10.00    0.00     3.00        10.00     3.00
       DF-1                               FRONT-1                     70.00    0.00     0.00        70.00     0.00
```

LV-D Details of Exterior Surfaces

Simple Structure Run 3, Chicago   Divide into zones; add plenum   DOE-2.2b-027 Fri Jan 9 15:25:08 1998BDL RUN 1
Design-day sizing of VAV system   Show All Reports
REPORT- LV-D Details of Exterior Surfaces in the Project   WEATHER FILE- TRY CHICAGO

NUMBER OF EXTERIOR SURFACES   9
(U-VALUE INCLUDES OUTSIDE AIR FILM; WINDOW INCLUDES FRAME, IF DEFINED)

SURFACE	- - - W I N D O W S - - -		- - - - W A L L - - - -		-W A L L + W I N D O W S-		AZIMUTH
	U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	
WALL-1PB	0.000	0.00	0.067	200.00	0.067	200.00	NORTH
in space: PLENUM-1							
BACK-1	0.531	229.00	0.067	571.00	0.200	800.00	NORTH
in space: SPACE3-1							
RIGHT-1	0.428	100.00	0.067	300.00	0.157	400.00	EAST
in space: SPACE2-1							
WALL-1PR	0.000	0.00	0.067	100.00	0.067	100.00	EAST
in space: PLENUM-1							
WALL-1PF	0.000	0.00	0.067	200.00	0.067	200.00	SOUTH
in space: PLENUM-1							
FRONT-1	0.554	244.00	0.067	556.00	0.216	800.00	SOUTH
in space: SPACE1-1							
WALL-1PL	0.000	0.00	0.067	100.00	0.067	100.00	WEST
in space: PLENUM-1							
LEFT-1	0.428	100.00	0.067	300.00	0.157	400.00	WEST
in space: SPACE4-1							
TOP-1	0.000	0.00	0.168	5000.00	0.168	5000.00	ROOF
in space: PLENUM-1							
F1-1	0.000	0.00	0.453	1056.00	0.453	1056.00	UNDERGRND
in space: SPACE1-1							
F2-1	0.000	0.00	0.453	456.00	0.453	456.00	UNDERGRND
in space: SPACE2-1							
F3-1	0.000	0.00	0.453	1056.00	0.453	1056.00	UNDERGRND
in space: SPACE3-1							
F4-1	0.000	0.00	0.453	456.00	0.453	456.00	UNDERGRND
in space: SPACE4-1							
F5-1	0.000	0.00	0.453	1976.00	0.453	1976.00	UNDERGRND
in space: SPACE5-1							

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum      DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system      Show All Reports
REPORT- LV-D  Details of Exterior Surfaces in the Project                    WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------(CONTINUED)--------
```

	AVERAGE U-VALUE/WINDOWS (BTU/HR-SQFT-F)	AVERAGE U-VALUE/WALLS (BTU/HR-SQFT-F)	AVERAGE U-VALUE WALLS+WINDOWS (BTU/HR-SQFT-F)	WINDOW AREA (SQFT)	WALL AREA (SQFT)	WINDOW+WALL AREA (SQFT)
NORTH	0.531	0.067	0.173	229.00	771.00	1000.00
EAST	0.428	0.067	0.139	100.00	400.00	500.00
SOUTH	0.554	0.067	0.186	244.00	756.00	1000.00
WEST	0.428	0.067	0.139	100.00	400.00	500.00
ROOF	0.000	0.168	0.168	0.00	5000.00	5000.00
ALL WALLS	0.509	0.067	0.166	673.00	2327.00	3000.00
WALLS+ROOFS	0.509	0.136	0.167	673.00	7327.00	8000.00
UNDERGRND	0.000	0.453	0.453	0.00	5000.00	5000.00
BUILDING	0.509	0.264	0.277	673.00	12327.00	13000.00

LV-E Details of Underground Surfaces

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-E  Details of Underground Surfaces in the Project                       WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------


    NUMBER OF UNDERGROUND SURFACES    5


        SURFACE                           AREA      CONSTRUCTION                              U-VALUE
        NAME             MULTIPLIER      (SQFT )    NAME                                 (BTU/HR-SQFT-F)

        F1-1                 1.0         1056.00    FLOOR-1                                   0.453
        F2-1                 1.0          456.00    FLOOR-1                                   0.453
        F3-1                 1.0         1056.00    FLOOR-1                                   0.453
        F4-1                 1.0          456.00    FLOOR-1                                   0.453
        F5-1                 1.0         1976.00    FLOOR-1                                   0.453
```

LV-F Details of Interior Surfaces

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-F  Details of Interior Surfaces in the Project                        WEATHER FILE- TRY  CHICAGO
------------------------------------------------------------------------------------------------------------------------


 Number of Interior Surfaces  13
 (U-VALUE includes both air films)


 SURFACE                          AREA        CONSTRUCTION                SURFACE TYPE                      U-VALUE
 NAME                            (SQFT )       NAME                                                     (BTU/HR-SQFT-F)

 C1-1                            1056.00       CLNG-1                     QUICK   STANDARD                   0.270
 SB12                            135.76        SB-U                       QUICK   AIR                        1.500
 SB14                            135.76        SB-U                       QUICK   AIR                        1.500
 SB15                            608.00        SB-U                       QUICK   AIR                        1.500
 C2-1                            456.00        CLNG-1                     QUICK   STANDARD                   0.270
 SB23                            135.76        SB-U                       QUICK   AIR                        1.500
 SB25                            208.00        SB-U                       QUICK   AIR                        1.500
 C3-1                            1056.00       CLNG-1                     QUICK   STANDARD                   0.270
 SB34                            135.76        SB-U                       QUICK   AIR                        1.500
 SB35                            608.00        SB-U                       QUICK   AIR                        1.500
 C4-1                            456.00        CLNG-1                     QUICK   STANDARD                   0.270
 SB45                            208.00        SB-U                       QUICK   AIR                        1.500
 C5-1                            1976.00       CLNG-1                     QUICK   STANDARD                   0.270


                                          ADJACENT SPACES
 SURFACE
 NAME                          SPACE-1                        SPACE-2

 C1-1                          SPACE1-1                       PLENUM-1
 SB12                          SPACE1-1                       SPACE2-1
 SB14                          SPACE1-1                       SPACE4-1
 SB15                          SPACE1-1                       SPACE5-1
 C2-1                          SPACE2-1                       PLENUM-1
 SB23                          SPACE2-1                       SPACE3-1
 SB25                          SPACE2-1                       SPACE5-1
 C3-1                          SPACE3-1                       PLENUM-1
 SB34                          SPACE3-1                       SPACE4-1
 SB35                          SPACE3-1                       SPACE5-1
 C4-1                          SPACE4-1                       PLENUM-1
 SB45                          SPACE4-1                       SPACE5-1
 C5-1                          SPACE5-1                       PLENUM-1
```

LV-G Details of Schedules

Simple Structure Run 3, Chicago   Divide into zones; add plenum   DOE-2.2b-027 Fri Jan 9 15:25:08 1998BDL RUN 1
Design-day sizing of VAV system   Show All Reports
REPORT- LV-G Details of Schedules Occurring in the Project   WEATHER FILE- TRY CHICAGO

 NUMBER OF SCHEDULES 12

     Schedule: OCCUPY-1   Type of Schedule: FRACTION

       THROUGH 31 12

          FOR DAYS   SUN SAT HOL

      HOUR 1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19   20   21   22   23
24

         0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00

          FOR DAYS   MON TUE WED THU FRI

      HOUR 1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19   20   21   22   23
24

         0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 1.00 1.00 1.00 0.80 0.40 0.80 1.00 1.00 1.00 1.00 0.50 0.10 0.10 0.00 0.00
0.00

          FOR DAYS   HDD

      HOUR 1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19   20   21   22   23
24

         0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00

          FOR DAYS   CDD

      HOUR 1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19   20   21   22   23
24

         1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
1.00

LV-H Details of Windows

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-H  Details of Windows Occurring in the Project                    WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------
```

```
NUMBER OF WINDOWS   6

(Note: u-values include outside air film)
```

					LOCATION OF ORIGIN			
					IN SURFACE		FRAME	FRAME
		GLASS	GLASS	GLASS	COORDINATES		AREA	U-VALUE
WINDOW		AREA	HEIGHT	WIDTH				
NAME	MULTIPLIER	(SQFT)	(FT)	(FT)	X (FT)	Y (FT)	(SQFT)	(BTU/HR-SQFT-F)
WF-1	1.0	180.00	4.00	45.00	10.00	3.00	0.00	0.384
DF-1	1.0	64.00	8.00	8.00	70.00	0.00	0.00	0.384
WR-1	1.0	100.00	4.00	25.00	12.50	3.00	0.00	0.384
WB-1	1.0	180.00	4.00	45.00	10.00	3.00	0.00	0.384
DB-1	1.0	49.00	7.00	7.00	70.00	0.00	0.00	0.384
WL-1	1.0	100.00	4.00	25.00	12.50	3.00	0.00	0.384

		GLASS	NUMBER	CENTER-OF-	GLASS	GLASS
WINDOW	SETBACK	SHADING	OF	GLASS U-VALUE	VISIBLE	SOLAR
NAME	(FT)	COEFF	PANES	(BTU/HR-SQFT-F)	TRANS	TRANS
WF-1	0.00	0.89	2	0.447	0.812	0.705
DF-1	0.00	0.83	1	1.003	0.611	0.626
WR-1	0.00	0.89	2	0.447	0.812	0.705
WB-1	0.00	0.89	2	0.447	0.812	0.705
DB-1	0.00	0.83	1	1.003	0.611	0.626
WL-1	0.00	0.89	2	0.447	0.812	0.705

LV-I Details of Constructions

```
Simple Structure Run 3, Chicago         Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system         Show All Reports
REPORT- LV-I  Details of Constructions Occurring in the Project                      WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------


    NUMBER OF CONSTRUCTIONS   5         DELAYED   3    QUICK   2


                            U-VALUE                SURFACE           NUMBER OF
             CONSTRUCTION                 SURFACE  ROUGHNESS  SURFACE  RESPONSE
             NAME           (BTU/HR-SQFT-F) ABSORPTANCE  INDEX  TYPE    FACTORS

             WALL-1              0.069         0.70        3    DELAYED      9
             ROOF-1              0.180         0.70        3    DELAYED      5
             CLNG-1              0.270         0.70        3    QUICK        0
             SB-U                1.500         0.70        3    QUICK        0
             FLOOR-1             0.453         0.70        3    DELAYED     16
```

LV-J Details of Building Shades

```
SINGLE FAMILY RESIDENCE                ===WITH ATTACHED SUNSPACE===

REPORT- LV-J  DETAILS OF BUILDING SHADES IN THE PROJECT                                           WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------

 NUMBER OF BUILDING SHADES   2         RECTANGULAR   2     OTHER   0


   RECTANGULAR SHADES
                                                                                       LOCATION OF ORIGIN
                                                                                       BUILDING COORDINATES
       SHADE                             HEIGHT   WIDTH     AZIMUTH   TILT
       NAME            TRANSMITTANCE      (FT)    (FT)      (DEG)    (DEG)      XB (FT)  YB (FT)  ZB (FT)

                           0.00           1.5     42.0      180.    180.         0.0      0.0      8.0
                           0.00           1.5     21.0      180.     0.          0.0     28.0      8.0
```

LV-K Weighting Factor Summary

The entries in this report can be a combination of custom weighting factors (for spaces with FLOOR-WEIGHT = 0) and ASHRAE weighting factors (for spaces with FLOOR-WEIGHT > 0).

At the top of the report is the U-name of each SPACE (SP NAME) along with the U-name of the set of weighting factors for that space (WF NAME). WF NAME will be blank except for library creation runs and for those spaces in a LOADS run that use custom weighting factors from a user library.

Down the left side of the report are six groupings of variable names that label the six types of weighting factors:

- Solar

- General lighting

- Task lighting

- People/equipment

- Conduction

- Air temperature

The weighting factors V0, V1, V2, W1, V2, G0*, G1, G2, G3, P1, and P2 are defined in the DOE-2 Engineers Manual (2.1A), p.II.67ff.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum      Fri Jan  9 15:25:08 1998BDL  RUN 1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-K  WEIGHTING FACTOR SUMMARY
--------------------------------------------------------------------------------------------------------

SP NAME--   PLENUM-1        SPACE1-1         SPACE2-1         SPACE3-1         SPACE4-1         SPACE5-1

SOLAR
V0          0.50123          0.28789          0.28964          0.28893          0.28964          0.19700
V1          0.19470         -0.31695         -0.31317         -0.31749         -0.31317         -0.06700
V2          0.00000          0.06073          0.05625          0.06042          0.05625          0.00000
W1          0.30408          1.35264          1.34679          1.35243          1.34679          0.87000
W2          0.00000         -0.39084         -0.38577         -0.39054         -0.38577          0.00000

GENERAL
LIGHTING
V0          0.70580          0.64109          0.64837          0.64222          0.64837          0.59000
V1         -0.00988         -0.72695         -0.73092         -0.72752         -0.73092         -0.46000
V2          0.00000          0.14887          0.14697          0.14852          0.14697          0.00000
W1          0.30408          1.20584          1.20330          1.20552          1.20330          0.87000
W2          0.00000         -0.27570         -0.27431         -0.27539         -0.27431          0.00000

TASK
LIGHTING
V0          0.68697          0.59243          0.60069          0.59371          0.60069          0.50000
V1          0.00895         -0.66346         -0.66820         -0.66414         -0.66820         -0.37000
V2          0.00000          0.13201          0.13000          0.13165          0.13000          0.00000
W1          0.30408          1.20740          1.20474          1.20707          1.20474          0.87000
W2          0.00000         -0.27605         -0.27464         -0.27574         -0.27464          0.00000

PEOPLE-
EQUIPMENT
V0          0.80413          0.57418          0.58281          0.57552          0.58281          0.68100
V1         -0.10821         -0.63965         -0.64468         -0.64037         -0.64468         -0.55100
V2          0.00000          0.12568          0.12364          0.12532          0.12364          0.00000
W1          0.30408          1.20800          1.20529          1.20766          1.20529          0.87000
W2          0.00000         -0.27619         -0.27476         -0.27588         -0.27476          0.00000

CONDUCTION
V0          0.80413          0.61369          0.62209          0.61491          0.62209          0.68100
V1         -0.10821         -0.69121         -0.69636         -0.69183         -0.69636         -0.55100
V2          0.00000          0.13938          0.13762          0.13902          0.13762          0.00000
W1          0.30408          1.20623          1.20366          1.20591          1.20366          0.87000
W2          0.00000         -0.27578         -0.27439         -0.27548         -0.27439          0.00000

AIR
TEMP     (BTU/HR-SQFT-F   )
G0*         1.11200          0.38719          0.41898          0.39146          0.41898          1.81000
G1*        -1.12493         -0.58182         -0.63280         -0.58840         -0.63280         -1.89000
G2*         0.01293          0.19652          0.21583          0.19885          0.21583          0.08000
G3*         0.00000         -0.00189         -0.00201         -0.00191         -0.00201          0.00000
P1         -0.30408         -1.25528         -1.24751         -1.25441         -1.24751         -0.87000
P2          0.00000          0.32209          0.31549          0.32128          0.31549          0.00000
```

LV-L Daylight Factor Summary

This report is printed for each combination of window and reference point in a daylit space. The first part of the report summarizes some of the daylighting-related input information for the space, window, and reference point. The second part lists the daylight factors that were calculated by the daylighting preprocessor for 20 values of solar altitude and azimuth covering the annual range of sun positions at the location being analyzed.

```
DAYLIGHTING EXAMPLE                    FLOOR OF OFFICE BUILDING IN CHICAGO          Fri Jan 30 14:26:19 1998BDL  RUN 1
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT   AUTO SHADE MANAGEMENT FOR SUN CONTROL
REPORT- LV-L  DAYLIGHT FACTOR SUMMARY FOR            SOUTHZONE
---------------------------------------------------------------------------------------------------------------------
--

SPACE--SOUTHZONE           WINDOW--SOUTHWIND                           REF PT NO.--1
AREA(SQFT)     600.0       SC 1.00   GTC   2  VIS-TRANS  0.75          X(FT)   10.0  Y(FT)  10.0  Z(FT)    2.5
AV REFL          0.46      H(FT)        3.0  W(FT)       20.0          ZONE-FRACTION      0.50
MAX-GLARE      100.0       AZIM(DEG)  180.0  TILT(DEG)   90.0          LTG-SET-POINT(FC)    50.0
VW-AZ(DEG)     270.0       DAY-X-DIV    8  DAY-Y-DIV    8              LTG-CTRL-TYPE      CONTINUOUS
                           X(FT)   0.0  Y(FT)    0.0  Z(FT)    4.0
                           WIN-SHADE-TYPE    MOVABLE-INTERIOR

                      EXT     EXT     DIR    REFL    DIR    REFL    DAY     DAY     WIN     WIN    BACKG   BACKG
  SUN   WIN  SUN  SUN  ILL     ILL     ILL    ILL     ILL    ILL     ILL     ILL     LUM     LUM    LUM     LUM
  POS DAY SHD  ALT AZIM -SKY    -SUN    -SKY   -SKY    -SUN   -SUN    FAC     FAC     FAC     FAC    FAC     FAC   GLARE
  NO. TYP IND (DEG)(DEG) (FC)    (FC)    (FC)   (FC)    (FC)   (FC)   -SKY    -SUN    -SKY    -SUN   -SKY    -SUN  INDEX

   1   1   1   10.  290. 1323.1  160.2   43.3   13.5    0.0    0.4  0.0429  0.0028  1.1379  0.0000 0.0047  0.0013  13.7
   1   1   2   10.  290. 1323.1  160.2   22.0   17.1    0.4    0.3  0.0296  0.0048  0.5384  0.0871 0.0060  0.0010  10.7
   1   2   1   10.  290.  366.9    0.0    7.5    3.0    0.0    0.0  0.0288  0.0000  0.6413  0.0000 0.0038  0.0000   5.0
   1   2   2   10.  290.  366.9    0.0    4.8    3.7    0.0    0.0  0.0233  0.0000  0.4239  0.0000 0.0047  0.0000   2.6
   2   1   1   10.  235. 1323.1  160.2   91.0   24.4    0.0    8.0  0.0872  0.0500  2.5785  0.0000 0.0085  0.0231  16.5
   2   1   2   10.  235. 1323.1  160.2   42.5   33.0   14.6   11.4  0.0571  0.1623  1.0375  2.9513 0.0116  0.0329  14.4
   3   1   1   10.  180. 1323.1  160.2  198.5   35.4  160.2   15.4  0.1768  1.0963  4.4449  0.0000 0.0124  0.0446  18.2
   3   1   2   10.  180. 1323.1  160.2   63.3   49.2   28.5   22.2  0.0850  0.3168  1.5449  5.7586 0.0172  0.0642  15.8
   4   1   1   10.  125. 1323.1  160.2   91.0   24.4    0.0    8.0  0.0872  0.0500  2.5785  0.0000 0.0085  0.0231  16.5
   4   1   2   10.  125. 1323.1  160.2   42.5   33.0   14.6   11.4  0.0571  0.1623  1.0375  2.9513 0.0116  0.0329  14.4
   5   1   1   10.   70. 1323.1  160.2   43.3   13.5    0.0    0.4  0.0429  0.0028  1.1379  0.0000 0.0047  0.0013  13.7
   5   1   2   10.   70. 1323.1  160.2   22.0   17.1    0.4    0.3  0.0296  0.0048  0.5384  0.0871 0.0060  0.0010  10.7
   6   1   1   31.  290. 2082.3 2128.4   57.1   19.0    0.0    5.9  0.0365  0.0028  0.9490  0.0000 0.0042  0.0013  14.7
   6   1   2   31.  290. 2082.3 2128.4   30.4   23.7    5.7    4.5  0.0260  0.0048  0.4722  0.0871 0.0053  0.0010  12.7
   7   1   1   31.  235. 2082.3 2128.4  114.9   32.5    0.0   33.6  0.0708  0.0158  1.9458  0.0000 0.0072  0.0073  16.9
   7   1   2   31.  235. 2082.3 2128.4   55.8   43.4   57.8   44.9  0.0476  0.0482  0.8658  0.8771 0.0097  0.0098  16.3
   8   1   1   31.  180. 2082.3 2128.4  229.7   45.4    0.0   65.2  0.1321  0.0306  3.2192  0.0000 0.0101  0.0142  18.2
   8   1   2   31.  180. 2082.3 2128.4   80.0   62.2  117.1   91.1  0.0683  0.0978  1.2410  1.7779 0.0138  0.0198  17.7
   9   1   1   31.  125. 2082.3 2128.4  114.9   32.5    0.0   33.6  0.0708  0.0158  1.9458  0.0000 0.0072  0.0073  16.9
   9   1   2   31.  125. 2082.3 2128.4   55.8   43.4   57.8   44.9  0.0476  0.0482  0.8658  0.8771 0.0097  0.0098  16.3
  10   1   1   31.   70. 2082.3 2128.4   57.1   19.0    0.0    5.9  0.0365  0.0028  0.9490  0.0000 0.0042  0.0013  14.7
  10   1   2   31.   70. 2082.3 2128.4   30.4   23.7    5.7    4.5  0.0260  0.0048  0.4722  0.0871 0.0053  0.0010  12.7
  11   1   1   51.  290. 2531.1 4564.7   62.2   21.6    0.0   12.6  0.0331  0.0028  0.8387  0.0000 0.0040  0.0013  14.9
  11   1   2   51.  290. 2531.1 4564.7   34.3   26.6   12.3    9.6  0.0241  0.0048  0.4375  0.0871 0.0049  0.0010  13.7
  12   1   1   51.  235. 2531.1 4564.7   99.0   31.3    0.0   34.9  0.0515  0.0077  1.3074  0.0000 0.0057  0.0035  16.2
  12   1   2   51.  235. 2531.1 4564.7   52.4   40.8   54.3   42.2  0.0368  0.0211  0.6693  0.3843 0.0075  0.0043  16.1
  13   1   1   51.  180. 2531.1 4564.7  144.5   39.6    0.0   68.7  0.0727  0.0151  1.7680  0.0000 0.0072  0.0070  16.8
  13   1   2   51.  180. 2531.1 4564.7   68.1   52.9  117.7   91.5  0.0478  0.0458  0.8691  0.8333 0.0097  0.0093  17.6
  14   1   1   51.  125. 2531.1 4564.7   99.0   31.3    0.0   34.9  0.0515  0.0077  1.3074  0.0000 0.0057  0.0035  16.2
  14   1   2   51.  125. 2531.1 4564.7   52.4   40.8   54.3   42.2  0.0368  0.0211  0.6693  0.3843 0.0075  0.0043  16.1
  15   1   1   51.   70. 2531.1 4564.7   62.2   21.6    0.0   12.6  0.0331  0.0028  0.8387  0.0000 0.0040  0.0013  14.9
  15   1   2   51.   70. 2531.1 4564.7   34.3   26.6   12.3    9.6  0.0241  0.0048  0.4375  0.0871 0.0049  0.0010  13.7
  16   1   1   72.  290. 3100.3 6170.7   74.0   26.2    0.0   17.0  0.0323  0.0028  0.7992  0.0000 0.0039  0.0013  15.4
  16   1   2   72.  290. 3100.3 6170.7   41.5   32.3   16.6   12.9  0.0238  0.0048  0.4328  0.0871 0.0048  0.0010  14.5
  17   1   1   72.  235. 3100.3 6170.7   91.3   31.1    0.0   23.6  0.0395  0.0038  0.9692  0.0000 0.0047  0.0018  16.0
  17   1   2   72.  235. 3100.3 6170.7   50.8   39.5   28.9   22.5  0.0291  0.0083  0.5292  0.1515 0.0059  0.0017  15.4
  18   1   1   72.  180. 3100.3 6170.7  104.5   34.5    0.0   36.3  0.0448  0.0059  1.0885  0.0000 0.0051  0.0027  16.2
  18   1   2   72.  180. 3100.3 6170.7   57.0   44.3   52.8   41.0  0.0327  0.0152  0.5944  0.2764 0.0066  0.0031  16.2
  19   1   1   72.  125. 3100.3 6170.7   91.3   31.1    0.0   23.6  0.0395  0.0038  0.9692  0.0000 0.0047  0.0018  16.0
  19   1   2   72.  125. 3100.3 6170.7   50.8   39.5   28.9   22.5  0.0291  0.0083  0.5292  0.1515 0.0059  0.0017  15.4
  20   1   1   72.   70. 3100.3 6170.7   74.0   26.2    0.0   17.0  0.0323  0.0028  0.7992  0.0000 0.0039  0.0013  15.4
  20   1   2   72.   70. 3100.3 6170.7   41.5   32.3   16.6   12.9  0.0238  0.0048  0.4328  0.0871 0.0048  0.0010  14.5
NOTE -- The following visible transmittance is used for the above values:
        For unshaded window or window with regular shade: 1.0
        For window with blind: actual visible transmittance at first slat angle
        In either case, actual transmittances are used in the hourly calculation.
```

Part 1 Input Information

Space-Related Quantities
SPACE

is the U-name of space.

AREA

is the floor area of space (before multiplication by space multiplier).

AV REFL

is the area-weighted average inside surface visible reflectance of space, which is calculated from INSIDE-VIS-REFL values for EXTERIOR-WALL, INTERIOR-WALL, UNDERGROUND-FLOOR, UNDERGROUND-WALL and WINDOW.

MAX-GLARE

is the threshold for closing window shades to control glare (MAX-GLARE keyword value; defaults to 100, which means no glare control).

VW-AZ

(view azimuth) is the azimuth angle, measured clockwise from north, of the occupant's direction of view; used to calculate the daylight glare index. It is entered (relative to the SPACE y-axis) with the VIEW-AZIMUTH keyword.

Window-Related Quantities
WINDOW

is the window U-name.

SH-COEF

is the shading coefficient of the glazing.

VIS-TRANS

is the visible transmittance of the glazing at normal incidence.

H

is the height of the glazing,

W

is the width of the glazing.

AZIM and TILT

are the azimuth and tilt angle, respectively, of the window outward normal in the building coordinate system. AZIM is measured clockwise from the building y-axis.

DAY-X-DIV and DAY-Y-DIV

are the number of elements into which the window is divided along its WIDTH and HEIGHT, respectively, for the integration which determines the daylight reaching the reference point from the window. DAY-X-DIV and DAY-Y-DIV are automatically determined by the program to insure an accurate integration.

X, Y, Z

are the coordinates of the glazing origin in the space coordinate system. For vertical windows, Z is the sill height.

WIN-SHADE-TYPE

is the type of shading device on the window, if any, as entered with the WIN-SHADE-TYPE keyword.

Reference Point-Related Quantities

REF PT NO.

is the number of reference point (1 or 2)

X, Y, Z

are the coordinates of reference point in the space coordinate system.

ZONE-FRACTION

is the fraction of the space floor area controlled by the lighting system at this reference point (value of ZONE-FRACTION1 or ZONE-FRACTION2 keyword).

LTG-SET-POINT

is the illuminance setpoint as entered with keyword LIGHT-SET-POINT1 for reference point 1, or with LIGHT-SET-POINT2 for reference point 2.

LTG-CTRL-TYPE

is the lighting control type as entered with keyword LIGHT-CTRL-TYPE1 for reference point 1, or with or LIGHT-CTRL-TYPE2 for reference point 2.

Part 2 Calculated Daylighting Factor Values
SUN POS NO.

(sun position number) is the sun-position index corresponding to different pairs of solar altitude and azimuth values (see SUN ALT and SUN AZIM, below).

DAY TYP

(day type) is 1 for clear sky and 2 for overcast sky. For the latter, the daylight factors for only one sun position are calculated.

WIN SHD IND

(window shade index) is 1 for bare window (shading device off), and 2 for window with shading device on. Visible transmittance of shade is taken to be 1.0 for daylight factor calculation.

SUN ALT

is the altitude of sun above the horizon. It has four equally-spaced values ranging from 10o to the maximum altitude the sun can reach at the location being analyzed.

SUN AZIM

is the azimuth of sun measured clockwise from North.

EXT ILL –SKY

is the exterior horizontal illuminance due to diffuse light from sky (excludes direct sun).

EXT ILL –SUN

is the exterior horizontal illuminance due to direct sun.

EXT ILL -SKY and EXT ILL –SUN

are calculated for standard CIE skies using, for clear sky, the atmospheric turbidity and moisture for the month of May.

The following quantities relate to the interior of the space. For WIN SHD IND = 2 (window with shade), the shade is assumed to have 100% transmittance; the actual shade transmittance is taken into account in the hourly loads calculation.

DIR ILL –SKY

(direct illuminance -sky) is the direct horizontal illuminance at the reference point produced by light which originates in the sky and reaches the reference point without reflection from the interior surfaces of the space. For an unshaded window (WIN SHD IND = 1), this includes the light coming directly from the sky or by reflection of sky light from exterior BUILDING-SHADEs. For a window with shade (WIND SHD IND = 2 and WIN-SHADE-TYPE other than NO-SHADE), the light source is the shade itself, a diffusely transmitting surface illuminated by direct light from the sky, sky light reflected from the ground, and sky light reflected from exterior obstructions.

REFL ILL –SKY

(reflected illuminance -sky) is the illuminance at the reference point produced by daylight which originates in the sky and reaches the reference point after reflecting from the interior surfaces of the space.

DIR ILL –SUN

(direct illuminance -sun): for an unshaded window (WIN SHD IND = 1), this is the direct horizontal illuminance at the reference point produced by light from the sun reaching the reference point without reflection from the interior surfaces of the space. For a window with shade (WIN SHD IND = 2), the light source is the shade illuminated by direct sunlight and by sunlight reflected by the ground and exterior obstructions.

REFL ILL –SUN

(reflected illuminance -sun) is the indirect horizontal illuminance at the reference point produced by sunlight which reflects from interior surfaces before reaching the reference point.

DAY ILL FAC –SKY

(daylight illuminance factor -sky) is the ratio (DIR ILL -SKY + REFL ILL -SKY)/(EXT ILL -SKY).

DAY ILL FAC –SUN

(daylight illuminance factor -sun) is the ratio (DIR ILL -SUN + REFL ILL -SUN)/(EXT ILL -SUN).

WIN LUM FAC –SKY

(window luminance factor -sky) is the average luminance of the window (as seen from the reference point) due to light originating in the sky, divided by EXT ILL -SKY. It has units footlamberts/footcandle (English) or candelas/m2/lux (metric).

WIN LUM FAC –SUN

(window luminance factor -sun) is the ratio between the average luminance of the window (as seen from the reference point) due to light originating at the sun, divided by EXT ILL -SUN. This quantity is not calculated for an unshaded window.

BACKG LUM FAC –SKY

(background luminance factor -sky) is the average luminance of interior surfaces due to light originating in the sky, divided by EXT ILL -SKY. It has units footlamberts/footcandle (English) or (candelas/m2)/lux (metric).

BACKG LUM FAC –SUN

(background luminance factor -sun) is the average luminance of interior surfaces due to light originating at the sun, divided by EXT ILL -SUN.

GLARE INDEX

is the daylight glare index at the reference point due to this window. (It assumes 100% shade transmittance for a shaded window (WIN SHD IND = 2). The actual glare index in the hourly calculation will generally be lower for shade transmittance < 100%.

LV-M DOE-2.2 Units Conversion Table

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum          DOE-2.2-44a2   9/24/2004   18:18:14  BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- LV-M DOE-2.2 Units Conversion Table                                              WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------

           ENGLISH    MULTIPLIED BY  GIVES   METRIC     MULTIPLIED BY   GIVES   ENGLISH

      1                   1.000000                           1.000000
      2                   1.000000                           1.000000
      3    BTU            0.293000    WH                      3.412969    BTU
      4    BTU/HR         0.293000    WATT                    3.412969    BTU/HR
      5    BTU/LB-F    4183.830078    J/KG-K                  0.000239    BTU/LB-F
      6    BTU/HR-SQFT-F   5.674460   W/M2-K                  0.176228    BTU/HR-SQFT-F
      7    DEGREES        1.000000    DEGREES                 1.000000    DEGREES
      9    SQFT           0.092903    M2                     10.763915    SQFT
     10    CUFT           0.028317    M3                     35.314724    CUFT
     11    LB/HR          0.453592    KG/HR                   2.204624    LB/HR
     12    LB/CUFT       16.018459    KG/M3                   0.062428    LB/CUFT
     13    MPH            0.447040    M/S                     2.236936    MPH
     14    BTU/HR-F       0.527178    W/K                     1.896893    BTU/HR-F
     15    FT             0.304800     M                      3.280840    FT
     16    BTU/HR-FT-F    1.729600    W/M-K                   0.578168    BTU/HR-FT-F
     17    BTU/HR- SQFT   3.152480    WATT /M2                0.317211    BTU/HR- SQFT
     18    IN             2.540000    CM                      0.393701    IN
     19    UNITS/IN       0.393700    UNITS/CM                2.540005    UNITS/IN
     20    UNITS          1.000000    UNITS                   1.000000    UNITS
     21    LB             0.453592    KG                      2.204624    LB
     22    FRAC.OR MULT.  1.000000    FRAC.OR MULT.           1.000000    FRAC.OR MULT.
     23    HOURS          1.000000    HRS                     1.000000    HOURS
     24    PERCENT-RH     1.000000    PERCENT-RH              1.000000    PERCENT-RH
     25    CFM            1.699010    M3/H                    0.588578    CFM
     26    IN-WATER      25.400000    MM-WATER                0.039370    IN-WATER
     27    LB/SQFT        4.882400    KG/M2                   0.204817    LB/SQFT
     28    KW             1.000000    KW                      1.000000    KW
     29    W/SQFT        10.763920    W/M2                    0.092903    W/SQFT
     30    THERMS        25.000000    THERMIES                0.040000    THERMS
     31    KNOTS          0.514440    M/SEC                   1.943861    KNOTS
     32    HR-SQFT-F /BTU 0.176228    M2-K /W                 5.674467    HR-SQFT-F /BTU
     33    $DOLLARS       1.000000    $DOLLARS                1.000000    $DOLLARS
     34    MBTU/HR        0.293000    MWATT                   3.412969    MBTU/HR
     35    YEARS          1.000000    YEARS                   1.000000    YEARS
     36    $/HR           1.000000    $/HR                    1.000000    $/HR
     37    HRS/YEARS      1.000000    HRS/YEARS               1.000000    HRS/YEARS
     38    PERCENT        1.000000    PERCENT                 1.000000    PERCENT
     39    $/MONTH        1.000000    $/MONTH                 1.000000    $/MONTH
     40    GALLONS/MIN/TON 1.078000   LITERS/MIN/KW           0.927644    GALLONS/MIN/TON
     41    BTU/LB         0.645683    WH/KG                   1.548748    BTU/LB
     42    LBS/SQIN-GAGE 68.947571    MBAR-GAGE               0.014504    LBS/SQIN-GAGE
     43    $/UNIT         1.000000    $/UNIT                  1.000000    $/UNIT
     44    BTU/HR/PERSON  0.293000    W/PERSON                3.412969    BTU/HR/PERSON
     45    LBS/LB         1.000000    KGS/KG                  1.000000    LBS/LB
     46    BTU/BTU        1.000000    KWH/KWH                 1.000000    BTU/BTU
     47    LBS/KW         0.453590    KG/KW                   2.204634    LBS/KW
     48    REV/MIN        1.000000    REV/MIN                 1.000000    REV/MIN
     49    KW/TON         1.000000    KW/TON                  1.000000    KW/TON
     50    MBTU           0.293000     MWH                    3.412969    MBTU
     51     GAL           3.785410    LITER                   0.264172     GAL
     52    GAL/MIN        3.785410    LITERS/MIN              0.264172    GAL/MIN
     53    BTU/F       1897.800049    J/K                     0.000527    BTU/F
     54    KWH            1.000000    KWH                     1.000000    KWH
     55    $/UNIT-HR      1.000000    $/UNIT-HR               1.000000    $/UNIT-HR
     56    KW/CFM         0.588500    KW/M3/HR                1.699235    KW/CFM
     57    BTU/SQFT-F  20428.400391   J/M2-K                  0.000049    BTU/SQFT-F
     58    HR/HR          1.000000    HR/HR                   1.000000    HR/HR
     59    BTU/FT-F    6226.479980    J/M-K                   0.000161    BTU/FT-F
     60    R              0.555556    K                       1.799999    R
     61    INCH MER      33.863800    MBAR                    0.029530    INCH MER
     62    UNITS/GAL/MIN  0.264170    UNITS/LITER/MIN         3.785441    UNITS/GAL/MIN
     63    (HR-SQFT-F/BTU)2 0.031056  (M2-K /W)2             32.199585    (HR-SQFT-F/BTU)2
     64    KBTU/HR        0.293000    KW                      3.412969    KBTU/HR
     65    KBTU           0.293000    KWH                     3.412969    KBTU
     66    CFM            0.471900    L/S                     2.119093    CFM
     67    CFM/SQFT      18.288000    M3/H-M2                 0.054681    CFM/SQFT
     68     1/R           1.799900     1/K                    0.555586     1/R
     69    1/KNOT         1.943860    SEC/M                   0.514440    1/KNOT
     70    FOOTCANDLES   10.763910     LUX                    0.092903    FOOTCANDLES
     71    FOOTLAMBERT    3.426259    CANDELA/M2              0.291864    FOOTLAMBERT
     72    LUMEN / WATT   1.000000    LUMEN / WATT            1.000000    LUMEN / WATT
     73    KBTU/SQFT-YR   3.152480    KWH/M2-YR               0.317211    KBTU/SQFT-YR
     74    F (DELTA)      0.555556    C (DELTA)               1.799999    F (DELTA)
     75    BTU/DAY        0.012202    WATT                   81.953773    BTU/DAY
     76    $/YEAR         1.000000    $/YEAR                  1.000000    $/YEAR
     77    BTU/WATT       0.293000    WATT/WATT               3.412969    BTU/WATT
```

78	RADIANS	1.000000	RADIANS	1.000000	RADIANS
79	WATT/BTU	3.413000	WATT/WATT	0.292997	WATT/BTU
80	BTU	0.000293	KWH	3412.969482	BTU
81	WATT	1.000000	WATT	1.000000	WATT
82	LUMENS	1.000000	LUMENS	1.000000	LUMENS
83	BTU/HR-FT-R2	3.115335	W/M-K2	0.320993	BTU/HR-FT-R2
84	LB/FT-S	1.488163	KG/M-S	0.671969	LB/FT-S
85	LB/FT-S-R	2.678693	KG/M-S-K	0.373316	LB/FT-S-R
86	LB/CUFT-R	28.833212	KG/M3-K	0.034682	LB/CUFT-R
87	BTU/HR-FT-R	1.730741	W/M-K	0.577787	BTU/HR-FT-R
88	THERM	2.831700	M3	0.353145	THERM
89	THERM/HR	2.831700	M3/HR	0.353145	THERM/HR
90	TON	0.907180	TONNE	1.102317	TON
91	TON/HR	0.907180	TONNE/HR	1.102317	TON/HR
92	BTU/UNIT	1.000000	BTU/UNIT	1.000000	BTU/UNIT
93	$	1.000000	$	1.000000	$
94	KW/GAL/MIN	0.264170	KW/LITER/MIN	3.785441	KW/GAL/MIN
95	CUFT/GAL	0.448831	M3-MIN/H-LITERS	2.228010	CUFT/GAL
96	MINUTES	1.000000	MINUTES	1.000000	MINUTES
97	UNUSED	1.000000	UNUSED	1.000000	UNUSED
98	UNUSED	1.000000	UNUSED	1.000000	UNUSED
99	UNUSED	1.000000	UNUSED	1.000000	UNUSED
100	UNUSED	1.000000	UNUSED	1.000000	UNUSED
101	UNUSED	1.000000	UNUSED	1.000000	UNUSED
102	UNUSED	1.000000	UNUSED	1.000000	UNUSED
103	UNUSED	1.000000	UNUSED	1.000000	UNUSED
104	UNUSED	1.000000	UNUSED	1.000000	UNUSED
105	UNUSED	1.000000	UNUSED	1.000000	UNUSED
106	UNUSED	1.000000	UNUSED	1.000000	UNUSED
107	UNUSED	1.000000	UNUSED	1.000000	UNUSED
108	UNUSED	1.000000	UNUSED	1.000000	UNUSED
109	UNUSED	1.000000	UNUSED	1.000000	UNUSED
110	UNUSED	1.000000	UNUSED	1.000000	UNUSED
111	UNUSED	1.000000	UNUSED	1.000000	UNUSED
112	UNUSED	1.000000	UNUSED	1.000000	UNUSED
113	BTU-F/BTU	0.555560	KWH-C/KWH	1.799986	BTU-F/BTU
114	UNUSED	1.000000	UNUSED	1.000000	UNUSED
115	VOLTS	1.000000	VOLTS	1.000000	VOLTS
116	C	1.000000	C	1.000000	C
117	AMPS	1.000000	AMPS	1.000000	AMPS
118	VOLTS/C	1.000000	VOLTS/C	1.000000	VOLTS/C
119	1/C	1.000000	1/C	1.000000	1/C
120	FT/MIN	0.005080	M/S	196.850388	FT/MIN
121	GAL/MIN	227.160004	LITERS/HR	0.004402	GAL/MIN
122	KW/CFM	588.500000	W/M3/HR	0.001699	KW/CFM
123	BTU/HR-F	0.000527	KW/C	1896.892578	BTU/HR-F
124	HP	0.102000	kW	9.803922	HP
125	CFM/TON	0.483200	(M3/H)/KW	2.069536	CFM/TON
126	UNUSED	1.000000	UNUSED	1.000000	UNUSED
127	UNUSED	1.000000	UNUSED	1.000000	UNUSED
128	UNUSED	1.000000	UNUSED	1.000000	UNUSED
129	UNUSED	1.000000	UNUSED	1.000000	UNUSED
130	1/VOLTS	1.000000	1/VOLTS	1.000000	1/VOLTS
131	(C-M2)/W	1.000000	(C-M2)/W	1.000000	(C-M2)/W
132	(C-M-SEC)/W	1.000000	(C-M-SEC)/W	1.000000	(C-M-SEC)/W
133	W/M2	1.000000	W/M2	1.000000	W/M2
134	TDV-MBTUH	0.293000	TDV-MW	3.412969	TDV-MBTUH
135	TDV-MBTU	0.293000	TDV-MWH	3.412969	TDV-MBTU
136	TDV-KBTU/KWH	0.293000	TDV-KWH/KWH	3.412969	TDV-KBTU/KWH
137	TDV-KBTU/THERM	0.010000	TDV-KWH/KWH	100.000000	TDV-KBTU/THERM

LV-N Building Coordinate Geometry

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2-44a2   9/24/2004    18:18:14  BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LV-N Building Coordinate Geometry                                          WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------
SPACE................... (SPACE ORIGIN)
    WALL............... (VERTEX1) (VERTEX2) (...)
        WINDOW......... (VERTEX1) (VERTEX2) (...)

-------------------------------------------------------------------------------------------------------------------------

PLENUM-1................ (    0.0      0.0      8.0)
    WALL-1PF............ (    0.0      0.0     10.0) (    0.0      0.0      8.0) (  100.0      0.0      8.0) (  100.0      0.0     10.0)
    WALL-1PR............ (  100.0      0.0     10.0) (  100.0      0.0      8.0) (  100.0     50.0      8.0) (  100.0     50.0     10.0)
    WALL-1PB............ (  100.0     50.0     10.0) (  100.0     50.0      8.0) (    0.0     50.0      8.0) (    0.0     50.0     10.0)
    WALL-1PL............ (    0.0     50.0     10.0) (    0.0     50.0      8.0) (    0.0      0.0      8.0) (    0.0      0.0     10.0)
    TOP-1   ............ (    0.0      0.0     10.0) (  100.0      0.0     10.0) (  100.0     50.0     10.0) (    0.0     50.0     10.0)
    C1-1............... (    0.0      0.0      8.0) (  100.0      0.0      8.0) (   88.0     12.0      8.0) (   12.0     12.0      8.0)
    C2-1............... (  100.0      0.0      8.0) (  100.0     50.0      8.0) (   88.0     38.0      8.0) (   88.0     12.0      8.0)
    C3-1............... (  100.0     50.0      8.0) (    0.0     50.0      8.0) (   12.0     38.0      8.0) (   88.0     38.0      8.0)
    C4-1............... (    0.0     50.0      8.0) (    0.0      0.0      8.0) (   12.0     12.0      8.0) (   12.0     38.0      8.0)
    C5-1............... (   12.0     12.0      8.0) (   88.0     12.0      8.0) (   88.0     38.0      8.0) (   12.0     38.0      8.0)
SPACE1-1................ (    0.0      0.0      0.0)
    FRONT-1 ............ (    0.0      0.0      8.0) (    0.0      0.0      0.0) (  100.0      0.0      0.0) (  100.0      0.0      8.0)
        WF-1........... (   10.0      0.0      7.0) (   10.0      0.0      3.0) (   55.0      0.0      3.0) (   55.0      0.0      7.0)
        DF-1........... (   70.0      0.0      8.0) (   70.0      0.0      0.0) (   78.0      0.0      0.0) (   78.0      0.0      8.0)
    C1-1............... (    0.0      0.0      8.0) (  100.0      0.0      8.0) (   88.0     12.0      8.0) (   12.0     12.0      8.0)
    SB12............... (  100.0      0.0      8.0) (  100.0      0.0      0.0) (   88.0     12.0      0.0) (   88.0     12.0      8.0)
    SB14............... (   12.0     12.0      8.0) (   12.0     12.0      0.0) (    0.0      0.0      0.0) (    0.0      0.0      8.0)
    SB15............... (   88.0     12.0      8.0) (   88.0     12.0      0.0) (   12.0     12.0      0.0) (   12.0     12.0      8.0)
SPACE2-1................ (  100.0      0.0      0.0)
    RIGHT-1 ............ (  100.0      0.0      8.0) (  100.0      0.0      0.0) (  100.0     50.0      0.0) (  100.0     50.0      8.0)
        WR-1........... (  100.0     12.5      7.0) (  100.0     12.5      3.0) (  100.0     37.5      3.0) (  100.0     37.5      7.0)
    SB12............... (  100.0      0.0      8.0) (  100.0      0.0      0.0) (   88.0     12.0      0.0) (   88.0     12.0      8.0)
    C2-1............... (  100.0      0.0      8.0) (  100.0     50.0      8.0) (   88.0     38.0      8.0) (   88.0     12.0      8.0)
    SB23............... (  100.0     50.0      8.0) (  100.0     50.0      0.0) (   88.0     38.0      0.0) (   88.0     38.0      8.0)
    SB25............... (   88.0     38.0      8.0) (   88.0     38.0      0.0) (   88.0     12.0      0.0) (   88.0     12.0      8.0)
SPACE3-1................ (  100.0     50.0      0.0)
    BACK-1  ............ (  100.0     50.0      8.0) (  100.0     50.0      0.0) (    0.0     50.0      0.0) (    0.0     50.0      8.0)
        WB-1........... (   90.0     50.0      7.0) (   90.0     50.0      3.0) (   45.0     50.0      3.0) (   45.0     50.0      7.0)
        DB-1........... (   30.0     50.0      7.0) (   30.0     50.0      0.0) (   23.0     50.0      0.0) (   23.0     50.0      7.0)
    SB23............... (  100.0     50.0      8.0) (  100.0     50.0      0.0) (   88.0     38.0      0.0) (   88.0     38.0      8.0)
    C3-1............... (  100.0     50.0      8.0) (    0.0     50.0      8.0) (   12.0     38.0      8.0) (   88.0     38.0      8.0)
    SB34............... (    0.0     50.0      8.0) (    0.0     50.0      0.0) (   12.0     38.0      0.0) (   12.0     38.0      8.0)
    SB35............... (   12.0     38.0      8.0) (   12.0     38.0      0.0) (   88.0     38.0      0.0) (   88.0     38.0      8.0)
SPACE4-1................ (    0.0     50.0      0.0)
    LEFT-1  ............ (    0.0     50.0      8.0) (    0.0     50.0      0.0) (    0.0      0.0      0.0) (    0.0      0.0      8.0)
        WL-1........... (    0.0     37.5      7.0) (    0.0     37.5      3.0) (    0.0     12.5      3.0) (    0.0     12.5      7.0)
    SB14............... (   12.0     12.0      8.0) (   12.0     12.0      0.0) (    0.0      0.0      0.0) (    0.0      0.0      8.0)
    SB34............... (    0.0     50.0      8.0) (    0.0     50.0      0.0) (   12.0     38.0      0.0) (   12.0     38.0      8.0)
    C4-1............... (    0.0     50.0      8.0) (    0.0      0.0      8.0) (   12.0     12.0      8.0) (   12.0     38.0      8.0)
    SB45............... (   12.0     12.0      8.0) (   12.0     12.0      0.0) (   12.0     38.0      0.0) (   12.0     38.0      8.0)
SPACE5-1................ (   12.0     12.0      0.0)
    SB15............... (   88.0     12.0      8.0) (   88.0     12.0      0.0) (   12.0     12.0      0.0) (   12.0     12.0      8.0)
    SB25............... (   88.0     38.0      8.0) (   88.0     38.0      0.0) (   88.0     12.0      0.0) (   88.0     12.0      8.0)
    SB35............... (   12.0     38.0      8.0) (   12.0     38.0      0.0) (   88.0     38.0      0.0) (   88.0     38.0      8.0)
    SB45............... (   12.0     12.0      8.0) (   12.0     12.0      0.0) (   12.0     38.0      0.0) (   12.0     38.0      8.0)
    C5-1............... (   12.0     12.0      8.0) (   88.0     12.0      8.0) (   88.0     38.0      8.0) (   12.0     38.0      8.0)
```

LS-A Space Peak Loads Summary

This report lists each space by U-name and shows the number of times each space is repeated (based on the keywords MULTIPLIER and FLOOR-MULTIPLIER) on the left of the report.

The individual space peak sensible cooling load with the month, day and hour it occurred is reported in the center. The sum of the cooling loads for all spaces (which is the non-coincident building peak load) is also reported.

The coincident building peak cooling load (the "block" load) is reported directly below the non-coincident peak, but it does not include the plenum load. The outside drybulb and wetbulb temperatures are also reported for the time of the peak load in each space and for the building. All hours are given in standard time.

The heating peak loads are treated similarly on the right.

A "load" here is defined as the amount of heat that must be added or removed from the space air per hour to maintain a constant air temperature equal to the TEMPERATURE keyword value in SPACE. These loads are modified in the SYSTEMS program to account for time-varying air temperatures.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum           DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-A Space Peak Loads Summary                                  DESIGN DAY    WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------

                      MULTIPLIER   COOLING LOAD      TIME OF   DRY-  WET-   HEATING LOAD      TIME OF   DRY-  WET-
   SPACE NAME       SPACE  FLOOR    (KBTU/HR)          PEAK    BULB  BULB    (KBTU/HR)          PEAK    BULB  BULB

   PLENUM-1           1.    1.        68.071   AUG  5  4 PM   94.F  74.F     -71.422   JAN  7  7 AM   -5.F  -6.F
   SPACE1-1           1.    1.        27.707   AUG  5  5 PM   94.F  74.F     -14.109   JAN  7  8 AM   -5.F  -6.F
   SPACE2-1           1.    1.        13.641   AUG  5 11 AM   80.F  70.F      -5.793   JAN  7  7 AM   -5.F  -6.F
   SPACE3-1           1.    1.        19.296   AUG  5  9 AM   75.F  68.F     -15.393   JAN  7  7 AM   -5.F  -6.F
   SPACE4-1           1.    1.        13.261   AUG  5  7 PM   92.F  73.F      -6.230   JAN  7  7 AM   -5.F  -6.F
   SPACE5-1           1.    1.        19.881   AUG  5  1 AM   82.F  71.F      -4.895   JAN  7 12 MDNT -5.F  -6.F
                                    ---------                            ---------
   SUM                               161.856                             -117.842
```

LS-B Space Peak Load Components <space name>

This report gives a breakdown of cooling and heating peak loads, according to the source of the load, for each space. A "load" here is defined as the amount of heat that must be added or removed from the space air per hour to maintain a constant air temperature equal to the TEMPERATURE keyword value in SPACE. These loads are modified in the SYSTEMS program to account for time-varying air temperatures.

The time of occurrence (in local standard time) of the peaks is indicated along with the corresponding outside conditions. The load components are:

WALL CONDUCTION

is the load due to conduction through exterior walls (TILT ^{3} 45°).

ROOF CONDUCTION

is the load due to conduction through roof sections (exterior walls with TILT < 45°).

WINDOW GLASS+FRM COND

is the load due to UADT heat gain through all the exterior windows (glass plus frames) plus solar energy absorbed by the glass and frames and conducted into the space.

WINDOW GLASS SOLAR

is the load caused by direct and diffuse solar radiation transmitted by the window glass into the space. Note that all sensible loads are calculated as delayed in time with weighting factors so that it is possible to have load contributions from WINDOW GLASS SOLAR at night.

DOOR CONDUCTION

is the load due to conduction through external doors in the space.

INTERNAL SURFACE COND

is the load due to conduction through INTERIOR-WALLs such as partitions and drop ceilings. These loads will be zero in this report if you choose the same LOADS calculation temperature for all spaces (as was the case in this example).

UNDERGROUND SURF COND

is the load due to conduction through basement floors and walls or slabs on grade.

The next five entries are the loads due to

Occupants

(resulting from user-supplied entries for keywords PEOPLE-SCHEDULE, NUMBER-OF-PEOPLE, AREA-PERSON, and PEOPLE-HEAT-GAIN)

Electric lighting

(from keywords LIGHTING-SCHEDULE, LIGHTING-TYPE, LIGHTING-W/AREA, TASK-LT-W/AREA, etc., or from commands LIGHTING-SYSTEM, LUMINAIRE-TYPE, LAMP-TYPE, etc.)

Equipment

(from keywords EQUIP-SCHEDULE, EQUIPMENT-W/AREA, etc.)

Process

(from keywords SOURCE-SCHEDULE, SOURCE-TYPE, SOURCE-POWER, etc.)

Infiltration of outside air

(from keywords INF-SCHEDULE, INF-METHOD, AIR-CHANGES/HR, etc.).

The RUN number in the upper right hand corner refers to the number of the pass through the LOADS program. For example, if you were doing parametric runs as part of the same job, successive passes through LOADS would be recorded as RUN 1, RUN 2, RUN 3, etc.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum       DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-B Space Peak Load Components    SPACE1-1                                          WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------

 SPACE   SPACE1-1
 SPACE TEMPERATURE USED FOR THE LOADS CALCULATION IS   70 F /  21 C


                    MULTIPLIER      1.0        FLOOR MULTIPLIER       1.0

                    FLOOR  AREA    1056  SQFT      98   M2
                    VOLUME         8448  CUFT     239   M3


                               COOLING  LOAD                                 HEATING  LOAD
                          ==========================                   ==========================
         TIME                    OCT 22  4PM                                 JAN 12  8AM

    DRY-BULB TEMP              70 F           21 C                   -7 F           -22 C
    WET-BULB TEMP              55 F           13 C                   -7 F           -22 C
    TOT HORIZONTAL SOLAR RAD  119 BTU/H.SQFT  375 W/M2                3 BTU/H.SQFT    8 W/M2
    WINDSPEED AT SPACE         8.3 KTS        4.3 M/S               5.1 KTS         2.6 M/S
    CLOUD AMOUNT 0(CLEAR)-10    0                                    0



                        SENSIBLE       LATENT                             SENSIBLE
                      (KBTU/H)  ( KW ) (KBTU/H) ( KW )            (KBTU/H) ( KW )
                      --------  ------ -------- ------            -------- --------

    WALL CONDUCTION      0.860   0.252   0.000   0.000              -2.418   -0.708
    ROOF CONDUCTION      0.000   0.000   0.000   0.000               0.000    0.000
    WINDOW GLASS+FRM COND 1.655  0.485   0.000   0.000              -8.995   -2.636
    WINDOW GLASS SOLAR   20.144  5.902   0.000   0.000               0.968    0.284
    DOOR CONDUCTION      0.000   0.000   0.000   0.000               0.000    0.000
    INTERNAL SURFACE COND 0.000  0.000   0.000   0.000               0.000    0.000
    UNDERGROUND SURF COND -0.665 -0.195  0.000   0.000              -1.814   -0.532
    OCCUPANTS TO SPACE   2.080   0.609   1.433   0.420               0.012    0.003
    LIGHT    TO SPACE    3.494   1.024   0.000   0.000               0.210    0.061
    EQUIPMENT TO SPACE   2.053   0.602   0.000   0.000               0.641    0.188
    PROCESS   TO SPACE   0.000   0.000   0.000   0.000               0.000    0.000
    INFILTRATION         0.000   0.000   0.000   0.000              -1.689   -0.495
                      --------  ------ ------- ------             -------- --------
    TOTAL               29.621   8.679   1.433   0.420             -13.086   -3.834
    TOTAL / AREA         0.028   0.088   0.001   0.004              -0.012   -0.039

    TOTAL LOAD          31.054 KBTU/H    9.099  KW        -13.086 KBTU/H      -3.834  KW
    TOTAL LOAD / AREA   29.41  BTU/H.SQFT 92.745 W/M2       12.392 BTU/H.SQFT  39.081  W/M2


                    ************************************************************
                    *                                                          *
                    *  NOTE  1)THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR  *
                    *  ----    LOADS                                            *
                    *         2)TIMES GIVEN IN STANDARD TIME FOR THE LOCATION   *
                    *           IN CONSIDERATION                                *
                    *         3)THE ABOVE LOADS ARE CALCULATED ASSUMING A       *
                    *           CONSTANT INDOOR SPACE TEMPERATURE               *
                    *                                                          *
                    ************************************************************
```

LS-C BuiLding Peak Load Components

This report is similar in format to LS-B. The major difference is that LS-C is generated at the "building level," i.e., the space loads are summed each hour to give the building coincident load and the peak values of this load are shown here.

"Floor area" in this report is that of conditioned spaces only (ZONE-TYPE = CONDITIONED); it excludes plenums and other unconditioned spaces (ZONE-TYPE = PLENUM or UNCONDITIONED). "Volume" is that of conditioned spaces and plenums; it excludes ZONE-TYPE = UNCONDITIONED.

The building coincident peak load does not include plenums (ZONE-TYPE = PLENUM) or other unconditioned spaces (ZONE-TYPE = UNCONDITIONED).

Although no infiltration is indicated for the peak cooling load in this example, the user should realize how DOE-2 treats infiltration loads. The sensible portion is treated as an instantaneous heat gain or loss. The latent portion is reported in LOADS, but is passed to SYSTEMS as a flow with the calculated humidity ratio for each hour. The contribution of the latent heat (negative or positive in relation to room humidity) is then calculated from a mass balance of moisture in the space to determine the return air humidity ratio. In dry climates the infiltration may actually result in a decreased space latent load and thus a decreased total SYSTEMS load. The opposite is true in humid climates where infiltration acts to increase the SYSTEMS load.

The heat gain or loss that occurs in plenums, including heat due to lights, is accounted for in the SYSTEMS simulation and causes a temperature change in the return air flowing through the plenum. Therefore, you should not specify plenums unless they are actually return air plenums. Unconditioned, non-return-air spaces should be specified in the SPACE command with ZONE-TYPE = UNCONDITIONED.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-C Building Peak Load Components                                                WEATHER FILE- TRY  CHICAGO
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     *** BUILDING ***




                    FLOOR   AREA     5000  SQFT       465  M2
                    VOLUME          50000  CUFT      1416  M3


                               COOLING  LOAD                                  HEATING  LOAD
                          ==========================                    ==========================
            TIME                  JUL  9  4PM                                 MAR 24  6AM

            DRY-BULB TEMP             94 F            34 C               8 F            -13 C
            WET-BULB TEMP             74 F            23 C               7 F            -14 C
            TOT HORIZONTAL SOLAR RAD 228 BTU/H.SQFT  717 W/M2            0 BTU/H.SQFT     0 W/M2
            WINDSPEED AT SPACE       5.4 KTS          2.8 M/S           9.4 KTS          4.8 M/S
            CLOUD AMOUNT 0(CLEAR)-10   4                                  7



                            SENSIBLE          LATENT                          SENSIBLE
                         (KBTU/H)  ( KW ) (KBTU/H)  ( KW )              (KBTU/H) ( KW )
                         --------  ------ --------  ------              -------- --------


            WALL CONDUCTION        3.987    1.168    0.000   0.000        -6.123   -1.794
            ROOF CONDUCTION        0.000    0.000    0.000   0.000         0.000    0.000
            WINDOW GLASS+FRM COND 10.157    2.976    0.000   0.000       -19.651   -5.758
            WINDOW GLASS SOLAR    22.881    6.704    0.000   0.000         2.414    0.707
            DOOR CONDUCTION        0.000    0.000    0.000   0.000         0.000    0.000
            INTERNAL SURFACE COND  0.000    0.000    0.000   0.000         0.000    0.000
            UNDERGROUND SURF COND -1.093   -0.320    0.000   0.000        -5.645   -1.654
            OCCUPANTS TO SPACE    10.434    3.057    6.776   1.985         0.004    0.001
            LIGHT    TO SPACE     16.957    4.968    0.000   0.000         0.969    0.284
            EQUIPMENT TO SPACE    10.332    3.027    0.000   0.000         0.807    0.237
            PROCESS   TO SPACE     0.000    0.000    0.000   0.000         0.000    0.000
            INFILTRATION           0.000    0.000    0.000   0.000       -11.157   -3.269
                                 --------  ------- ------- ------        -------- --------
            TOTAL                 73.656   21.581    6.776   1.985       -38.381  -11.246
            TOTAL / AREA           0.015    0.046    0.001   0.004        -0.008   -0.024

            TOTAL LOAD           80.431 KBTU/H     23.566  KW       -38.381 KBTU/H   -11.246  KW
            TOTAL LOAD / AREA    16.09  BTU/H.SQFT 50.733  W/M2       7.676 BTU/H.SQFT 24.210  W/M2



                   ****************************************************************
                   *                                                              *
                   *  NOTE  1)THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR      *
                   *  ----    LOADS                                                *
                   *        2)TIMES GIVEN IN STANDARD TIME FOR THE LOCATION        *
                   *          IN CONSIDERATION                                     *
                   *        3)THE ABOVE LOADS ARE CALCULATED ASSUMING A            *
                   *          CONSTANT INDOOR SPACE TEMPERATURE                    *
                   *                                                              *
                   ****************************************************************
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LS-D Building Monthly Loads Summary

This report gives a summary of monthly cooling, heating, and electrical requirements plus annual total energy requirements and maximum monthly peak loads. Unconditioned spaces (ZONE-TYPE = UNCONDITIONED or PLENUM) are not included in this report's monthly load.

Once again, you should be aware that these loads are based on a constant temperature within each SPACE (that is, no setback, no floating, and no other temperature variations within the SPACE). Additionally, these loads do not account for conditioning of outside ventilation air. Later, in SYSTEMS, these items will be accounted for.

COOLING, HEATING, and ELEC

are the three sections of this building level report.

COOLING ENERGY

is the monthly sensible cooling load for all conditioned SPACEs in the building.

MAXIMUM COOLING LOAD

is the peak coincident sensible cooling load for all conditioned SPACEs in the building. To the left of this column are the day and hour (local standard time) of the peak cooling load along with the outside drybulb and wetbulb temperatures at that time.

HEATING ENERGY

is the monthly heating load for all conditioned SPACEs in the building.

MAXIMUM HEATING LOAD

is the peak coincident heating load for all conditioned SPACEs in the building. To the left of this column are the day and hour (local standard time) of the peak heating load along with the outside drybulb and wetbulb temperatures at that time.

ELECTRICAL ENERGY

is the monthly electrical consumption for lights, convenience outlets and non-HVAC equipment.

MAXIMUM ELEC LOAD

is the monthly peak electrical consumption in a one-hour period for lights, convenience outlets, and miscellaneous equipment input as SOURCE.

TOTAL

is the annual total for the cooling load, heating load and electrical load of the building.

MAX

is the highest monthly peak cooling load, heating load and electrical load.

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Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-D Building Monthly Loads Summary                                          WEATHER FILE- TRY  CHICAGO
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| | - - - - - - - - COOLING - - - - - - - - | | | | | - - - - - - - HEATING - - - - - - - - | | | | | - - - ELEC - - - | |
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	5.38947	31 15	30.F	25.F	45.418	-10.065	12 3	1.F	0.F	-37.352	3027.	12.000
FEB	4.90776	28 15	52.F	42.F	44.295	-9.185	4 6	7.F	6.F	-36.168	2654.	12.000
MAR	6.74509	3 16	79.F	62.F	52.219	-6.658	24 6	8.F	7.F	-38.381	2936.	12.000
APR	12.32965	2 15	69.F	53.F	57.821	-2.017	8 6	32.F	29.F	-16.160	2994.	12.000
MAY	14.45126	20 14	76.F	67.F	63.784	-0.757	9 5	40.F	38.F	-10.506	2936.	12.000
JUN	18.19720	20 15	90.F	77.F	69.729	-0.075	23 5	52.F	48.F	-4.085	2903.	12.000
JUL	22.84128	9 15	94.F	74.F	73.656	0.000	0 0	0.F	0.F	0.000	3027.	12.000
AUG	20.40500	19 16	90.F	71.F	72.721	-0.001	5 5	55.F	54.F	-0.557	2936.	12.000
SEP	16.13781	17 15	82.F	66.F	70.483	-0.371	22 6	35.F	31.F	-10.162	2903.	12.000
OCT	12.67929	10 15	68.F	54.F	65.100	-1.562	21 6	30.F	29.F	-13.971	3027.	12.000
NOV	6.27171	7 15	55.F	46.F	58.931	-5.518	28 7	26.F	24.F	-23.169	2629.	12.000
DEC	5.11098	10 15	41.F	35.F	47.798	-9.108	22 8	15.F	15.F	-30.361	3027.	12.000
	---------				----------	---------				----------	--------	-------
TOTAL	145.467					-45.318					34996.	
MAX					73.656					-38.381		12.000

LS-E Space Monthly Load Components <space name>

This report gives a breakdown of loads for each space on a monthly basis, according to the source of the load. All entries are in MBtu/month or MWh/month. Each load is broken down into three types: heating (HEATNG), sensible cooling (SEN CL) and latent cooling (LAT CL). Latent cooling loads are accumulated only for those hours in each month that have a net sensible cooling load. Positive entries correspond to heat gain, negative entries correspond to heat loss, and all sensible loads are calculated as delayed in time with weighting factors.

The load sources, listed across the top of the report, are described below. The corresponding headings from Report LS-B are given in brackets.

WALLS

is the heat conduction through exterior walls with TILT greater than 45o, plus conduction through doors located in exterior walls. [WALLS plus DOOR]

ROOFS

is the heat conduction through exterior walls with TILT less than 45o.   [ROOFS]

INT SUR

is the heat conduction through interior walls. This entry will be non-zero only if there are one or more adjoining spaces with a loads calculation temperature that is different from that of the space being reported.   [INTERNAL SURFACES]

UND SUR

is the heat conduction through underground surfaces. [UNDERGROUND SURFACES]

INFIL

is the load due to air infiltration. [INFILTRATION]

WIN CON

is the sum of the UADT load through the windows (glass plus frames) plus solar energy absorbed by the glass and frames and conducted into the space. [WINDOW CONDUCTION]

WIN SOL

is the load from direct and diffuse solar radiation transmitted by the window glass. [WINDOW SOLAR]

OCCUP

is the heat gain from occupants.   [OCCUPANTS TO SPACE]

LIGHTS

is the heat gain from lights. [LIGHT TO SPACE]

EQUIP

is the load resulting from equipment. These values are calculated from user-supplied entries for EQUIP-SCHEDULE, EQUIPMENT-KW, EQUIPMENT-W/SQFT (AREA??), EQUIP-SENSIBLE and EQUIP-LATENT.   [EQUIPMENT TO SPACE]

SOURCE

is the load resulting from internal heating loads other than people, lights, or equipment. These values are calculated from the user-supplied entries for SOURCE-SCHEDULE, SOURCE-TYPE, SOURCE-BTU/HR, SOURCE-SENSIBLE, and SOURCE-LATENT. [PROCESS TO SPACE]

The LS-E Report is printed once for the combined DESIGN-DAY intervals (if one or more DESIGN-DAYs are specified) and once for the combined RUN-PERIOD intervals that use the weather file.

To illustrate how the entries in this report are accumulated, consider a sequence of four hours in January in which the load components from conduction through walls and heat from lights are as follows (the other load components are assumed to be zero):

	Walls	Lights
hour 1:	-0.01	0.03
hour 2:	-0.02	0.03
hour 3:	-0.04	0.03
hour 4:	-0.05	0.03

In hours 1 and 2 the net loads are (-0.01 + 0.03) = 0.02, and (-0.02 + 0.03) = 0.01, respectively. Thus, both these hours have a net (sensible) cooling load. In hours 3 and 4, on the other hand, the net loads are (-0.04 + 0.03) = -0.01 and (-0.05 + 0.03) = -0.02, respectively. Thus, these hours have a net heating load. The entries in the LS-E Report for January would then be (assuming all other hours have zero loads):

		WALLS	LIGHTS	TOTAL
	HEATNG	-0.09	0.06	-0.03 (from hours 3 and 4)
JAN	SEN CL	-0.03	0.06	0.03 (from hours 1 and 2)
	LAT CL	0.	0.	0.

```
Simple Structure Run 3, Chicago       Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN
Design-day sizing of VAV system       Show All Reports
REPORT- LS-E Space Monthly Load Components  SPACE1-1                              WEATHER FILE- TRY  CHICAGO
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(UNITS=MBTU)		WALLS	ROOFS	INT SUR	UND SUR	INFIL	WIN CON	WIN SOL	OCCUP	LIGHTS	EQUIP	SOURCE	TOTAL
JAN	HEATNG	-0.810	0.000	0.000	-0.996	-0.395	-2.914	1.028	0.228	0.458	0.357	0.000	-3.045
	SEN CL	-0.153	0.000	0.000	-0.354	-0.155	-0.737	1.362	0.291	0.528	0.357	0.000	1.138
	LAT CL					0.000			0.199		0.000	0.000	0.199
FEB	HEATNG	-0.682	0.000	0.000	-0.965	-0.504	-2.556	1.035	0.193	0.392	0.316	0.000	-2.770
	SEN CL	-0.122	0.000	0.000	-0.375	-0.163	-0.632	1.461	0.258	0.469	0.319	0.000	1.216
	LAT CL					0.000			0.176		0.000	0.000	0.176
MAR	HEATNG	-0.511	0.000	0.000	-0.928	-0.417	-1.971	1.062	0.120	0.273	0.262	0.000	-2.110
	SEN CL	-0.128	0.000	0.000	-0.467	-0.206	-0.657	1.565	0.379	0.680	0.441	0.000	1.608
	LAT CL					0.006			0.260		0.000	0.000	0.265
APR	HEATNG	-0.223	0.000	0.000	-0.427	0.000	-0.856	0.569	0.055	0.128	0.114	0.000	-0.640
	SEN CL	-0.056	0.000	0.000	-0.706	0.000	-0.483	2.453	0.468	0.858	0.585	0.000	3.119
	LAT CL					0.000			0.303		0.000	0.000	0.303
MAY	HEATNG	-0.131	0.000	0.000	-0.240	0.000	-0.502	0.411	0.027	0.077	0.087	0.000	-0.271
	SEN CL	-0.014	0.000	0.000	-0.616	0.000	-0.376	2.517	0.474	0.878	0.617	0.000	3.480
	LAT CL					0.000			0.292		0.000	0.000	0.292
JUN	HEATNG	-0.024	0.000	0.000	-0.037	0.000	-0.090	0.090	0.005	0.016	0.015	0.000	-0.026
	SEN CL	0.124	0.000	0.000	-0.487	0.000	0.123	2.851	0.492	0.928	0.673	0.000	4.705
	LAT CL					0.000			0.292		0.000	0.000	0.292
JUL	HEATNG	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SEN CL	0.348	0.000	0.000	-0.271	0.000	0.823	3.174	0.522	0.990	0.714	0.000	6.302
	LAT CL					0.000			0.306		0.000	0.000	0.306
AUG	HEATNG	-0.001	0.000	0.000	0.000	0.000	-0.003	0.003	0.000	0.001	0.000	0.000	0.000
	SEN CL	0.260	0.000	0.000	-0.180	0.000	0.506	3.180	0.501	0.955	0.704	0.000	5.925
	LAT CL					0.000			0.292		0.000	0.000	0.292
SEP	HEATNG	-0.052	0.000	0.000	-0.028	0.000	-0.197	0.123	0.008	0.026	0.027	0.000	-0.095
	SEN CL	0.052	0.000	0.000	-0.233	0.000	-0.216	3.399	0.489	0.918	0.660	0.000	5.070
	LAT CL					0.000			0.292		0.000	0.000	0.292
OCT	HEATNG	-0.168	0.000	0.000	-0.141	0.000	-0.625	0.369	0.027	0.078	0.084	0.000	-0.377
	SEN CL	-0.063	0.000	0.000	-0.353	0.000	-0.554	2.872	0.496	0.912	0.630	0.000	3.939
	LAT CL					0.000			0.306		0.000	0.000	0.306
NOV	HEATNG	-0.438	0.000	0.000	-0.464	-0.314	-1.650	0.669	0.100	0.230	0.227	0.000	-1.640
	SEN CL	-0.126	0.000	0.000	-0.319	-0.169	-0.684	1.652	0.331	0.606	0.429	0.000	1.720
	LAT CL					0.003			0.226		0.000	0.000	0.229
DEC	HEATNG	-0.716	0.000	0.000	-0.853	-0.472	-2.648	0.634	0.201	0.418	0.350	0.000	-3.087
	SEN CL	-0.150	0.000	0.000	-0.271	-0.140	-0.674	0.876	0.319	0.569	0.363	0.000	0.893
	LAT CL					0.000			0.221		0.000	0.000	0.221
TOT	HEATNG	-3.756	0.000	0.000	-5.080	-2.102	-14.013	5.990	0.965	2.096	1.839	0.000	-4.060
	SEN CL	-0.026	0.000	0.000	-4.632	-0.834	-3.560	27.361	5.020	9.292	6.493	0.000	9.114
	LAT CL					0.009			3.164		0.000	0.000	3.173

LS-F Building Monthly Load Components

This report gives a breakdown of loads on a monthly basis for the entire building, according to the source of the load. The loads in unconditioned spaces (ZONE-TYPE = UNCONDITIONED or PLENUM) are not included; all entries are in millions of Btu/month.

Like Report LS-E, three types of loads are shown: heating (HEATNG), sensible cooling (SEN CL), and latent cooling (LAT CL). The reported sources of the load (WALLS, ROOFS, etc.) are defined in the LS-E report description.

For multizone buildings, the load components are obtained by summing the corresponding load components for each conditioned space after multiplication by the space MULTIPLIER or FLOOR-MULTIPLIER. For example, consider a building with two spaces, Z-1 and Z-2, with space MULTIPLIERs of 2 and 3, respectively. If the heating load components in January due to glass conduction are -5.90 MBtu for Z-1 and -2.30 MBtu for Z-2, then the corresponding building load component is 2 x (-5.90) + 3 x (-2.30) = -18.70 MBtu.The total monthly heating and sensible cooling loads in the last column of this report are the same as those given in Report LS-D, Building Monthly Loads Summary, under the headings HEATING ENERGY and COOLING ENERGY.

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Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN
Design-day sizing of VAV system        Show All Reports
REPORT- LS-F Building Monthly Load Components in   MBTU                          WEATHER FILE- TRY  CHICAGO
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    (UNITS=MBTU) WALLS    ROOFS     INT SUR   UND SUR    INFIL    WIN CON   WIN SOL    OCCUP    LIGHTS     EQUIP     SOURCE    TOTAL
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -2.799    0.000     0.000    -3.225    -1.462    -8.167     1.914     0.793     1.600     1.280     0.000   -10.065
JAN SEN CL  -0.440    0.000     0.000    -0.839    -1.145    -1.535     1.993     1.796     3.279     2.282     0.000     5.389
    LAT CL                                           0.000                         1.059               0.000     0.000     1.059
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -2.339    0.000     0.000    -3.142    -1.932    -7.154     2.157     0.667     1.391     1.168     0.000    -9.185
FEB SEN CL  -0.374    0.000     0.000    -0.894    -1.224    -1.363     2.308     1.581     2.869     2.006     0.000     4.908
    LAT CL                                           0.000                         0.943               0.000     0.000     0.943
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -1.668    0.000     0.000    -2.911    -1.566    -5.276     2.515     0.392     0.928     0.928     0.000    -6.658
MAR SEN CL  -0.453    0.000     0.000    -1.290    -1.383    -1.684     3.096     2.093     3.783     2.584     0.000     6.745
    LAT CL                                           0.032                         1.274               0.000     0.000     1.306
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.730    0.000     0.000    -1.419     0.000    -2.334     1.517     0.174     0.406     0.368     0.000    -2.017
APR SEN CL  -0.223    0.000     0.000    -1.992     0.000    -1.238     5.759     2.429     4.471     3.123     0.000    12.330
    LAT CL                                           0.000                         1.439               0.000     0.000     1.439
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.394    0.000     0.000    -0.697     0.000    -1.271     1.064     0.078     0.218     0.246     0.000    -0.757
MAY SEN CL  -0.071    0.000     0.000    -1.880     0.000    -1.002     7.210     2.417     4.509     3.269     0.000    14.451
    LAT CL                                           0.000                         1.379               0.000     0.000     1.379
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.069    0.000     0.000    -0.102     0.000    -0.226     0.224     0.014     0.044     0.040     0.000    -0.075
JUN SEN CL   0.397    0.000     0.000    -1.475     0.000     0.348     8.448     2.460     4.626     3.392     0.000    18.197
    LAT CL                                           0.000                         1.380               0.000     0.000     1.380
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG   0.000    0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
JUL SEN CL   1.084    0.000     0.000    -0.816     0.000     2.142     9.365     2.602     4.898     3.566     0.000    22.841
    LAT CL                                           0.000                         1.446               0.000     0.000     1.446
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.003    0.000     0.000    -0.002     0.000    -0.010     0.009     0.001     0.002     0.002     0.000    -0.001
AUG SEN CL   0.743    0.000     0.000    -0.541     0.000     1.216     8.254     2.495     4.725     3.514     0.000    20.405
    LAT CL                                           0.000                         1.380               0.000     0.000     1.380
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.219    0.000     0.000    -0.126     0.000    -0.694     0.390     0.039     0.118     0.121     0.000    -0.371
SEP SEN CL   0.038    0.000     0.000    -0.660     0.000    -0.631     7.096     2.433     4.550     3.311     0.000    16.138
    LAT CL                                           0.000                         1.380               0.000     0.000     1.380
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -0.663    0.000     0.000    -0.575     0.000    -2.035     0.905     0.125     0.330     0.350     0.000    -1.562
OCT SEN CL  -0.296    0.000     0.000    -0.913     0.000    -1.349     4.979     2.476     4.567     3.215     0.000    12.679
    LAT CL                                           0.000                         1.444               0.000     0.000     1.444
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -1.506    0.000     0.000    -1.556    -1.159    -4.603     1.399     0.316     0.767     0.822     0.000    -5.518
NOV SEN CL  -0.445    0.000     0.000    -0.801    -1.129    -1.651     2.648     1.826     3.369     2.454     0.000     6.272
    LAT CL                                           0.019                         1.107               0.000     0.000     1.126
    ---------------------------------------------------------------------------------------------------------------------------
        HEATNG  -2.319    0.000     0.000    -2.632    -1.612    -6.999     1.292     0.656     1.371     1.135     0.000    -9.108
DEC SEN CL  -0.507    0.000     0.000    -0.751    -1.287    -1.673     1.461     1.934     3.508     2.427     0.000     5.111
    LAT CL                                           0.000                         1.160               0.000     0.000     1.160
    ---------------------------------------------------------------------------------------------------------------------------
         HEATNG -12.887    0.000     0.000   -16.491    -8.028   -39.333    13.566     3.256     7.176     6.461     0.000    -6.280
TOT SEN CL  -0.488    0.000     0.000   -12.892    -6.169    -8.286    62.964    26.834    49.616    35.526     0.000   147.104
    LAT CL                                           0.051                        15.556               0.000     0.000    15.607
```

LS-G Space Daylighting Summary <space name>

This report gives monthly-average lighting energy reduction, illuminance, and glare for each daylit space. If only one lighting reference point is specified, the entries under REF PT 2 will be zero. Task lighting energy, as determined by TASK-LIGHTING-KW or TASK-LT-W/AREA, is not considered.

PERCENT LIGHTING ENERGY REDUCTION BY DAYLIGHTING (ALL HOURS)

gives the percentage by which electric lighting energy is reduced, due to daylighting, for the entire space (TOTAL ZONE), and for the lighting zones at each lighting reference point (REF PT 1 and REF PT 2). In this section of the report, all hours of the day are taken into account, including nighttime hours when the lighting energy reduction due to daylighting is zero.

PERCENT LIGHTING ENERGY REDUCTION BY DAYLIGHTING (REPORT SCHEDULE HOURS)

gives the percentage by which electric lighting energy is reduced, due to daylighting, for the entire space (TOTAL ZONE), and for the lighting zones at each lighting reference point (REF PT 1 and REF PT 2). In this section of the report, only those hours are taken into account for which the value of DAYLIGHT-REP-SCH for this space is non-zero (the default). If DAYLIGHT-REP-SCH is not defined the entries will be the same as those in Part 1 above.

In the following four sections, only those hours are taken into account for which the sun is up and the value of DAYLIGHT-REP-SCH is non-zero (the default).

AVERAGE DAYLIGHT ILLUMINANCE

gives the average illuminance due to daylight at each lighting reference point.

PERCENT HOURS DAYLIGHT ILLUMINANCE ABOVE SETPOINT

gives the percentage of hours that the illuminance from daylight exceeds the required illuminance level as specified by LIGHT-SET-POINT1 at REF PT 1 and LIGHT-SET-POINT2 at REF PT 2. (See Report LS-J for the frequency of occurrence distribution for daylight illuminance.)

AVERAGE GLARE INDEX

gives the average daylight glare index at each lighting reference point (REF PT 1 and REF PT 2).

PERCENT HOURS GLARE TOO HIGH

gives the percentage of hours at each lighting reference point that the daylight glare index exceeds the MAX-GLARE value (or a value of 22, the maximum recommended for general office work, if MAX-GLARE has not been specified).

```
DAYLIGHTING EXAMPLE                   FLOOR OF OFFICE BUILDING IN CHICAGO    DOE-2.2b-027  Fri Jan 30 14:26:19 1998BDL RUN
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT  AUTO SHADE MANAGEMENT FOR SUN CONTROL
REPORT- LS-G Space Daylighting Summary     SOUTHZONE                                  WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------
```

```
  SPACE  SOUTHZONE
```

```
                                                  ----------------REPORT SCHEDULE HOURS WITH SUN UP----------------

              PERCENT LIGHTING         PERCENT LIGHTING          AVERAGE      PERCENT HOURS
              ENERGY REDUCTION         ENERGY REDUCTION          DAYLIGHT       DAYLIGHT
              BY DAYLIGHTING           BY DAYLIGHTING         ILLUMINANCE     ILLUMINANCE          AVERAGE       PERCENT HOURS
                 (ALL HOURS)        (REPORT SCHEDULE HOURS)   (FOOTCANDLES)   ABOVE SETPOINT      GLARE INDEX    GLARE TOO HIGH
              ----------------------  ----------------------  --------------  --------------    --------------   --------------
          TOTAL  REF PT  REF PT     TOTAL  REF PT  REF PT     REF PT  REF PT   REF PT  REF PT    REF PT  REF PT   REF PT  REF PT
 MONTH     ZONE    1       2         ZONE    1       2          1       2        1       2         1       2        1       2
 -----    -----  ------  ------     -----  ------  ------     ------  ------   ------  ------    ------  ------   ------  ------

 JAN      16.2   32.4     0.0       21.0    42.0    0.0       71.5     0.0     33.0     0.0       6.0     0.0      0.0     0.0

 FEB      21.7   43.4     0.0       27.8    55.6    0.0       77.0     0.0     39.3     0.0       7.1     0.0      0.0     0.0

 MAR      25.1   50.3     0.0       31.5    63.1    0.0       76.3     0.0     52.7     0.0       7.8     0.0      0.0     0.0

 APR      27.6   55.3     0.0       33.7    67.3    0.0       95.6     0.0     73.3     0.0       9.1     0.0      0.0     0.0

 MAY      29.0   57.9     0.0       34.4    68.8    0.0       92.6     0.0     83.5     0.0       9.1     0.0      0.0     0.0

 JUN      29.9   59.8     0.0       34.8    69.7    0.0       96.1     0.0     87.4     0.0       9.5     0.0      0.0     0.0

 JUL      30.0   60.1     0.0       34.7    69.4    0.0      103.5     0.0     93.2     0.0       9.8     0.0      0.0     0.0

 AUG      29.2   58.3     0.0       34.5    68.9    0.0      105.6     0.0     87.1     0.0       9.8     0.0      0.0     0.0

 SEP      28.0   56.0     0.0       33.9    67.8    0.0      122.3     0.0     80.0     0.0      10.0     0.0      0.0     0.0

 OCT      24.4   48.8     0.0       30.8    61.7    0.0      107.1     0.0     59.5     0.0       8.8     0.0      0.0     0.0

 NOV      17.0   33.9     0.0       21.7    43.4    0.0       79.3     0.0     37.0     0.0       6.6     0.0      0.0     0.0

 DEC      14.4   28.8     0.0       18.6    37.1    0.0       47.7     0.0     21.5     0.0       5.0     0.0      0.0     0.0
          -----  ------  ------     -----  ------  ------     ------  ------   ------  ------    ------  ------   ------  ------

 ANNUAL   24.5   48.9     0.0       29.9    59.7    0.0       89.6     0.0     62.4     0.0       8.2     0.0      0.0     0.0
```

LS-H Energy Reduction By Daylight <space name>

For each daylit space this report gives the monthly lighting energy reduction due to daylighting for each hour of the day, and for all hours of the day combined (including nighttime hours). HOUR OF DAY is given in standard time, even if DAYLIGHT-SAVINGS = YES. Hour 1 is 12 midnight to 1 am, hour 2 is 1 am to 2 am, etc. The schedule DAYLIGHT-REP-SCH has no effect on this report. Task lighting energy, as determined by TASK-LIGHTING-KW or TASK-LT-W/AREA, is not considered. The daylighting report schedule has no affect on this report.

See Report LS-I for lighting energy reduction vs. hour of day for the entire building.

```
DAYLIGHTING EXAMPLE                       FLOOR OF OFFICE BUILDING IN CHICAGO    DOE-2.2b-027  Fri Jan 30 14:26:19 1998BDL RUN  1
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT    AUTO SHADE MANAGEMENT FOR SUN CONTROL
REPORT- LS-H Energy Reduction By Daylight   SOUTHZONE                                          WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------------


    SPACE   SOUTHZONE


                                                     HOUR OF DAY
                                                                                                                       ALL
    MONTH    1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  HOURS
    -----  --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

    JAN      0   0   0   0   0   0   0   1  14  21  26  28  29  27  24  20   2   0   0   0   0   0   0   0    16

    FEB      0   0   0   0   0   0   0  10  25  29  32  33  33  32  29  24  14   0   0   0   0   0   0   0    22

    MAR      0   0   0   0   0   0   4  22  29  32  34  35  35  34  33  29  23   4   0   0   0   0   0   0    25

    APR      0   0   0   0   0   2  18  29  34  35  35  35  35  35  35  33  27  12   0   0   0   0   0   0    28

    MAY      0   0   0   0   0  10  26  31  34  35  35  35  35  35  35  34  28  18   3   0   0   0   0   0    29

    JUN      0   0   0   0   1  13  25  34  35  35  35  35  35  35  35  35  30  24   9   0   0   0   0   0    30

    JUL      0   0   0   0   0  10  29  33  35  35  35  35  35  35  35  35  33  26   9   0   0   0   0   0    30

    AUG      0   0   0   0   0   3  23  32  34  35  35  35  35  35  35  34  31  20   2   0   0   0   0   0    29

    SEP      0   0   0   0   0   0  17  31  33  35  35  35  35  35  35  32  28   5   0   0   0   0   0   0    28

    OCT      0   0   0   0   0   0   5  27  30  33  34  35  34  33  30  27   7   0   0   0   0   0   0   0    24

    NOV      0   0   0   0   0   0   0  12  23  27  28  30  29  26  22  12   0   0   0   0   0   0   0   0    17

    DEC      0   0   0   0   0   0   0   2  16  21  25  26  27  23  20  10   0   0   0   0   0   0   0   0    14
           --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

    ANNUAL   0   0   0   0   0   4  16  27  29  31  32  33  33  32  31  27  16   8   2   0   0   0   0   0    24

                              PERCENT LIGHTING ENERGY REDUCTION BY DAYLIGHT



    NOTE- THE ENTRIES IN THIS REPORT ARE NOT
          SUBJECT TO THE DAYLIGHTING REPORT SCHEDULE
```

LS-I Energy Reduction By Daylight   BUILDING

For the building as a whole this report gives the monthly lighting energy reduction due to daylighting for each hour of the day and for all hours of the day combined (including nighttime hours). HOUR OF DAY is given in standard time, even if DAYLIGHT-SAVINGS = YES. Hour 1 is 12 pm to 1 am, hour 2 is 1 am to 2 am, etc. All spaces in the building are included in this report, even those that are not daylit (i.e., have DAYLIGHTING = NO). This report is not affected by DAYLIGHT-REP-SCH. Task lighting energy, as determined by TASK-LIGHTING-KW or TASK-LT-W/AREA, is not considered. The daylighting report schedule has no affect on this report.

See Report LS-H for lighting energy reduction vs. hour of day for individual daylit spaces.

```
DAYLIGHTING EXAMPLE                      FLOOR OF OFFICE BUILDING IN CHICAGO     DOE-2.2b-027  Fri Jan 30 14:26:19 1998BDL RUN  1
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT    AUTO SHADE MANAGEMENT FOR SUN CONTROL
REPORT- LS-I Energy Reduction By Daylight   Building                                            WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------


 *** BUILDING ***


                                                         HOUR OF DAY
                                                                                                                      ALL
 MONTH   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24   HOURS
 -----  --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

 JAN     0   0   0   0   0   0   0   0   6   9  11  12  12  12  10   7   1   0   0   0   0   0   0   0     7

 FEB     0   0   0   0   0   0   0   4  10  11  14  14  15  14  12  10   6   0   0   0   0   0   0   0     9

 MAR     0   0   0   0   0   0   2   9  12  14  15  16  16  15  15  12   9   2   0   0   0   0   0   0    11

 APR     0   0   0   0   0   1   8  13  15  16  16  16  16  16  15  14  11   6   0   0   0   0   0   0    12

 MAY     0   0   0   0   0   6  12  14  16  16  16  16  16  16  16  15  12   9   2   0   0   0   0   0    13

 JUN     0   0   0   0   0   8  12  15  16  16  16  16  16  16  16  16  14  12   6   0   0   0   0   0    14

 JUL     0   0   0   0   0   7  13  15  16  16  16  16  16  16  16  15  15  13   6   0   0   0   0   0    14

 AUG     0   0   0   0   0   2  11  14  15  16  16  16  16  16  16  15  14  10   1   0   0   0   0   0    13

 SEP     0   0   0   0   0   0   8  12  13  15  16  16  16  15  15  13  11   3   0   0   0   0   0   0    12

 OCT     0   0   0   0   0   0   3  10  11  13  14  14  14  14  12  10   3   0   0   0   0   0   0   0    10

 NOV     0   0   0   0   0   0   0   5   9  11  12  13  13  11   9   5   0   0   0   0   0   0   0   0     7

 DEC     0   0   0   0   0   0   0   1   6   9  11  11  12  10   8   4   0   0   0   0   0   0   0   0     6
        --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

 ANNUAL  0   0   0   0   0   3   8  11  12  14  14  15  15  14  13  11   7   4   1   0   0   0   0   0    11

                      PERCENT LIGHTING ENERGY REDUCTION BY DAYLIGHT



 NOTE- THE ENTRIES IN THIS REPORT ARE NOT
       SUBJECT TO THE DAYLIGHTING REPORT SCHEDULE
```

LS-J Daylight Illuminance Frequency <space name>

For each daylit space this report gives the monthly daylight-illuminance frequency-of-occurrence distribution at each lighting reference point. If only one lighting reference point is specified, entries under REF-PT-2 will be zero. Note that the hours considered for this report are those with the sun up and the daylighting report schedule "on."

PERCENT OF HOURS IN ILLUMINANCE RANGE

gives the percentage of hours (with sun up and DAYLIGHT-REP-SCH value non-zero) that the daylight illuminance falls in the indicated range: 0-10, 10-20, ..., 70-80, and greater than 80 footcandles (or, for metric output, 0-100, 100-200, ..., 700-800, and greater than 800 lux). Note: because of roundoff, the sum of these percentages for any given month may not be exactly 100.

PERCENT OF HOURS ILLUMINANCE LEVEL EXCEEDED

gives the percentage of hours (with sun up and DAYLIGHT-REP-SCH value non-zero) that the daylight illuminance is higher than the indicated illuminance level.

```
DAYLIGHTING EXAMPLE                    FLOOR OF OFFICE BUILDING IN CHICAGO    DOE-2.2b-027  Fri Jan 30 14:26:19 1998BDL RUN  1
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT   AUTO SHADE MANAGEMENT FOR SUN CONTROL
REPORT- LS-J Daylight Illuminance Frequency SOUTHZONE                                       WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------

 SPACE  SOUTHZONE
PERCENT OF HOURS IN ILLUMINANCE RANGE                       PERCENT OF HOURS ILLUMINANCE LEVEL EXCEEDED
                ----------------------------------------          -------------------------------------------
ILLUMINANCE RANGE (FOOTCANDLES)                             ILLUMINANCE LEVEL (FOOTCANDLES)
        REF
MONTH    PT    0 -- 10 -- 20 -- 30 -- 40 -- 50 -- 60 -- 70 -- 80 -ABOVE     0    10    20    30    40    50    60    70    80

JAN     -1-    15   21   24    6    1    4    1    2   27          100    85    64    40    34    33    29    28    27
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

FEB     -1-     4   10   20   21    6    5    2    2   31          100    96    86    66    45    39    35    32    31
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

MAR     -1-     0    4   15   14   13    4    5    7   36          100   100    96    80    66    53    48    43    36
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

APR     -1-     0    0    6   10   10    4    3    6   61          100   100   100    94    83    73    70    67    61
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

MAY     -1-     0    0    2    8    6    5    6   12   60          100   100   100    97    90    84    78    72    60
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

JUN     -1-     0    0    0    3   10    4    8    4   71          100   100   100   100    97    87    83    76    71
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

JUL     -1-     0    0    0    2    4    5    8    7   73          100   100   100    99    97    93    88    80    73
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

AUG     -1-     0    0    3    5    6    5    6    9   67          100   100   100    97    93    87    82    77    67
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

SEP     -1-     0    1    7    6    6    1    4    7   68          100   100    99    92    86    80    79    75    68
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

OCT     -1-     3    6   12   11    9    1    3    3   53          100    97    91    79    68    59    59    56    53
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

NOV     -1-    17   13   23   10    0    1    3    2   31          100    83    70    48    37    37    36    33    31
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

DEC     -1-    21   28   28    2    0    1    2    1   18          100    79    51    23    22    22    20    18    18
        -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0
               ---------------------------------------------           --------------------------------------------------

ANNUAL -1-     5    7   12    8    6    3    4    5   50          100    95    88    76    68    62    59    55    50
       -2-     0    0    0    0    0    0    0    0    0            0     0     0     0     0     0     0     0     0

NOTE- THE HOURS CONSIDERED IN THIS REPORT ARE THOSE
      WITH SUN UP AND DAYLIGHTING REPORT SCHEDULE ON
```

LS-K Space Input Fuels Summary <space name>

This report gives monthly summaries of the fuel inputs required by each space for lighting, equipment and processes. Following the reports for each space is a separate building level report that gives the sum of the input fuels for the building as a whole.

Lighting, equipment and process are the three major sections of this report, which is printed once for each space and once for the building as a whole.

TASK LIGHTING

is the electricity used by the space for all task lighting.

TOTAL LIGHTING

is the electricity used by the space for all lighting including task and overhead.

GENERAL EQUIPMENT

is the electricity used by the space for running all equipment (i.e., computers, copy machines, etc.). For the building report, this includes building equipment such as elevators which may not be included in any space.

PROCESS ELECTRIC

is all electricity used to maintain any of the processes in the space.

PROCESS GAS

is all gas used to maintain any of the processes in the space.

PROCESS HOT WATER

is the total hot water used in all processes in the space.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-K Space Input Fuels Summary     SPACE1-1                              WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------
```

 SPACE   SPACE1-1

MONTH	TASK LIGHTING (KWH)	TOTAL LIGHTING (KWH)	GENERAL EQUIPMENT (KWH)	PROCESS ELECTRIC (KWH)	PROCESS GAS (MBTU)	PROCESS HOT WATER (MBTU)
JAN	0.00	402.18	237.05	0.00	0.0000	0.0000
FEB	0.00	349.67	210.95	0.00	0.0000	0.0000
MAR	0.00	386.57	233.42	0.00	0.0000	0.0000
APR	0.00	400.28	231.98	0.00	0.0000	0.0000
MAY	0.00	386.57	233.42	0.00	0.0000	0.0000
JUN	0.00	384.67	228.35	0.00	0.0000	0.0000
JUL	0.00	402.18	237.05	0.00	0.0000	0.0000
AUG	0.00	386.57	233.42	0.00	0.0000	0.0000
SEP	0.00	384.67	228.35	0.00	0.0000	0.0000
OCT	0.00	402.18	237.05	0.00	0.0000	0.0000
NOV	0.00	337.87	217.45	0.00	0.0000	0.0000
DEC	0.00	402.18	237.05	0.00	0.0000	0.0000
ANNUAL	0.00	4625.43	2765.53	0.00	0.0000	0.0000

LS-L Management and Solar Summary <space name>

This report gives monthly summaries of window shade management and solar radiation into the space.

Column 1 is the count of the number of hours that window shade management would be employed in the space for each month. Management is employed under any of the following conditions:

- The shading schedule for an exterior window specifies management.

- If the transmitted direct solar gain through an exterior window exceeds a pre-specified value, MAX-SOLAR-SCH, then shades will be in effect with a probability of SUN-CTRL-PROB.

- If daylighting is requested (DAYLIGHTING=YES) and the daylight glare exceeds a pre-specified value MAX-GLARE, then the shades will be in effect.

Column 2 is the average solar radiation into the space through all glazing areas in Btu or Wh per day.

Column 3 is the maximum solar radiation into the space through all glazing areas for all hours in the month. The unit of measure is Btu/hr or W.

Note that the entries in this report are solar heat gains, not solar loads; i.e., weighting factors to convert heat gains into delayed loads have not been applied. The solar heat gain is due to solar radiation transmitted through windows plus solar radiation absorbed by the windows and re-conducted into the space.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- LS-L Management and Solar Summary   SPACE1-1                                      WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------

  DATA FOR SPACE     SPACE1-1

         NUMBER OF HOURS   AVERAGE DAILY     MAXIMUM HOURLY
           MANAGEMENT      SOLAR RADIATION   SOLAR RADIATION
           WOULD BE         INTO SPACE         INTO SPACE
  MONTH    EMPLOYED         (BTU/DAY )         (BTU/HR  )


  JAN          0.          92725.312          45517.965

  FEB          0.         107067.641          44765.695

  MAR          0.         101555.164          41114.320

  APR          0.         121276.719          32348.395

  MAY          0.         113858.781          24972.248

  JUN          0.         118545.953          19746.131

  JUL          0.         123403.203          22385.572

  AUG          0.         124248.797          28500.076

  SEP          0.         141774.109          36847.043

  OCT          0.         124876.234          41848.086

  NOV          0.          92896.164          43870.461

  DEC          0.          58697.254          43582.469

            --------      ------------      --------------

  ANNUAL       0.         110008.266          45517.965
```

HVAC AIRSIDE REPORTS

SV-A System Design Parameters for <system name>

This report echoes your input to the program for each system as interpreted by the SYSTEMS design routines. See "DESIGN-DAY Command" in the Topics Manual. The report is divided into three sections: System-Level Design Values, Fan Design Values and Zone-Level Design Values.

For systems having mixing sections (dual-duct and multizone systems) an additional section appears detailing the cold duct, hot duct, and total zonal air flows, as well as the minimum air flow ratios for these quantities.

Note: the quantities in this report have been adjusted for altitude even though DOE-2 requires that any flows you enter in SYSTEMS be at sea level.

```
Design-day sizing of VAV system        Show All Reports
REPORT- SV-A System Design Parameters for   SYST-1                              WEATHER FILE- TRY  CHICAGO
------------------------------------------------------------------------------------------------------------
                        FLOOR              OUTSIDE   COOLING              HEATING   COOLING   HEATING  HEAT PUMP
        SYSTEM  ALTITUDE  AREA      MAX      AIR    CAPACITY   SENSIBLE  CAPACITY     EIR       EIR    SUPP-HEAT
         TYPE   FACTOR   (SQFT )   PEOPLE   RATIO   (KBTU/HR)    (SHR)   (KBTU/HR)  (BTU/BTU) (BTU/BTU) (KBTU/HR)

        VAVS    1.020    5000.0     52.     0.179   241.081     0.662    -50.000     0.000     0.000     0.000


                      DIVERSITY   POWER     FAN    STATIC   TOTAL   MECH                        MAX FAN   MIN FAN
         FAN   CAPACITY  FACTOR   DEMAND  DELTA-T  PRESSURE   EFF    EFF      FAN       FAN      RATIO     RATIO
         TYPE   (CFM )   (FRAC)    (KW)     (F)   (IN-WATER) (FRAC) (FRAC)  PLACEMENT  CONTROL   (FRAC)    (FRAC)

        SUPPLY   5924.    1.00    6.817    3.63      5.5     0.55   0.72   DRAW-THRU   SPEED     1.10      0.30


                       SUPPLY   EXHAUST            MINIMUM  OUTSIDE   COOLING            EXTRACTION  HEATING  ADDITION
         ZONE           FLOW      FLOW     FAN      FLOW   AIR FLOW  CAPACITY  SENSIBLE    RATE    CAPACITY   RATE   ZONE
         NAME          (CFM )    (CFM )    (KW)    (FRAC)   (CFM )  (KBTU/HR)   (FRAC)  (KBTU/HR) (KBTU/HR) (KBTU/HR) MULT

     ZONE1-1          1623.       0.      0.000    0.300    224.     0.00       0.00      32.64    -87.91    -54.50   1.
     ZONE2-1           784.       0.      0.000    0.300    102.     0.00       0.00      15.78    -42.49    -26.34   1.
     ZONE3-1          1207.       0.      0.000    0.300    224.     0.00       0.00      24.28    -65.40    -40.55   1.
     ZONE4-1           765.       0.      0.000    0.300    102.     0.00       0.00      15.40    -41.46    -25.71   1.
     ZONE5-1          1545.       0.      0.000    0.300    408.     0.00       0.00      31.08    -83.72    -51.91   1.

      PLENUM-1-Z         0.       0.      0.000    0.000      0.     0.00       0.00       0.00      0.00      0.00
     1.
```

System-Level Design Values

SYSTEM TYPE

is the code-word identifying the type of system.

ALTITUDE FACTOR

is the altitude adjustment factor for air flows; it multiplies air flows at sea level to get air flows at the actual altitude of the building.

FLOOR AREA

is the total floor area of all zones served by the system that have ZONE-TYPE = CONDITIONED or UNCONDITIONED, or, for ZONE-TYPE = PLENUM, that have non-zero occupancy.

MAX PEOPLE

is the maximum number of people in all of the zones served by the system that have ZONE-TYPE = CONDITIONED or UNCONDITIONED, or, for ZONE-TYPE = PLENUM, that have non-zero occupancy. The maximum number of people in a zone is determined by the NUMBER-OF-PEOPLE or AREA/PERSON keywords in the SPACE command; any variation in occupancy resulting from PEOPLE-SCHEDULE is ignored in calculating MAX PEOPLE.

OUTSIDE AIR RATIO

is the ratio of outside air flow to supply air flow at design conditions for central systems. Its value is either the user input value of MIN-OUTSIDE-AIR or is calculated by SYSTEMS from the ventilation or exhaust input at the zone level divided by the supply fan flow (as listed in the Fan Design Values section, below) . This is a design quantity and so does not reflect values entered through the MIN-AIR-SCH keyword. For zonal systems, this value will be zero.

When OUTSIDE AIR RATIO is determined from zone ventilation rates, it is the sum of the values under OUTSIDE AIR FLOW (in the Zone-Level Design Values section, below) divided by the supply fan flow. This outside air ratio is what the program will use as the minimum outside air ratio. It is assumed that the outside air is brought in at the main system fan and is distributed to the individual zones in proportion to the supply air to each zone.

Note: The SYSTEMS design routine does not examine the values entered in schedules. Consequently, if you specify the outside air ratio through MIN-AIR-SCH but want SYSTEMS to size the equipment, you should also specify MIN-OUTSIDE-AIR.

COOLING CAPACITY

is either the value you enter for the keyword COOLING-CAPACITY at the system level or is computed by SYSTEMS from the peak (sensible plus latent) cooling load.

SENSIBLE (SHR)

is the sensible heat ratio, i.e., the fraction of the total cooling capacity that is sensible cooling capacity at the peak or design condition. If you have not entered COOL-SH-CAP at the system level for a central system, this value is calculated from a simulation of the conditions at peak loads.

HEATING CAPACITY

is the maximum value for heating. It reflects either the user input or a calculation from peak loads. Like COOLING CAPACITY, this value will be zero for zonal systems, where the capacity is shown at the zone level.

COOLING EIR

is the electric input ratios for cooling. Values are taken from user input or are default values.

HEATING EIR

is the electric input ratios for heating. Values are taken from user input or are default values.

HEAT PUMP SUPP-HEAT

is the heat pump supplemental heating capacity.

Fan Design Values

This section gives the characteristics of the system supply and return fans. Given for each fan are: type, capacity, rated capacity, diversity factor (capacity*[MAX-FAN-RATIO] / [sum of zone air flows]), power demand, fan temperature rise, static pressure, supply efficiency, supply mechanical efficiency, fan placement, type of fan control, and the maximum and minimum fan ratios.

Note that the static pressure may have a value of zero. This simply means that the static pressure was not specified and was not used to calculate fan power consumption.

Zone-Level Design Values

The following quantities apply to the base zone and have not been multiplied by the number of identical zones (as given by the product of MULTIPLIER and FLOOR-MULTIPLIER).

SUPPLY FLOW

is the calculated or user-specified supply flow for each zone. Only if you have specified a value for the ASSIGNED-FLOW keyword in the ZONE-AIR command will the value here correspond to your input. The ZONE keywords AIR-CHANGES/HR and FLOW/AREA will be accepted by SYSTEMS only if they are consistent with the user-supplied HEATING-CAPACITY and COOLING-CAPACITY and are equivalent to a flow larger than that of the exhaust from or the ventilation to the zone. The ALTITUDE FACTOR will be applied.

EXHAUST FLOW

is the airflow exhausted directly from the zone via an exhaust fan.

FAN

is the total of the zone supply and exhaust fan electrical consumption at design conditions. This is zero in the example because there are no zone fans.

MINIMUM FLOW

reflects the your input for MIN-FLOW-RATIO, unless that input is in conflict with exhaust or ventilation requirements. In the absence of user input, SYSTEMS will calculate the minimum flow ratio for VAV systems from the minimum flow needed to meet the minimum ventilation requirements and the required heating capacity.

OUTSIDE AIR FLOW

reflects the user-specified outside air quantity entered at the zone level. If OUTSIDE-AIR-FLOW is specified, its value is multiplied by the ALTITUDE FACTOR and reported here. Otherwise the reported value is the maximum of the flow-equivalent values of OA-CHANGES and OA-FLOW/PER, multiplied by ALTITUDE FACTOR. For the actual amount of outside air delivered to the zone for central systems, see OUTSIDE AIR RATIO above.

COOLING CAPACITY

will be zero at the zone level for central systems. For zonal systems it will either be the value you specify for COOLING-CAPACITY or it will be calculated by SYSTEMS to meet the peak loads at the rated conditions for HP, PTAC, and FC systems or at any conditions for IU systems. This is done similarly for HEATING CAPACITY for the above-mentioned systems and for UVT and UHT systems.

SENSIBLE

is the cooling sensible heat ratio for zonal systems.

EXTRACTION RATE

is the cooling extraction rate at design conditions. This is not the value used in the simulation; that value is recalculated hourly and depends on the loads, the conditions, the thermostat type and the thermostat throttling range. ADDITION RATE (heating) is treated similarly.

HEATING CAPACITY

is the design capacity of the zonal heating equipment, if any.

ZONE MULT

is the user-specified number of identical zones (product of MULTIPLIER and FLOOR-MULTIPLIER for the zone).

For systems having mixing sections (dual-duct and multizone systems), an additional section details the cold duct, hot duct and total zonal air flows, as well as the minimum air flow ratios for these quantities.

SV-A System Design Parameters for <space name> (REFRIGERATED EQUIPMENT)

When refrigerated equipment is input, an alternate SV-A report is printed. The top half of the report is identical to that as previously described. The bottom half, titled REFRIGERATED EQUIP IN <space name>, covers the design parameters for three categories: ZONE, COMPRESSOR and CONDENSER.

Report SV-A has been expanded to include a line for each fan detailing its capacity, rated capacity, diversity factor (Capacity*[MAX-FAN-RATIO] / [Sum of zone airflows]), power demand, fan temperature rise, static pressure, supply efficiency, supply mechanical efficiency, fan placement, type of fan control, and the maximum and minimum fan ratios. For systems having mixing sections, (dual-duct and multizone systems), an additional section has been added detailing the cold duct, hot duct, and total zonal airflows, as well as the minimum airflow ratios for these quantities. Note that the static pressure may have a value of 0. This simply means that the variable was not specified by the user, and was not used to calculate fan power consumption.

UNIT

identifies the units input in the list of up to three entries of REFG-ZONE-LOAD.

DISCHARGE TEMP

is the temperature inside the cases.

SENSIBLE LOADS TEMP

is the sensible cooling effect at the constant temperature used in the LOADS module.

SENSIBLE HEAT TEMP

is the sensible cooling effect at the zone's design heating temperature.

SENSIBLE COOL TEMP

is the sensible cooling effect at the zone's design cooling temperature.

COMPRESSOR CAPACITY

is the compressor capacity at the design operating conditions. Notice that when two or more compressors are multiplexed (using keyword REFG-COMP-GROUP), their combined capacity is indicated for the unit at the lowest evaporator temperature.

COMPRESSOR EFFICIENCY

is the compressor EER (Energy Efficiency Ratio).

DESIGN HEAT REJ

is the combined condenser heat rejection of all the compressors input.

FAN ENERGY

is the tower fan or air cooled condenser fan rating.

PUMP ENERGY

is the tower condenser pump rating; it is zero for air cooled applications.

```
OFFICE BUILDING & DELI/RESTAURANT      ELECTROCHROMIC GLAZING IN ATRIUM
VAV SYSTEM IN OFFICE & PSZ IN ATRIUM   GAS ENGINE DRIVEN CHILLER & HEAT RECY   SAMP3.INP  RUN 3
REPORT- SV-A  SYSTEM DESIGN PARAMETERS                        FS-SYS1                       WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------
SYSTEM          SYSTEM          ALTITUDE    FLOOR AREA      MAX
 NAME            TYPE          MULTIPLIER    (SQFT )      PEOPLE

FS-SYS1         PSZ              1.020        1800.0        6.

   SUPPLY                       RETURN                         OUTSIDE   COOLING              HEATING   COOLING   HEATING
    FAN      ELEC   DELTA-T      FAN      ELEC   DELTA-T      AIR     CAPACITY   SENSIBLE  CAPACITY     EIR       EIR
   (CFM )    (KW)     (F)      (CFM )     (KW)     (F)      RATIO   (KBTU/HR)    (SHR)   (KBTU/HR)  (BTU/BTU) (BTU/BTU)

   1924.    1.476     2.4         0.     0.000     0.0     0.352     79.077     0.621  -112.077      0.36      0.37


                    SUPPLY   EXHAUST              MINIMUM  OUTSIDE   COOLING            EXTRACTION  HEATING   ADDITION
          ZONE      FLOW      FLOW     FAN        FLOW    AIR FLOW  CAPACITY  SENSIBLE    RATE     CAPACITY    RATE
          NAME      (CFM )    (CFM )   (KW)       RATIO    (CFM )  (KBTU/HR)   (SHR)    (KBTU/HR) (KBTU/HR)  (KBTU/HR) MULTIPLIER

ATZ1                1924.       0.    0.000       1.000      678.     0.00      0.00      39.49      0.00     -62.35      1.0



REFRIGERATED EQUIP IN ATZ1

           - - - - - - - - - - - Z O N E - - - - - - - - - - -     - C O M P R E S S O R -     - - - C O N D E N S E R - - -

          DISCHARGE    SENSIBLE      SENSIBLE      SENSIBLE    COMPRESSOR   COMPRESSOR      DESIGN      FAN       PUMP
           TEMP      LOADS TEMP    HEAT TEMP     COOL TEMP    CAPACITY    EFFICIENCY    HEAT REJ    ENERGY    ENERGY
UNIT        (F)      (KBTU/HR)     (KBTU/HR)     (KBTU/HR)    (KBTU/HR)   (BTU/WATT)    (KBTU/HR)    (KW)      (KW)

 1        -10.0      -8.894        -8.471        -8.894       14.547        3.8         51.693      0.271     0.064
 2         23.0      -3.923        -3.615        -3.923       16.390        7.0
 3         30.0      -5.280        -4.800        -5.280        0.000        7.3
```

SV-B Zone Fan Data <system name> (PIU systems only)

This report is produced whenever a Powered Induction Unit (PIU) system is specified.

U-name

The U-name of the HVAC system is given after ZONE FAN DATA (PIU).

ZONE NAME

is the zone U-name.

FAN FLOW

is the calculated (or input) capacity of the PIU box fan.

SUPPLY FLOW

is the flow rate of air delivered by the central system.

MIN FLOW RATIO

is the minimum stop position of primary air supply to the PIU box.

REHEAT-DELTA-T

is the temperature rise of the reheat coil in the PIU box.

FAN-DELTA-T

is the temperature rise due to the PIU box's fan motor.

FAN KW

is the PIU box's fan motor electrical requirement.

```
31-STORY OFFICE BLDG, CHICAGO - LOAD2    RUN 5 POWERED INDUCTION UNITS           DOE-2.1E-092  Wed Oct  8 16:17:08 1997SDL RUN  5
                                         SINGLE-ZONE UNIT IN BASEMENT
REPORT- SV-B  ZONE FAN DATA                        MAIN                    WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------


                   FAN     SUPPLY     MIN    REHEAT    FAN
   ZONE           FLOW      FLOW     FLOW   DELTA-T  DELTA-T    FAN
   NAME           (CFM )   (CFM )    RATIO    (F)      (F)      KW

   RZ1               0.    10924.    0.500    50.0     0.00    0.000

   TZ1               0.     8497.    0.500    50.0     0.00    0.000

   PLEN1             0.        0.    0.000     0.0     0.00    0.000

   PLEN2             0.        0.    0.000     0.0     0.00    0.000

   RZ2             687.      859.    0.200    50.0     1.02    0.227

   RZ3             547.      498.    0.200    50.0     1.02    0.181

   RZ4             675.      844.    0.200    50.0     1.02    0.223

   RZ5             822.     1027.    0.200    50.0     1.02    0.271

   TZ2             673.      842.    0.200    50.0     1.02    0.222

   TZ3             483.      439.    0.200    50.0     1.02    0.159

   TZ4             659.      824.    0.200    50.0     1.02    0.217

   TZ5             799.      998.    0.200    50.0     1.02    0.264
```

SS-* Overview of Report Family

Report SS-A is always created for each system input. In the following, we describe the reports in alphabetical order (except for special report REFG for refrigerated casework, which is described last). However, we caution you to be aware that in a DOE-2.2 run, SYSTEMS reports are not printed alphabetically but are grouped according to a plant, system and zone hierarchy (see, for example, the output of sample run simstr3). The report hierarchy follows.

Plant Level:

SS-D   Building HVAC Load Summary

SS-E   Building HVAC Load Hours

SS-M   Building HVAC Fan Elec Energy

System level:

SS-A   System Loads Summary for

SS-B   System Loads Summary for

SS-C   System Load Hours for

SS-H   System Utility Energy Use for

SS-I   Sensible/Latent Summary for

SS-J Peak Heating and Cooling for

SS-K   Space Temperature Summary for

SS-R   Zone Performance Summary for

SS-L   Fan Electric Energy Use for

SS-N   Relative Humidity Summary for

SS-P   Heating Performance Summary of

SS-P   Cooling Performance Summary of

SS-Q   Heat Pump Cooling Summary for

SS-Q   Heat Pump Cooling Summary for

Zone level:

SS-G   Zone Loads Summary for

SS-F   Zone Demand Summary for

SS-O   Space Temperature Summary for

SS-P   Heating Performance Summary of

SS-P   Cooling Performance Summary of

The following reports are related and their formats are identical at the Plant, System and Zone levels:

Plant	System	Zone
SS-D	SS-A	SS-G
SS-E	SS-C	None
SS-M	SS-L	None

SS-A System Loads Summary for <system name>

This report is always printed by the program for each HVAC system modeled. It shows monthly cooling, heating and electrical loads. The loads shown are the sum of zone-level loads and central air-handling-unit loads. (Zone-level loads are shown separately in Report SS-G.). This report is for comparison of monthly cooling and heating needs for the HVAC system. DX cooling loads are reported here (for PSZ, PMZS, PVAVS, PTAC, PVVT, RESVVT, RESYS and RESYS2 systems) but are not passed to the PLANT program.

Title

The title of the report shows the user name of the HVAC system being summarized (SYST-1).

COOLING, HEATING and ELEC

are the three sections of this system-level report.

COOLING ENERGY

is the monthly sum of energy (sensible and latent) extracted by the HVAC system during the operation hours of the system and passed as a load to PLANT.

MAXIMUM COOLING LOAD

includes sensible and latent space cooling loads, ventilation air and fan heat. The peak cooling load shown here is often the start-up load after the system has been shut down overnight. Notice, however, that when the system size is inadequate to meet the start-up load there is no indication of this problem on the report. You should first inspect the PLANT program BEPS or BEPU report, which shows the "Percent of Hours Any System Zone Outside of Throttling Range," for a macro view, and Report SS-O or SS-F for a zonal report of overheated or undercooled hours.

To the left of the MAXIMUM COOLING LOAD column are the day and hour (in standard time) of the peak cooling load along with the outside drybulb and wetbulb temperatures at the time of the peak.

HEATING ENERGY

is the monthly sum of heat delivered by the secondary HVAC system during the operation hours of the system and passed as a load to PLANT.

MAXIMUM HEATING LOAD

includes space heating loads, ventilation, and humidification. Again, the peak heating load is often due to start-up conditions after the system has been shut down overnight. To the left of this column are the day and hour of the peak heating load along with the outside drybulb and wetbulb temperatures at the time of the peak.

ELECTRICAL ENERGY

is the monthly electrical consumption for lights, convenience outlets, supply and return fans, and energy consumed by packaged HVAC units (all electrical energy in the building except for central plant equipment (boilers, chillers, dw-heaters, cooling towers, pumps) and except electricity specified within an electric meter).

MAXIMUM ELEC LOAD

is the monthly peak electrical consumption in a one-hour period for lights, convenience outlets, energy consumed by packaged HVAC units, and fans for the zones served by the HVAC system.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1

Design-day sizing of VAV system        Show All Reports
REPORT- SS-A System Loads Summary for      SYST-1                                           WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------------
```

	- - - - - - - - C O O L I N G - - - - - - - -					- - - - - - - H E A T I N G - - - - - - - -					- - - E L E C - - -	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	0.00000	31 24	22.F	19.F	0.000	-34.185	2 8	4.F	3.F	-302.628	3345.	12.808
FEB	0.00000	28 24	31.F	28.F	0.000	-26.459	4 8	7.F	6.F	-282.776	2938.	12.813
MAR	0.29252	3 17	78.F	61.F	38.440	-14.241	24 8	6.F	5.F	-288.753	3137.	12.817
APR	2.21315	28 15	78.F	68.F	88.418	-3.037	8 8	31.F	28.F	-165.791	3165.	12.898
MAY	5.73766	21 14	85.F	75.F	134.605	-0.417	9 8	43.F	39.F	-83.966	3126.	13.459
JUN	13.74432	20 16	90.F	77.F	168.344	0.000	30 1	67.F	56.F	0.000	3206.	14.930
JUL	26.51843	14 14	96.F	77.F	198.804	0.000	31 1	70.F	62.F	0.000	3540.	15.757
AUG	20.47318	11 16	88.F	74.F	158.441	0.000	31 1	63.F	52.F	0.000	3322.	14.419
SEP	9.37699	11 15	87.F	72.F	131.353	-0.239	23 8	36.F	34.F	-86.821	3140.	13.710
OCT	2.91350	30 17	74.F	67.F	52.422	-2.618	20 8	42.F	36.F	-176.753	3193.	12.680
NOV	0.00000	30 24	34.F	32.F	0.000	-11.372	28 8	24.F	22.F	-243.944	2802.	12.756
DEC	0.00000	31 24	33.F	33.F	0.000	-25.084	26 8	15.F	15.F	-278.370	3313.	12.799
TOTAL	81.270					-117.652					38225.	
MAX					198.804					-302.628		15.757

SS-B System Loads Summary for <system name>

This is a summary of the heating and cooling required by all the zones (combined) served by the HVAC system. The items summarized are zone-level cooling, zone-level heating, zone baseboard heating, and preheat energy. In addition, this report lists the preheat energy required and the peak preheat load. The preheat coils raise the temperature of the mixed air to a specified temperature. When you specify baseboard heating in a zone the heating supplied is reported under the heading BASEBOARD HEATING ENERGY.

Title

The U-name of the HVAC system (SYST-1) is printed on the title line.

COOLING BY ZONE COILS OR NAT VENTIL, MAXIMUM COOLING BY ZONE COILS OR NAT VENTIL

are, respectively, the monthly total and peak sensible plus latent cooling supplied by coils located in the zone(s) or by natural ventilation. (The cooling of the primary supply air in the system is summarized in Report SS-A.) Loads met by DX units are reported here and an electrical demand is passed to PLANT.

HEATING BY ZONE COILS OR FURNACE, MAXIMUM HEATING BY ZONE COILS OR FURNACE

are the monthly total heating and peak heating, respectively, supplied by coils or a furnace (oil- or gas-fired) in the zones. The furnace loads, met here in SYSTEMS, are not passed to PLANT but rather a utility demand for oil or gas is passed to PLANT. Baseboard heating is not included. In this example, the zone coils are electric resistance coils and the electrical demand will be passed to PLANT. For RESYS and RESYS2 systems only, these columns report the heating load on the furnace.

BASEBOARD HEATING ENERGY, MAXIMUM BASEBOARD HEATING ENERGY

are, respectively, the monthly total heating and peak heating supplied by baseboard heaters in all the zones served by the system. These loads are passed to PLANT unless BASEBOARD-SOURCE is set equal to ELECTRIC or FURNACE, in which case the load is met in SYSTEMS and a utility demand is passed to PLANT.

PREHEAT COIL ENERGY OR ELEC FOR FURN FAN (millions of Btu), MAXIMUM PREHEAT COIL ENERGY OR ELEC FOR FURN FAN

are, respectively, the monthly total heating and peak heating supplied by the preheat coil(s) to raise the temperature of the mixed air (return air plus makeup air) to a specified value, PREHEAT-T, or, for RESYS and RESYS2 systems only, the monthly and peak electricity use by the furnace fan. The preheat loads are passed to PLANT unless PREHEAT-SOURCE is set equal to ELECTRIC or FURNACE, in which case the load is met in SYSTEMS and a utility demand is passed to PLANT.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-B System Loads Summary for      SYST-1                                    WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------
```

	- -Z O N E C O O L I N G- -		- -Z O N E H E A T I N G-		- - B A S E B O A R D S - -		--PREHEAT OR FURN FAN ELEC--	
MONTH	COOLING BY ZONE COILS OR NAT VENTIL (MBTU)	MAXIMUM COOLING BY ZONE COILS OR NAT VENTIL (KBTU/HR)	HEATING BY ZONE COILS OR FURNACE (MBTU)	MAXIMUM HEATING BY ZONE COILS OR FURNACE (KBTU/HR)	BASEBOARD HEATING ENERGY (MBTU)	MAXIMUM BASEBOARD HEATING ENERGY (KBTU/HR)	PREHEAT COIL ENERGY OR ELEC FOR FURN FAN (MBTU)	MAXIMUM PREHEAT COIL ENERGY OR ELEC FOR FURN FAN (KBTU/HR)
JAN	0.00000	0.000	-16.01356	-220.092	0.00000	0.000	-9.02215	-60.000
FEB	0.00000	0.000	-12.72717	-215.489	0.00000	0.000	-6.00675	-52.242
MAR	0.00000	0.000	-8.64450	-214.292	0.00000	0.000	-1.63046	-45.949
APR	0.00000	0.000	-2.10624	-139.546	0.00000	0.000	-0.05452	-14.030
MAY	0.00000	0.000	-0.28904	-72.240	0.00000	0.000	-0.00123	-1.231
JUN	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
JUL	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
AUG	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
SEP	0.00000	0.000	-0.13039	-62.131	0.00000	0.000	-0.00219	-2.185
OCT	0.00000	0.000	-1.92327	-159.822	0.00000	0.000	-0.05401	-12.100
NOV	0.00000	0.000	-7.42374	-199.828	0.00000	0.000	-0.64055	-21.261
DEC	0.00000	0.000	-14.15183	-215.598	0.00000	0.000	-2.94054	-38.964
TOTAL	0.000		-63.410		0.000		-20.352	
MAX		0.000		-220.092		0.000		-60.000

SS-C System Load Hours for <system name>

The number of cooling and heating hours and fan operating hours for each month are reported for the system. Included are the hours when both heating and cooling are required. In addition, this report gives the heating and electrical loads at the time of the cooling peak. Note: the hour counts in this report are incremented by 1.0 when the relevant condition (e.g., "fans on") applies for all or part of the hour.

HOURS COOLING LOAD, HOURS HEATING LOAD

give the total hours in each month when the HVAC system is operating with a cooling load or a heating load, respectively.

HOURS COINCIDENT COOL-HEAT LOAD

gives the number of hours in each month when the HVAC system is operating with simultaneous heating and cooling loads.

The above numbers do not include hours when the only load was from pilot lights or crankcase heating.

HOURS FLOATING

is the total number of hours that no heating or cooling was provided (with the fans on or off).

HOURS HEATING AVAIL.

is the number of hours that heating equipment is available, as determined by HEATING-SCHEDULE.

HOURS COOLING AVAIL.

is the number of hours that cooling equipment is available, as determined by COOLING-SCHEDULE.

HOURS FANS ON

is the number of hours that fans are in operation, including cycling of fans on to maintain night setback or setup temperature setpoint.

HOURS FANS CYCLE ON

is the number of hours fans were cycled on to maintain night setback or setup temperature setpoint.

HOURS NIGHT VENTING

is the number of hours fans were on to maintain the night venting setpoint.

HOURS FLOATING WHEN FANS ON

is the number of hours that no heating or cooling was provided (with the fans on).

HEATING LOAD AT COOLING PEAK

is the heating load at the time of maximum cooling. It provides an assessment of oversizing for simultaneous heating/cooling systems (e.g., reheat systems).

ELECTRIC LOAD AT COOLING PEAK

is the demand of all electric equipment calculated in LOADS and SYSTEMS at the time of maximum cooling.

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum              DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- SS-C System Load Hours for          SYST-1                                  WEATHER FILE- TRY  CHICAGO
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                - - - - - - - - - - - - - - - - N U M B E R    O F    H O U R S - - - - - - - - - - - - - - - - -  --COINCIDENT LOADS--
```

MONTH	HOURS COOLING LOAD	HOURS HEATING LOAD	HOURS COINCIDENT COOL-HEAT LOAD	HOURS FLOATING	HOURS HEATING AVAIL.	HOURS COOLING AVAIL.	HOURS FANS ON	HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING LOAD AT COOLING PEAK (KBTU/HR)	ELECTRIC LOAD AT COOLING PEAK (KW)
JAN	0	416	0	328	744	0	416	174	0	0	0.000	0.475
FEB	0	372	0	300	672	0	372	163	0	0	0.000	0.475
MAR	10	252	0	482	711	29	269	39	0	7	0.000	10.680
APR	67	107	1	547	504	204	234	0	0	61	0.000	12.889
MAY	116	31	0	597	452	259	213	0	0	66	0.000	13.089
JUN	209	0	0	511	147	549	217	0	0	8	0.000	13.523
JUL	245	0	0	499	2	737	245	5	0	0	0.000	15.013
AUG	224	0	0	520	30	701	226	0	0	2	0.000	13.827
SEP	152	16	0	552	314	374	215	0	0	47	0.000	13.710
OCT	96	94	1	555	494	233	234	0	0	45	0.000	10.680
NOV	0	224	0	496	676	34	232	35	0	8	-42.282	2.055
DEC	0	371	0	373	744	0	371	129	0	0	0.000	0.475
ANNUAL	1119	1883	2	5760	5490	3120	3244	545	0	244		

SS-D Building HVAC Load Summary

The cooling, heating and electrical energy required by the systems and zones served by the central plant are reported monthly along with the peak cooling, heating and electrical loads for the combined systems, and the time of occurrence. Note that these peak loads may result from startup after the building has been shut down overnight. Cooling done in SYSTEMS by DX units is not included here in cooling loads but in electrical loads.

COOLING ENERGY

is the sensible plus latent monthly cooling required by the HVAC systems from the central plant. For water loop heat pump systems the value reported here is the heat rejected to the plant's cooling tower.

TIME OF MAX

gives the day and hour in local standard time that the maximum cooling load occurs.

DRY-BULB TEMP and WET-BULB TEMP

are the outside drybulb wetbulb temperatures during the peak cooling load.

MAXIMUM COOLING LOAD

gives the peak cooling load for each month and for the year.

HEATING ENERGY

is the total monthly heating required by the HVAC systems from the central plant. For water loop heat pump systems the value reported here is the supplementary heat from the plant's hot water boiler.

TIME OF MAX

shows the day and hour in local standard time of the maximum heating load.

DRY-BULB TEMP and WET-BULB TEMP

are the outside drybulb wetbulb temperatures during the peak heating load.

MAXIMUM HEATING LOAD

gives the peak heating load for each month and for the year.

ELECTRICAL ENERGY

is the monthly electrical requirement for lights and convenience outlets for the building zones served by the plant. In addition, the electrical energy contains the fan energy requirement for the HVAC systems and electric energy for cooling and heating in packaged units. It does not include the electrical energy associated with central plant equipment such as pumps, cooling towers and chillers. These are reported in the PLANT program.

MAXIMUM ELEC LOAD

is the monthly peak electrical demand for the items in (9), ELECTRICAL ENERGY, above.

Bottom of Report

At the bottom of the report are the peak daily integrated cooling load for the design day (DES DAY) and for the annual run using the weather file (WTH FILE). These numbers are used by PLANT to size cold storage systems.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-D Building HVAC Load Summary                                        WEATHER FILE- TRY  CHICAGO
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	- - - - - - - C O O L I N G - - - - - - - -					- - - - - - - H E A T I N G - - - - - - - -					- - - E L E C - - -	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY HR	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY HR	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	0.00000	31 24	22.F	19.F	0.000	-34.185	2 8	4.F	3.F	-302.628	3345.	12.808
FEB	0.00000	28 24	31.F	28.F	0.000	-26.459	4 8	7.F	6.F	-282.776	2938.	12.813
MAR	0.29252	3 17	78.F	61.F	38.440	-14.241	24 8	6.F	5.F	-288.753	3137.	12.817
APR	2.21315	28 15	78.F	68.F	88.418	-3.037	8 8	31.F	28.F	-165.791	3165.	12.898
MAY	5.73766	21 14	85.F	75.F	134.605	-0.417	9 8	43.F	39.F	-83.966	3126.	13.459
JUN	13.74432	20 16	90.F	77.F	168.344	0.000	30 1	67.F	56.F	0.000	3206.	14.930
JUL	26.51843	14 14	96.F	77.F	198.804	0.000	31 1	70.F	62.F	0.000	3540.	15.757
AUG	20.47318	11 16	88.F	74.F	158.441	0.000	31 1	63.F	52.F	0.000	3322.	14.419
SEP	9.37699	11 15	87.F	72.F	131.353	-0.239	23 8	36.F	34.F	-86.821	3140.	13.710
OCT	2.91350	30 17	74.F	67.F	52.422	-2.618	20 8	42.F	36.F	-176.753	3193.	12.680
NOV	0.00000	30 24	34.F	32.F	0.000	-11.372	28 8	24.F	22.F	-243.944	2802.	12.756
DEC	0.00000	31 24	33.F	33.F	0.000	-25.084	26 8	15.F	15.F	-278.370	3313.	12.799
TOTAL	81.270					-117.652					38225.	
MAX					198.804					-302.628		15.757

```
MAXIMUM DAILY INTEGRATED COOLING LOAD (DES DAY )            0.000 (KBTU)
MAXIMUM DAILY INTEGRATED COOLING LOAD (WTH FILE)        1997.705 (KBTU)
```

SS-E Building HVAC Load Hours

Just as the monthly load hours are reported for an HVAC system in Report SS-C, the combined load hours for all of the HVAC systems served by the central plant are shown in this report. Heating and electrical loads for the plant at the time of the cooling peak are also reported. Note: the hour counts in this report are incremented by 1.0 when the relevant condition (e.g., "fans on") applies for all or part of the hour.

HOURS COOLING LOAD

HOURS HEATING LOAD

are the required operation hours of the central plant for supplying cooling or heating, respectively, to the HVAC systems served.

HOURS COINCIDENT COOL-HEAT LOAD

gives the number of hours in each month when the central plant is operating with simultaneous heating and cooling loads.

HOURS FLOATING

is the total number of hours (with fans on or off) that space temperatures are not at thermostat set points.

HOURS HEATING AVAIL.

is the number of hours that heating equipment is available, as determined by HEATING-SCHEDULE.

HOURS COOLING AVAIL.

is the number of hours that cooling equipment is available, as determined by COOLING-SCHEDULE.

HOURS FANS ON

is the number of fan operating hours. This includes times when fans cycle on at night to maintain the setback or setup temperature set point or to provide night ventilation.

HOURS FANS CYCLE ON

is the number of hours fans were cycled on to satisfy night setback or setup temperature set point.

HOURS NIGHT VENTING

is the number of hours fans were on to maintain the night ventilation set point.

HOURS FLOATING WHEN FANS ON

is the number of hours (with the fans on) that no heating or cooling was provided.

HEATING LOAD AT COOLING PEAK

is the heating load at the time of maximum cooling. It provides an assessment of oversizing for simultaneous heating/cooling systems (e.g., reheat systems).

ELECTRIC LOAD AT COOLING PEAK

is the electric demand of all electric equipment calculated in LOADS and SYSTEMS at the time of maximum cooling.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-E Building HVAC Load Hours                                          WEATHER FILE- TRY  CHICAGO
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MONTH	HOURS COOLING LOAD	HOURS HEATING LOAD	HOURS COINCIDENT COOL-HEAT LOAD	HOURS FLOATING	HOURS HEATING AVAIL.	HOURS COOLING AVAIL.	HOURS FANS ON	HOURS FANS CYCLE ON	HOURS NIGHT VENTING	HOURS FLOATING WHEN FANS ON	HEATING LOAD AT COOLING PEAK (KBTU/HR)	ELECTRIC LOAD AT COOLING PEAK (KW)
											--COINCIDENT LOADS--	
JAN	0	416	0	328	744	0	416	174	0	0	0.000	0.475
FEB	0	372	0	300	672	0	372	163	0	0	0.000	0.475
MAR	10	252	0	482	715	29	269	39	0	7	0.000	10.680
APR	67	107	1	547	516	204	234	0	0	61	0.000	12.889
MAY	116	31	0	597	485	259	213	0	0	66	0.000	13.089
JUN	209	0	0	511	171	549	217	0	0	8	0.000	13.523
JUL	245	0	0	499	7	737	245	5	0	0	0.000	15.013
AUG	224	0	0	520	43	701	226	0	0	2	0.000	13.827
SEP	152	16	0	552	346	374	215	0	0	47	0.000	13.710
OCT	96	94	1	555	511	233	234	0	0	45	0.000	10.680
NOV	0	224	0	496	686	34	232	35	0	8	-42.282	2.055
DEC	0	371	0	373	744	0	371	129	0	0	0.000	0.475
ANNUAL	1119	1883	2	5760	5640	3120	3244	545	0	244		

SS-F Zone Demand Summary for <zone name>

For a zone, this report gives monthly monthly sums for zone heating and cooling demands from the HVAC system, minimum and maximum zone air temperatures, and the number of hours the loads are not met in the zone.

HEAT EXTRACTION ENERGY and HEAT ADDITION ENERGY

are the sensible cooling energy and heating energy requirements, respectively, of this zone during the HVAC system's operating hours. For the RESYS and RESYS2 systems, the heat extraction may include natural ventilation. For plenums, these values are for heat removed from or added to the return air. For unconditioned zones, these values should be zero.

BASEBOARD ENERGY and MAXIMUM BASEBOARD LOAD

When the keyword BASEBOARD-RATIO is used, the zone heating is supplied by baseboards. Monthly heating energy requirements for these baseboards are reported in addition to the peak heating requirement.

MAXIMUM ZONE TEMPERATURE and MINIMUM ZONE TEMPERATURE

The monthly maximum and minimum air temperatures in the zone when system fans are operating.

HOURS UNDERHEATED and HOURS UNDERCOOLED

If the capacity of the HVAC system is less than the heat extraction or addition needed to hold the zone thermostat set point, a load-not-met condition occurs that is recorded as either an underheated or undercooled hour. These hours may include startups after a night shutdown of the HVAC system.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-F Zone Demand Summary for      ZONE1-1                            WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------

      - - - -D E M A N D S- - - - -   - -B A S E B O A R D S- - -   - -T E M P E R A T U R E S- -   - -L O A D S   N O T   M E T- -

                HEAT          HEAT                      MAXIMUM       MAXIMUM       MINIMUM
             EXTRACTION     ADDITION     BASEBOARD     BASEBOARD        ZONE          ZONE
               ENERGY        ENERGY       ENERGY         LOAD          TEMP          TEMP        HOURS            HOURS
   MONTH       (MBTU)        (MBTU)       (MBTU)       (KBTU/HR)        (F)           (F)         UNDER            UNDER
   JAN        0.39591        -2.314      0.00000        0.000          77.1          55.8        HEATED           COOLED
                                                                                                  0                0
   FEB        0.38562        -1.840      0.00000        0.000          76.4          55.8         0                0

   MAR        0.91858        -0.989      0.00000        0.000          76.7          55.8        10                0

   APR        1.85465        -0.221      0.00000        0.000          77.4          62.8         4                0

   MAY        2.30360        -0.023      0.00000        0.000          77.8          62.9         2                0

   JUN        3.10090         0.000      0.00000        0.000          77.9          72.6         0                0

   JUL        4.22996         0.000      0.00000        0.000          89.5          73.5         0                0

   AUG        3.67799         0.000      0.00000        0.000          78.2          73.6         0                0

   SEP        3.12406        -0.011      0.00000        0.000          78.2          70.6         0                0

   OCT        2.09386        -0.178      0.00000        0.000          78.0          63.0         1                0

   NOV        0.56666        -0.712      0.00000        0.000          77.6          55.9         0                0

   DEC        0.37838        -1.925      0.00000        0.000          77.1          55.8         0                0
```

SS-G Zone Loads Summary for <zone name>

Zone cooling, heating and electrical requirements are reported in this monthly summary. The cooling and heating energy reported is supplied only at the zone level (such as for reheat coils). Often heating and cooling loads are reported as zero in this report when the central HVAC system (e.g., a dual-duct system) provides all the heating and cooling.

COOLING ENERGY and HEATING ENERGY

The monthly cooling and heating energy, respectively, delivered by zone coils and baseboards during scheduled operation hours.

MAXIMUM COOLING LOAD and MAXIMUM HEATING LOAD

The peak energy delivered by zone coils and baseboards for cooling and heating, respectively. Includes sensible and latent space cooling loads, ventilation air and fan heat. To the left of these columns are the day and hour (in local standard time) of the peak cooling load along with the outside drybulb and wetbulb temperatures at the time of the peak.

The peak cooling load shown here is often the start-up load after the system has been shut down overnight. Notice, however, that when the system size is inadequate to meet the start-up load there is no indication of this problem on the report. You should first inspect the PLANT program BEPS or BEPU report, which shows "Percent of Hours Any System Zone Outside of Throttling Range", for a macro view, and at SS-O (Space Temperature Summary) or SS-F (Zone Demand Summary) for a zonal report of where "loads not met" conditions prevail.

ELECTRICAL ENERGY and MAXIMUM ELEC LOAD

The monthly total and peaks of electrical energy use in this zone, including lights, fans, and compressors and electric coils in packaged HVAC units.

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- SS-G Zone Loads Summary for         ZONE1-1                              WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------
       - - - - - - - - C O O L I N G - - - - - - - -     - - - - - - - - H E A T I N G - - - - - - - -     - - - E L E C - - -

                                             MAXIMUM                                           MAXIMUM      ELEC-     MAXIMUM
           COOLING     TIME    DRY-  WET-     COOLING    HEATING     TIME    DRY-  WET-         HEATING     TRICAL       ELEC
           ENERGY    OF MAX    BULB  BULB     LOAD       ENERGY    OF MAX    BULB  BULB         LOAD        ENERGY       LOAD
 MONTH     (MBTU)    DY  HR    TEMP  TEMP     (KBTU/HR)  (MBTU)    DY  HR    TEMP  TEMP         (KBTU/HR)   (KWH)       (KW)

 JAN       0.00000   31  24    22.F  19.F     0.000      -3.459    13   8     7.F   6.F         -44.670      639.       2.534
 FEB       0.00000   28  24    31.F  28.F     0.000      -2.764    24   8    20.F  18.F         -44.503      561.       2.534
 MAR       0.00000   31  24    39.F  36.F     0.000      -1.779    24   8     6.F   5.F         -46.699      620.       2.534
 APR       0.00000   30   1    55.F  48.F     0.000      -0.551     8   8    31.F  28.F         -26.684      632.       2.534
 MAY       0.00000   31   1    54.F  49.F     0.000      -0.118     9   8    43.F  39.F         -17.443      620.       2.534
 JUN       0.00000   30   1    67.F  56.F     0.000       0.000    30   1    67.F  56.F           0.000      613.       2.534
 JUL       0.00000   31   1    70.F  62.F     0.000       0.000    31   1    70.F  62.F           0.000      639.       2.534
 AUG       0.00000   31   1    63.F  52.F     0.000       0.000    31   1    63.F  52.F           0.000      620.       2.534
 SEP       0.00000   30   1    46.F  40.F     0.000      -0.047    23   8    36.F  34.F         -16.880      613.       2.534
 OCT       0.00000   31  24    70.F  62.F     0.000      -0.475    20   8    42.F  36.F         -29.587      639.       2.534
 NOV       0.00000   30  24    34.F  32.F     0.000      -1.621    28   8    24.F  22.F         -39.539      555.       2.534
 DEC       0.00000   31  24    33.F  33.F     0.000      -3.099    22   8    15.F  15.F         -44.911      639.       2.53
           ---------                          ----------  ---------                             ----------   --------   -------

 TOTAL     0.000                                          -13.913                                            7391.

 MAX                                          0.000                                             -46.699                 2.534
```

SS-H System Utility Energy Use for <system name>

This report gives monthly values of electrical energy for fans, gas/oil energy for heating and cooling, and electrical energy for heating and cooling for an HVAC system.

FAN ELEC

shows the total and maximum hourly electrical consumption of the supply, return, exhaust and zonal fans.

FUEL HEAT

shows the total fuel consumption by packaged systems for heating. This will be zero unless one of the heat sources is FURNACE.

FUEL COOL

shows the total fuel consumption by packaged systems for cooling.

ELEC HEAT

shows the electrical consumption for heating. This includes electric baseboards and reheat coils as well as the electrical load attributable to the heating cycle of a heat pump.

ELEC COOL

shows the electrical consumption and hourly maxima for cooling.

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum            DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- SS-H System Utility Energy Use for  SYST-1                                       WEATHER FILE- TRY  CHICAGO
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       - -F A N   E L E C- - -    - -F U E L   H E A T- -    - -F U E L   C O O L- -    -E L E C   H E A T- -    -E L E C   C O O L- -

                   MAXIMUM                     MAXIMUM                     MAXIMUM                     MAXIMUM                     MAXIMUM
           FAN         FAN    GAS OIL          GAS OIL    GAS OIL          GAS OIL    ELECTRIC        ELECTRIC    ELECTRIC        ELECTRIC
        ENERGY        LOAD    ENERGY             LOAD     ENERGY             LOAD      ENERGY           LOAD      ENERGY           LOAD
MONTH    (KWH)        (KW)    (MBTU)          (KBTU/HR)   (MBTU)          (KBTU/HR)    (KWH)            (KW)       (KWH)            (KW)


JAN       318.       3.087    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

FEB       284.       3.002    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

MAR       202.       2.972    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

APR       171.       1.398    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

MAY       190.       1.959    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

JUN       304.       3.591    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

JUL       513.       4.971    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

AUG       386.       3.080    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

SEP       237.       2.391    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

OCT       166.       1.415    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

NOV       172.       2.649    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000

DEC       286.       3.041    0.000           0.000       0.000           0.000        0.             0.000       0.             0.000
        ----------  ----------  -----------  -----------  -----------  -----------  ----------  ----------  ----------  ----------
TOTAL    3230.                  0.000                     0.000                       0.                     0.
MAX                  4.971                     0.000                     0.000                     0.000                     0.000
```

SS-I Sensible/Latent Summary for <system name>

This is a summary of the monthly cooling and heating energy provided by each HVAC system. The quantities shown are the sum of zone-level loads and central air-handling-unit loads.

SENSIBLE COOLING ENERGY

is the monthly sum of sensible energy extracted by the HVAC system.

LATENT COOLING ENERGY

is the monthly sum of latent energy extracted by the HVAC system. The sum of (1) and (2) should equal COOLING ENERGY in Report SS-A.

MAX TOTAL COOLING ENERGY

is the hourly peak energy (sensible plus latent) extracted by the system during the month.

SENSIBLE HEAT RATIO AT MAX

is the sensible heat ratio ([sensible cooling]/[total cooling]) for the hour that the maximum total cooling occurs.

TIME OF MAX

is the day and hour (in local standard time) that the total peak cooling load occurred.

SENSIBLE HEATING ENERGY

is the monthly sum of sensible energy added by the HVAC system.

LATENT HEATING ENERGY

is the monthly sum of latent energy extracted by the HVAC system. The sum of (6) and (7) should equal HEATING ENERGY in Report SS-A.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum         DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-I Sensible/Latent Summary for    SYST-1                                            WEATHER FILE- TRY  CHICAGO
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          SENSIBLE      LATENT     MAX TOTAL                                    SENSIBLE      LATENT     MAX TOTAL
          COOLING      COOLING      COOLING        SENSIBLE       TIME          HEATING      HEATING      HEATING
          ENERGY       ENERGY       ENERGY       HEAT RATIO     OF MAX         ENERGY       ENERGY       ENERGY
  MONTH   (MBTU)       (MBTU)      (KBTU/HR)        AT MAX       DY  HR         (MBTU)       (MBTU)      (KBTU/HR)

  JAN     0.00000      0.00000       0.000                                    -34.18526     0.00000     -302.62750
  FEB     0.00000      0.00000       0.000                                    -26.45858     0.00000     -282.77591
  MAR     0.26943      0.02309      38.440          1.000        3   17       -14.24075     0.00000     -288.753
  APR     1.96484      0.24831      88.418          0.805       28   15        -3.03746     0.00000     -165.791
  MAY     4.91520      0.82246     134.605          0.739       21   14        -0.41691     0.00000      -83.966
  JUN    12.11147      1.63286     168.344          0.749       20   16         0.00000     0.00000        0.000
  JUL    22.16018      4.35825     198.804          0.800       14   14         0.00000     0.00000        0.000
  AUG    17.12798      3.34520     158.441          0.781       11   16         0.00000     0.00000        0.000
  SEP     8.36948      1.00751     131.353          0.803       11   15        -0.23907     0.00000      -86.821
  OCT     2.66797      0.24553      52.422          0.788       30   17        -2.61819     0.00000     -176.753
  NOV     0.00000      0.00000       0.000                                    -11.37247     0.00000     -243.94443
  DEC     0.00000      0.00000       0.000                                    -25.08353     0.00000     -278.36969
        ---------    ---------    ---------      ---------                   ---------    ---------    ---------
  TOTAL   69.587       11.683                                               -117.652       0.000
  MAX                             198.804          0.800                                               -302.628
```

SS-J Peak Heating and Cooling for <system name>

For each HVAC system, this report gives an hourly profile of three types of peak day that occur during the RUN-PERIOD:

1. Under --COOLING--,the day that contains the hour with the maximum (sensible plus latent) cooling energy.

2. Under --HEATING--, the day that contains the hour with the maximum heating energy.

3. Under DAY COOLING PEAK, the day whose integrated cooling load (i.e., load summed over 24 hours) is highest. This day can be used to size thermal energy storage systems; however, to insure that the peak integrated load shown here is truly represented, you should examine reports SS-O (Space Temperature Summary) or SS-F (Zone Demand Summary), which show the number of hours that cooling loads are not met.

HOUR

gives the hour of the day, ranging from hour 1 (midnight to 1am) to hour 24 (11pm to midnight). The hour shown is in local standard time even if DAYLIGHT-SAVINGS = YES.

HOURLY COOLING LOAD

is the total hourly energy, sensible plus latent, extracted by the HVAC system. The cooling load is followed by an asterisk (*) when the system is unable to meet the cooling demand for that hour. This means that in at least one zone served by this system there is an unmet cooling load and the zone temperature is outside the throttling range.

SENSIBLE HEAT RATIO

is the ratio of sensible to total cooling energy for the hour.

DRYBULB TEMP and WETBULB TEMP

are the outside drybulb and wetbulb temperatures, respectively, for the given hour.

HOURLY HEATING LOAD

is the hourly heating energy delivered by the HVAC system. For SYSTEM:TYPE = RESYS and RESVVT, this includes baseboard heating energy. The heating load is followed by an asterisk (*) when the system is unable to meet the heating demand for that hour. This means that in at least one zone served by the system, there is an unmet heating load and the zone temperature is outside the throttling range.

A separate report is provided whenever DESIGN-DAY is input.

Bottom of Report - Some additional information is shown at the bottom of the report:

SYSTEM-TYPE

is the DOE-2 code-word for the type of this HVAC system.

SQFT/TON

is the area served by this system divided by the peak cooling in tons.

COOLING PEAK

is the peak cooling divided by the area served by this system.

HEATING PEAK

is the peak heating divided by the area served by this system.

SUPPLY AIR PEAK FLOW

is the design supply air flow divided by area served by this system.

MIN-OA/PERSON

is the design minimum outside air flow divided by the maximum number of people in all the zones served by this system.

OA FRAC AT CLG PEAK

is the outside air fraction (outside air flow divided by supply flow) at the peak cooling hour.

OA FRAC AT HTG PEAK

is the outside air fraction (outside air flow divided by supply flow) at the peak heating hour.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum         DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-J Peak Heating and Cooling for   SYST-1                                          WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------


          - - - - - C O O L I N G - - - - -      - - - H E A T I N G - - -     D A Y   C O O L I N G   P E A K

                    JUL 14                             JAN  2                           JUL 14


          HOURLY                               HOURLY                         HOURLY
          COOLING   SENSIBLE   DRY-   WET-      HEATING   DRY-   WET-          COOLING   SENSIBLE   DRY-   WET-
          LOAD      HEAT       BULB   BULB      LOAD      BULB   BULB          LOAD      HEAT       BULB   BULB
  HOUR    (KBTU)    RATIO      TEMP   TEMP      (KBTU)    TEMP   TEMP          (KBTU)    RATIO      TEMP   TEMP

    1      0.000    0.000      83.F   72.F     -105.596   1.F    0.F           0.000    0.000      83.F   72.F
    2      0.000    0.000      81.F   72.F     -106.951   1.F    0.F           0.000    0.000      81.F   72.F
    3      0.000    0.000      80.F   71.F     -107.897   1.F    0.F           0.000    0.000      80.F   71.F
    4      0.000    0.000      78.F   71.F     -107.401   2.F    1.F           0.000    0.000      78.F   71.F
    5      0.000    0.000      77.F   70.F     -110.220   2.F    1.F           0.000    0.000      77.F   70.F
    6      0.000    0.000      78.F   71.F     -107.897   2.F    1.F           0.000    0.000      78.F   71.F
    7    142.068 *  0.890      79.F   71.F     -109.054   3.F    2.F         142.068 *  0.890      79.F   71.F
    8    191.428 *  0.797      82.F   72.F     -302.628   4.F    3.F         191.428 *  0.797      82.F   72.F
    9    177.026 *  0.778      86.F   74.F     -192.600   4.F    3.F         177.026 *  0.778      86.F   74.F
   10    179.816 *  0.791      88.F   74.F     -157.094   5.F    4.F         179.816 *  0.791      88.F   74.F
   11    185.444 *  0.781      91.F   76.F     -142.285   6.F    5.F         185.444 *  0.781      91.F   76.F
   12    182.825    0.807      94.F   76.F     -125.894   8.F    7.F         182.825    0.807      94.F   76.F
   13    198.804    0.800      96.F   77.F     -120.275   9.F    9.F         198.804    0.800      96.F   77.F
   14    190.141    0.797      87.F   74.F     -106.301  11.F   11.F         190.141    0.797      87.F   74.F
   15    175.715    0.778      76.F   71.F     -100.302  12.F   12.F         175.715    0.778      76.F   71.F
   16    161.530    0.763      78.F   72.F      -95.847  14.F   13.F         161.530    0.763      78.F   72.F
   17    151.517    0.753      78.F   72.F      -93.170  15.F   14.F         151.517    0.753      78.F   72.F
   18      0.000    0.000      89.F   75.F      -91.288  15.F   15.F           0.000    0.000      89.F   75.F
   19      0.000    0.000      87.F   75.F        0.000  17.F   16.F           0.000    0.000      87.F   75.F
   20      0.000    0.000      84.F   74.F        0.000  17.F   16.F           0.000    0.000      84.F   74.F
   21      0.000    0.000      84.F   74.F        0.000  18.F   18.F           0.000    0.000      84.F   74.F
   22      0.000    0.000      82.F   74.F        0.000  17.F   17.F           0.000    0.000      82.F   74.F
   23      0.000    0.000      80.F   72.F        0.000  17.F   17.F           0.000    0.000      80.F   72.F
   24      0.000    0.000      78.F   72.F        0.000  17.F   17.F           0.000    0.000      78.F   72.F
          --------                             --------                      ---------
  SUM                                                                         1936.315
  MAX    198.804                              -302.628


            SYSTEM-TYPE         VAVS         SQFT/TON             301.8
            COOLING PEAK          39.76 (BTU/HR- SQFT)  HEATING PEAK        -60.53 (BTU/HR- SQFT)
            SUPPLY AIR PEAK FLOW   1.18 (CFM/SQFT)      MIN-OA/PERSON        20.40 (CFM )
            OA FRAC AT CLG PEAK   0.245                 OA FRAC AT HTG PEAK   0.276

            * ASTERISKS INDICATE HOURS LOADS NOT MET
```

SS-K Space Temperature Summary for <system name>

This report gives a monthly summary of various temperature quantities for the spaces served by an HVAC system. It can be used to determine the potential for night ventilation as a cooling strategy. Blank entries indicate that no hours existed in a particular category. The averages given are over all spaces served by the system.

AVERAGE SPACE TEMP ALL HOURS

is the average space temperature for all hours in the run.

AVERAGE SPACE TEMP COOLING HOURS

is the average space temperature for hours when cooling is required.

AVERAGE SPACE TEMP HEATING HOURS

is the average space temperature for hours when heating is required.

AVERAGE SPACE TEMP FAN ON HOURS

is the average space temperature when the fans are running.

AVERAGE SPACE TEMP FAN OFF HOURS

is the average space temperature when the fans are not running.

AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR & ROOM AIR, ALL HOURS

is the average value of [outdoor temperature minus space air temperature] over all hours.

AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR & ROOM AIR, FAN ON HOURS

is the average value of [outdoor temperature minus space air temperature] when the fans are on.

AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR & ROOM AIR, FAN OFF HOURS

is the average value of [outdoor temperature minus space air temperature] when the fans are off.

SUMMED TEMP DIFFERENCE BETWEEN OUTDOOR & ROOM AIR, HEATING HOURS

is the sum of the absolute value of [outdoor temperature minus room air temperature] for hours when heating is required, divided by 24. This is a degree day-like quantity.

SUMMED TEMP DIFFERENCE BETWEEN OUTDOOR & ROOM AIR, ALL HOURS

is the sum of the absolute value of [outdoor temperature minus room air temperature] for all hours, divided by 24. This is a degree day-like quantity.

HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR & ROOM AIR

is the average value of [outdoor humidity ratio minus return air humidity ratio] for all hours.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-K Space Temperature Summary for  SYST-1                            WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------
```

| MONTH | A V E R A G E   S P A C E   T E M P | | | | | AVERAGE TEMPERATURE DIFFERENCE | | | SUMMED TEMP DIFFERENCE | | HUMIDITY RATIO DIFFERENCE |
	ALL HOURS (F)	COOLING HOURS (F)	HEATING HOURS (F)	FAN ON HOURS (F)	FAN OFF HOURS (F)	BETWEEN OUTDOOR& ROOM AIR ALL HOURS (F)	BETWEEN OUTDOOR& ROOM AIR FAN ON HOURS (F)	BETWEEN OUTDOOR& ROOM AIR FAN OFF HOURS (F)	BETWEEN OUTDOOR& ROOM AIR HEATING HOURS (F)	BETWEEN OUTDOOR& ROOM AIR ALL HOURS (F)	BETWEEN OUTDOOR AND ROOM AIR (FRAC.OR MULT.)
JAN	61.63	0.00	62.66	62.66	60.33	-36.29	-41.03	-30.29	711.11	1125.03	-0.00080
FEB	61.66	0.00	62.66	62.66	60.41	-34.14	-36.24	-31.54	561.72	955.93	-0.00081
MAR	63.96	63.27	67.21	67.20	62.12	-25.59	-30.81	-22.63	342.62	802.70	-0.00052
APR	71.59	74.32	70.22	72.53	71.13	-20.00	-20.24	-19.88	120.10	601.15	-0.00071
MAY	75.52	76.87	70.62	75.21	75.65	-18.75	-15.24	-20.16	31.51	583.28	-0.00122
JUN	80.61	77.82	0.00	77.74	81.84	-13.51	-6.96	-16.34	0.00	417.12	-0.00002
JUL	83.80	78.93	0.00	78.93	86.19	-8.23	-0.53	-12.02	0.00	318.53	0.00231
AUG	82.10	78.19	0.00	78.18	83.81	-10.25	-2.18	-13.77	0.00	355.19	0.00167
SEP	77.30	77.26	70.62	76.14	77.80	-15.92	-9.84	-18.51	17.00	491.29	-0.00053
OCT	71.50	73.85	69.94	72.29	71.13	-17.85	-16.19	-18.61	92.55	553.79	-0.00060
NOV	64.72	0.00	67.12	67.33	63.48	-23.77	-28.55	-21.50	269.06	713.72	-0.00094
DEC	61.80	0.00	63.92	63.92	59.69	-30.07	-32.54	-27.61	503.05	932.13	-0.00083
ANNUAL	71.40	77.28	65.04	69.96	72.25	-21.12	-22.67	-20.21	2648.73	7849.84	-0.00024

SS-L Fan Electric Energy Use for <system name>

This report gives a breakdown of monthly electric energy for fans (central and zone-level) and fan part load operation for an HVAC system.

FAN ELECTRIC ENERGY DURING HEATING

is the total electric energy used by the fans for hours when only heating is required.

FAN ELECTRIC ENERGY DURING COOLING

is the total electric energy used by the fans for hours when only cooling is required.

FAN ELECTRIC ENERGY DURING HEATING-COOLING

is the total electric energy used by the fans for hours when both heating and cooling are required.

FAN ELECTRIC ENERGY DURING FLOATING

is the total electric energy used by the fans when neither heating nor cooling is provided.

The right-hand side of the report shows the part-load operation of the fans. The number of operating hours within each part load band (0-10 percent, 10-20 percent, etc.) is given as well as the total hours of operation. If the fan operates during an hour, its part load in percent is 100*(total flow)/(design flow).

BREAKDOWN OF ANNUAL FAN POWER USAGE

gives the annual electric energy for the system's supply, return and exhaust fans.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum           DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-L Fan Electric Energy Use for     SYST-1                                      WEATHER FILE- TRY  CHICAGO
------------------------------------------------------------------------------------------------------------------------
```

MONTH	FAN ELEC DURING HEATING (KWH)	FAN ELEC DURING COOLING (KWH)	FAN ELEC DURING HEAT & COOL (KWH)	FAN ELEC DURING FLOATING (KWH)	00 10	10 20	20 30	30 40	40 50	50 60	60 70	70 80	80 90	90 100	100 +	TOTAL RUN HOURS
JAN	318.090	0.000	0.000	0.000	0	0	0	395	10	4	7	0	0	0	0	416
FEB	283.986	0.000	0.000	0.000	0	0	0	356	5	3	8	0	0	0	0	372
MAR	190.102	6.798	0.000	4.759	0	0	0	254	10	3	2	0	0	0	0	269
APR	74.480	53.102	0.680	44.094	0	0	0	224	10	0	0	0	0	0	0	234
MAY	21.075	119.405	0.000	49.758	0	0	0	170	40	3	0	0	0	0	0	213
JUN	0.000	295.147	0.000	8.699	0	0	0	86	93	29	8	1	0	0	0	217
JUL	0.000	513.332	0.000	0.000	0	0	0	29	62	96	48	9	1	0	0	245
AUG	0.000	382.394	0.000	3.914	0	0	0	41	84	90	11	0	0	0	0	226
SEP	10.877	189.057	0.000	37.108	0	0	0	138	57	20	0	0	0	0	0	215
OCT	65.035	68.979	0.680	32.738	0	0	0	233	1	0	0	0	0	0	0	234
NOV	166.180	0.000	0.000	6.131	0	0	0	222	7	2	1	0	0	0	0	232
DEC	285.966	0.000	0.000	0.000	0	0	0	350	11	3	7	0	0	0	0	371
ANNUAL	1415.759	1628.213	1.360	187.201	0	0	0	2498	390	253	92	10	1	0	0	3244

```
BREAKDOWN OF ANNUAL FAN POWER USAGE

                ANNUAL
       FAN     FAN ELEC
      TYPE      (KWH)
    SUPPLY       3230.
              -----------
     TOTAL       3230.
```

SS-M Building HVAC Fan Elec Energy

This report gives a breakdown of electric energy used by all fans in the building.

FAN ELECTRIC ENERGY DURING HEATING

is the total electric energy used by the fans when only heating is required.

FAN ELECTRIC ENERGY DURING COOLING

is the total electric energy used by the fans when only cooling is required.

FAN ELECTRIC ENERGY DURING HEATING-COOLING

is the total electric energy used by the fans when both heating and cooling are required.

FAN ELECTRIC ENERGY DURING FLOATING

is the total electric energy used by the fans when neither heating nor cooling is provided.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-M Building HVAC Fan Elec Energy                                   WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------


            FAN ELECTRIC   FAN ELECTRIC   FAN ELECTRIC     FAN ELECTRIC
            ENERGY DURING  ENERGY DURING  ENERGY DURING    ENERGY DURING
              HEATING         COOLING     HEATING-COOLING    FLOATING
   MONTH      (KWH)           (KWH)          (KWH)            (KWH)


   JAN        318.090          0.000          0.000            0.000

   FEB        283.986          0.000          0.000            0.000

   MAR        190.102          6.798          0.000            4.759

   APR         74.480         53.102          0.680           44.094

   MAY         21.075        119.405          0.000           49.758

   JUN          0.000        295.147          0.000            8.699

   JUL          0.000        513.332          0.000            0.000

   AUG          0.000        382.394          0.000            3.914

   SEP         10.877        189.057          0.000           37.108

   OCT         65.035         68.979          0.680           32.738

   NOV        166.180          0.000          0.000            6.131

   DEC        285.966          0.000          0.000            0.000
            -------------  -------------  ---------------  -------------

   ANNUAL    1415.759       1628.213          1.360          187.201
```

SS-N Relative Humidity Summary for \<system name\>

In this scatter plot, the vertical axis, at the left, shows relative humidity bins. The horizontal azis, at the top, shows hours of the day (in local standard time), where "1AM" is midnight to 1:00am, "2" is 1:00am to 2:00am, etc. The cells of the plot contain number of hours during the run period for which the relative humidity of the system return air was in the particular relative humidity bin for a particular hour of the day. Only hours for which the fans are on are counted in this plot, except that hours the fans are on due to NIGHT-CYCLE-CTRL are not counted.

The TOTAL column at the far right is the sum of the entries in each row. It shows the frequency of relative humidity values for the run period. (Because the relative humidity counts are made only for hours when the fans are on, the sum the values in this column will generally not be equal to the number of hours in the run.)

```
Simple Structure Run 3, Chicago         Divide into zones; add plenum            DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system         Show All Reports
REPORT- SS-N Relative Humidity Summary for  SYST-1                                      WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------


                                  TOTAL HOURS AT RELATIVE HUMIDITY LEVEL AND TIME OF DAY

                HOUR     1AM 2    3   4   5   6   7   8   9  10  11  12   1PM 2    3   4   5   6   7   8   9  10  11  12    TOTAL
                         --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

                90-100     0   0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   0      1

                80-89      0   0   0   0   0   0   0   0   1   1   0   1   1   1   1   0   0   0   0   0   0   0   0   0      6

                70-79      0   0   0   0   0   0   0   0   2   1   0   0   0   0   1   0   0   0   0   0   0   0   0   0      4

                60-69      0   0   0   0   0   0   0   2   2   3   4   3   1   3   1   5   5   4   0   0   0   0   0   0     33

                50-59      0   0   0   0   0   0   0  45  45  31  19  10  12   7   9   9  13   5   0   0   0   0   0   0    205

                40-49      0   0   0   0   0   0   0  46  60  70  74  77  78  81  73  77  77   6   0   0   0   0   0   0    719

                30-39      0   0   0   0   0   0   0  31  60  63  64  58  44  58  67  61  57  26   0   0   0   0   0   0    599

                20-29      0   0   0   0   0   0   0  17  65  64  65  64  75  72  72  72  70  49   0   0   0   0   0   0    685

                10-19      0   0   0   0   0   0   0   0  17  19  25  38  39  29  28  28  30  21   0   0   0   0   0   0    274

                 0-09      0   0   0   0   0   0   0   0   0   0   0   1   2   1   0   0   0   0   0   0   0   0   0   0     14

                         === === === === === === === === === === === === === === === === === === === === === === === ===  =====


                    ***********************************************************
                    *                                                         *
                    *   NOTE  1)THE RELATIVE HUMIDITY COUNTS ARE MADE ONLY FOR  *
                    *            THE HOURS WHEN THE FANS ARE ON                *
                    *                                                         *
                    ***********************************************************
```

SS-O Space Temperature Summary for <zone name>

In this scatter plot the vertical axis, at the left, shows temperature bins. The horizontal axis, at the top, gives hours of the day in local standard time, where "1AM" is midnight to 1:00am, "2" is 1:00am to 2:00am, etc. Entered in each cell of the plot is the number of hours during the run period for which the zone air temperature was in the particular bin for the particular hour of the day. Only hours for which the fans are on are counted in this plot, except that hours the fans are on due to NIGHT-CYCLE-CTRL are not counted.

The column at the far right labeled "TOTAL" is the sum of the entries in each row. It shows the frequency of temperature values for the run period. Because the temperature counts are only made for hours when the fans are on, summing the totals column will not sum to the number of hours in the run.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- SS-O Space Temperature Summary for  ZONE1-1                                   WEATHER FILE- TRY  CHICAGO
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                                TOTAL HOURS AT TEMPERATURE LEVEL AND TIME OF DAY

               HOUR    1AM 2   3   4   5   6   7   8   9  10  11  12   1PM 2   3   4   5   6   7   8   9  10  11  12    TOTAL
                       --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---  -----

           ABOVE 85      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0

           80-85         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0

           75-80         0   0   0   0   0   0   0  54  72  83  94 103 121 137 141 142 126   1   0   0   0   0   0   0   1074

           70-75         0   0   0   0   0   0   0  85 176 168 157 148 130 114 110 108 125 108   0   0   0   0   0   0   1429

           65-70         0   0   0   0   0   0   0   0   2   0   0   0   0   0   1   1   0   0   0   0   0   0   0   0      4

           60-65         0   0   0   0   0   0   0   2   2   1   1   1   1   1   0   1   1   2   0   0   0   0   0   0     13

           BELOW 60      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0

                       === === === === === === === === === === === === === === === === === === === === === === === ===  =====


                   ****************************************************************
                   *                                                              *
                   *  NOTE  1)THE TEMPERATURE COUNTS ARE MADE ONLY FOR            *
                   *          THE HOURS WHEN THE FANS ARE ON                      *
                   *                                                              *
                   ****************************************************************
```

SS-P Heating/Cooling Performance Summary of <zone or system name>

Two SS-P reports are produced for each unit or system: one for heating operation and one for cooling operation. These reports are provided for:

- each PSZ, PVAVS, RESYS, RESVVT, or PVVT system if Report SS-H is requested;

- each zone in a PTAC, HP, FC, UHT, UVT system if Report SS-H or SS-L is requested in the SYSTEMS-REPORT command.

UNIT TYPE

is the DOE-2 code-word for this HVAC system.

HEATING-CAPACITY and HEATING-EIR or COOLING-CAPACITY and COOLING-EIR and SUPPLY-FLOW

are as reported on SV-A for this system.

UNIT LOAD

gives the monthly sum and peak load on the unit and time of occurrence of peak in local standard time .

ENERGY USE

gives the monthly sum and peak electric energy used by the unit and time of occurrence of peak. Energy use includes that from the compressor, outdoor fans, pumps, auxiliaries (specified by UNIT-AUX-KW), crankcase heat and evaporative precooler.

COMPRESSOR

gives the monthly sum and peak electric energy used by the engine/motor, not including the crankcase heat, and time of occurrence of the peak.

FAN ENERGY

gives the monthly sum and peak fan energy during the time the unit is in the heating/cooling mode, and the time of occurrence of the peak.

Number of hours within each PART LOAD range

For each month, shows the number of hours that the unit (top line) or indoor fan (bottom line) spent in various part load ranges (0-10%, 10-20%, etc.). If the unit is on during the hour and the operation is within the specified range, the count of hours is incremented by 1.

```
                                                              DOE-2.2b-130  Wed Feb 12 14:57:23 1997BDL RUN  1

REPORT- SS-P Cooling Performance Summary of System 1                            WEATHER FILE- LOS ANGELES, CA
--------------------------------------------------------------------------------------------------------------

       UNIT TYPE is PSZ              COOLING-CAPACITY =  110.949 (KBTU/HR) COOLING-EIR = 0.360 (BTU/BTU) SUPPLY-FLOW =    3895.
(CFM)

              UNIT LOAD  ENERGY USE  COMPRESSOR  FAN ENERGY   --------  Number of hours within each PART LOAD range  ---- TOTAL
         SUM  (MBTU)     (KWH)       (KWH)       (KWH)        00   10   20   30   40   50   60   70   80   90  100   RUN
MONTH PEAK (KBTU/HR)     (KW)        (KW)        (KW)         10   20   30   40   50   60   70   80   90  100   +   HOURS
----- ---- ----------  -----------  -----------  -----------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----


JAN   SUM     1.527      140.908      135.708     1701.129 CMP  0    0   14   12   16    0    0    0    0    0    0    42
      PEAK    55.358       4.737        4.737        2.286 FAN  0    0    0    0    0    0    0    0    0    0   42    42
      DAY/HR  11/15       11/15        11/15        31/24

FEB   SUM     1.050       96.190       92.040     1536.501 CMP  0    0    3    6    8    6    0    0    0    0    0    23
      PEAK    60.188       5.157        5.157        2.286 FAN  0    0    0    0    0    0    0    0    0    0   23    23
      DAY/HR  13/16       13/16        13/16        28/24

MAR   SUM     2.074      183.247      179.647     1701.129 CMP  0    0    8    5   18   14    0    0    0    0    0    45
      PEAK    64.816       5.565        5.565        2.286 FAN  0    0    0    0    0    0    0    0    0    0   45    45
      DAY/HR   6/16        6/16         6/16        31/24

APR   SUM     5.323      469.032      468.832     1646.253 CMP  0    0   20   13   35   39    5    0    0    0    0   112
      PEAK    71.524       6.317        6.317        2.286 FAN  0    0    0    0    0    0    0    0    0    0  112   112
      DAY/HR  22/16       22/16        22/16        30/ 1

MAY   SUM    11.011      961.959      961.959     1701.129 CMP  0    0   23   31   57   76   22    2    0    0    0   211
      PEAK    78.657       7.146        7.146        2.286 FAN  0    0    0    0    0    0    0    0    0    0  211   211
      DAY/HR  29/17       29/16        29/16        31/ 1

JUN   SUM    12.232     1066.793     1066.793     1646.253 CMP  0    0   25   33   71   72   30    2    0    0    0   233
      PEAK    78.545       7.113        7.113        2.286 FAN  0    0    0    0    0    0    0    0    0    0  233   233
      DAY/HR  20/17       20/17        20/17        30/ 1

JUL   SUM    18.125     1610.477     1610.477     1701.129 CMP  0    0   52   46   82   85   71    9    0    0    0   345
      PEAK    80.497       7.844        7.844        2.286 FAN  0    0    0    0    0    0    0    0    0    0  345   345
      DAY/HR  10/17       10/17        10/17        31/ 1

AUG   SUM    20.744     1891.062     1891.062     1701.129 CMP  0    0   77   56   61   88   84   27    3    2    0   398
      PEAK    93.582      10.261       10.261        2.286 FAN  0    0    0    0    0    0    0    0    0    0  398   398
      DAY/HR  31/17       31/15        31/15        31/ 1

SEP   SUM    16.612     1492.149     1492.149     1646.253 CMP  0    0   56   51   66   92   56    4    0    0    0   325
      PEAK    78.350       7.418        7.418        2.286 FAN  0    0    0    0    0    0    0    0    0    0  325   325
      DAY/HR   7/17        7/16         7/16        30/ 1

OCT   SUM     9.943      880.284      879.984     1701.129 CMP  0    0   42   42   65   56   10    0    0    0    0   215
      PEAK    74.318       6.866        6.866        2.286 FAN  0    0    0    0    0    0    0    0    0    0  215   215
      DAY/HR   1/16        1/15         1/15        31/24

NOV   SUM     4.618      406.664      405.214     1646.253 CMP  0    0   21   25   56    6    0    0    0    0    0   108
      PEAK    58.215       5.316        5.316        2.286 FAN  0    0    0    0    0    0    0    0    0    0  108   108
      DAY/HR  29/15       29/15        29/15        30/24

DEC   SUM     2.950      277.788      269.190     1701.129 CMP  0    0   24   21   26    6    0    0    0    0    0    77
      PEAK    62.773       6.122        6.122        2.286 FAN  0    0    0    0    0    0    0    0    0    0   77    77
      DAY/HR  19/15       19/15        19/15        31/24

YR    SUM   106.208     9476.502     9453.041    20029.475 CMP  0    0  365  341  561  540  278   44    3    2    0  2134
      PEAK    93.582      10.261       10.261        2.286 FAN  0    0    0    0    0    0    0    0    0    0 2134  2134
      MON/DAY  8/31        8/31         8/31        12/31
```

SS-Q Heat Pump Cooling/Heating Summary for <system name>

Two reports, one for cooling operation and one for heating operation, are produced for each system that contains an electric or gas heat pump. These reports are provided for each PSZ, PVAVS, RESYS, RESVVT and PTAC system if SS-A is requested.

UNIT RUN TIME

is the total run time for all the gas heat pumps or the sum of the hourly part load ratios for all the electric heat pumps in the system. If a system serves several zones, each of which has a separate heat pump, the run time is the total run time of all the heat pumps. For example, if, in a particular hour, each of the heat pumps in three zones runs for 0.5 hours, then UNIT RUN TIME is incremented by 3 x 0.5 = 1.5.

TOTAL LOAD ON UNIT

is the total load on all the units (including the defrost load for heat pumps in the heating mode) in the system.

ENERGY INTO UNIT

is the electric or fuel energy into all of the units to provide heating or cooling. Does not include auxiliaries for the unit except those included in the base EIR or HIR.

AUXILIARY ENERGY

is the energy for outdoor fans, evaporative precoolers, auxiliary electrical, or pumps for the units.

SUP UNIT LOAD

is the total load on the supplemental heating units. This includes time when the supplemental unit is operating alone or in conjunction with the heat pump.

SUP UNIT ENERGY

is the energy into the supplemental heating units.

WASTE HEAT GENERATED

is the recoverable waste heat generated by the units.

WASTE HEAT USE

is the amount of waste heat used to meet the domestic hot water loads.

DEFROST LOAD

for heating summary only, is the heating load imposed when running in defrost mode.

INDOOR FAN ENERGY

is the electric consumption of the indoor fans.

CSPF (WITH PARASITICS) and CSPF (WITHOUT PARASITICS), or HSPF (WITH PARASITICS) and HSPF (WITHOUT PARASITICS)

are the cooling and heating season performance factors, respectively, as computed with and without parasitics. The value without parasitics is the total load (main and supplemental) divided by the total energy consumed (main plus supplemental). The value with parasitics adds all the auxiliaries (pumps, fans, etc.) to the energy consumed and subtracts the indoor fan heat from the load (which increases heating load and decreases cooling load).

REPORT- SS-Q Heat Pump Cooling Summary for System 1   WEATHER FILE- LOS ANGELES, CA

	UNIT RUN TIME (HOURS)	TOTAL LOAD ON UNIT (MBTU)	ENERGY IN TO UNIT (MBTU)	AUXILIARY ENERGY (MBTU)	SUP UNIT LOAD (MBTU)	SUP UNIT ENERGY (MBTU)	WASTE HEAT GENERATED (MBTU)	WASTE HEAT USE (MBTU)		INDOOR FAN ENERGY (MBTU)
JAN	15.	1.527	0.463	0.018	0.000	0.000	0.000	0.000	0.000	1.545
FEB	10.	1.050	0.314	0.014	0.000	0.000	0.000	0.000	0.000	1.440
MAR	19.	2.074	0.613	0.012	0.000	0.000	0.000	0.000	0.000	1.744
APR	50.	5.323	1.600	0.001	0.000	0.000	0.000	0.000	0.000	2.185
MAY	100.	11.011	3.283	0.000	0.000	0.000	0.000	0.000	0.000	2.969
JUN	110.	12.232	3.641	0.000	0.000	0.000	0.000	0.000	0.000	3.192
JUL	166.	18.125	5.497	0.000	0.000	0.000	0.000	0.000	0.000	4.042
AUG	193.	20.744	6.454	0.000	0.000	0.000	0.000	0.000	0.000	4.272
SEP	152.	16.612	5.093	0.000	0.000	0.000	0.000	0.000	0.000	3.703
OCT	92.	9.943	3.003	0.001	0.000	0.000	0.000	0.000	0.000	2.903
NOV	42.	4.618	1.383	0.005	0.000	0.000	0.000	0.000	0.000	1.927
DEC	28.	2.950	0.919	0.029	0.000	0.000	0.000	0.000	0.000	1.810
0ANNUAL	978.	106.208	32.263	0.080	0.000	0.000	0.000	0.000	0.000	31.733

CSPF (WITH PARASITICS)   =   1.66 (KBTU/HR)
CSPF (WITHOUT PARASITICS) =   3.29 (BTU/BTU)

SS-R Zone Performance Summary for <system name>

This report has been added to provide information on the part-load performance of VAV boxes in zones as well as to identify those zones that influence the WARMEST and COLDEST supply air reset controls.

ZONE OF MAXIMUM HTG DMND

is the number of hours this zone has the highest heating demand of all the zones.

ZONE OF MAXIMUM CLG DMND

is the number of hours this zone has the highest cooling demand of all the zones.

ZONE UNDER HEATED

is the number of hours that the zone is being conditioned and the zone air temperature is below the heating thermostat throttling range.

ZONE UNDER COOLED

is the number of hours that the zone is being conditioned and the zone air temperature is above the cooling thermostat throttling range.

Number of hours in each PART LOAD range

is the number of hours the airflow part load ratio was in each bin, where the airflow part load ratio is defined as the hourly flow divided by the design flow as reported in SV-A

TOTAL RUN HOURS

is the total number of hours in which there was a non-zero airflow into the zone.

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum         DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- SS-R Zone Performance Summary for   SYST-1                                       WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------


                ZONE OF  ZONE OF   ZONE     ZONE     -------- Number of hours within each PART LOAD range  --------- TOTAL
                MAXIMUM  MAXIMUM   UNDER    UNDER     00    10    20    30    40    50    60    70    80    90   100    RUN
                HTG DMND CLG DMND  HEATED   COOLED    10    20    30    40    50    60    70    80    90   100    +    HOURS
 ZONE           (HOURS)  (HOURS)  (HOURS)  (HOURS)
 ---------------- -------- -------- -------- --------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
 ZONE1-1
                     0        0       17        0        0    0    0 2684  322  172   63    3    0    0    0 3244
 ZONE2-1
                     0        0       17        0        0    0    0 2688  388  119   42    6    1    0    0 3244
 ZONE3-1
                     0        0       21        0        0    0    0 2522  360  272   75   13    0    2    0 3244
 ZONE4-1
                     0        0       35        0        0    0    0 2880  261   83   17    3    0    0    0 3244
 ZONE5-1
                     0        0       31       12        0    0    0 2263  199  353  216   93   36   84    0 3244

                 -------- -------- -------- --------
          TOTAL       0        0      121       12
```

SUPL Evap/ Desiccant Cooling for \<system name\>

This report is printed for each system that has a desiccant or evaporative cooling unit to supplement the mechanical cooling. These are systems for which the user has specified DESICCANT = LIQ-VENT-AIR-1, LIQ-VENT-AIR-2, or SOL-VENT-AIR-1; or EVAP-CL-TYPE = INDIRECT or INDIRECT-DIRECT. This report will not be printed for stand-alone desiccant or evaporative cooling systems (SYSTEM:TYPE = PTGSD or EVAP-COOL). In this case the usual SYSTEMS reports are used.

TOTAL COOLING ENERGY

is the monthly sum of the energy (sensible and latent) removed by the supplemental unit from the supply air before it reaches the cooling coil.

SENSIBLE COOLING ENERGY

is the monthly sum of the sensible energy removed by the supplemental unit.

LATENT COOLING ENERGY

is the monthly sum of the latent energy removed by the supplemental unit.

HOURS ON

is the total number of hours the unit was operating during the month.

ELECTRIC ENERGY

is the monthly electrical consumption by the supplemental unit.

GAS OIL ENERGY

is the fuel consumed by the supplemental unit for the month.

```
SMALL BAR/LOUGE                         DEMO DESICCANT & EVAPORATIVE COOLING    DOE-2.1E-092  Wed Oct  8 16:41:48 1997SDL RUN  2
NEW FEATURES IN DOE2.1E RUN 2           SYSTEM 2: PKG ROOFTOP PSZ AC UNIT       DESICCANT COOLING OF MIN OA
REPORT- SUPL  SYSTEM SUPPLEMENTAL EVAPORATIVE OR DESICCANT COOLING FOR  SYS1                 WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------

               TOTAL        SENSIBLE        LATENT
              COOLING        COOLING        COOLING
              ENERGY         ENERGY         ENERGY       HOURS      ELECTRIC       GAS OIL
    MONTH     (MBTU)         (MBTU)         (MBTU)        ON         ENERGY        ENERGY
                                                                    (KWH)         (MBTU)

    JAN       0.00000        0.00000        0.00000        0           0.         0.00000
    FEB       0.00000        0.00000        0.00000        0           0.         0.00000
    MAR       0.44183        0.12643        0.31541       29          17.         1.15190
    APR       2.96209        1.60152        1.36056      204         116.         6.79351
    MAY       3.90973        0.96668        2.94304      249         144.         9.95194
    JUN       8.92682        2.58435        6.34247      533         307.        20.52970
    JUL      13.88187        0.88956       12.99232      705         411.        31.03108
    AUG      12.53177        0.90114       11.63064      671         391.        29.44838
    SEP       5.70114        2.40156        3.29958      360         205.        12.66627
    OCT       3.29700        1.76097        1.53603      226         128.         7.46790
    NOV       0.52543        0.22485        0.30058       34          19.         1.22540
    DEC       0.00000        0.00000        0.00000        0           0.         0.00000
             ----------     ----------     ----------    ----       ----------    ----------
    TOTAL    52.17781       11.45708       40.72067     3011        1739.       120.26609
```

ERV Energy Recovery Summary for <system name>

This report is printed for each system that has an energy recovery ventilator (ERV) that acts as a heat-recovery device between the the central exhaust and the outside air makeup. These are systems for which the user has specified RECOVER-EXHAUST = YES. The first set of items are design information:

AIRFLOW

is the design airflow of the outdoor, exhaust, and purge airstreams.

POWER CONSUMPTION

for ERVs with self-contained fans, is the electric energy used by the outside and exhaust fans. For heat wheels, is also the energy used by the motor that rotates the wheel.

PREHEAT

is the capacity of the preheat coil, if any. Note that this preheat coil is not the same as the air-handler's preheat coil. This coil is used strictly to prevent frosting in the exhaust airstream.

The next set of items summarize performance:

SENSIBLE HEATING, COOLING

is the sensible heating and cooling energy recovered.

TOTAL HEATING, COOLING

is the total heating and cooling energy recovered, including latent.

EXCESS SENSIBLE HEATING, COOLING

is the sensible heating and cooling energy recovered that is beyond that needed, and that results in overheating or overcooling of the mixed air.

POWER FANS&HX

is the power of the fans and heat-wheel motor. If the ERV does not have self-contained fans, but instead relies upon the HVAC fans, this entry includes the HVAC fan energy penalty associated with the increased static pressure loss across the heat exchanger. *Note that other reports for HVAC fan energy do not include this penalty.*

PREHEAT HOT WATER, ELECTRIC

is the preheat energy used to prevent condensation and/or frost build-up within the heat exchanger.

HOURS HEAT, COOL

is the number of hours the ERV was operating in the heating mode (raising the mixed-air temperature), and in the cooling mode (lowering the mixed-air temperature). Note that, depending on the manner in which the ERV is controlled, the ERV may be in the heating mode while the air handler is in the cooling mode (using its cooling coil to lower the supply temperature). The opposite is also true.

EXHAUST OUTLET WET, FROSTED

is the number of hours the exhaust air was cooled to the point where condensation or frost developed on the heat exchanger. For an enthalpy exchanger, moisture exchange may be contributing to this process.

MAKE-UP OUTLET WET, FROSTED

is the number of hours the outside air outlet was cooled to the point where condensation or frost developed on the heat exchanger. For an enthalpy exchanger, moisture exchange may be contributing to this process.

CONDENSATE CONTROL

is the number of hours that one of the condensate control mechanisms was active (preheat, outside-air bypass, or exhaust bypass).

ERV Example Report   DOE-2.2-42h   12/15/2003   16:44:20 BDL RUN 1

REPORT- ERV Energy Recovery Summary for: AHU-1   WEATHER FILE- Chicago   IL TMY2

```
------------ AIR FLOW ------------  -------- POWER CONSUMPTION -------   ----------
 OUTDOOR     EXHAUST      PURGE      OA FAN      EXH FAN     HT EXCH     PREHEAT
 (CFM )      (CFM )       (CFM )     (KW)        (KW)        (KW)        (KBTU/HR)
----------  ----------  ----------  ----------  ----------  ----------  ----------

    624.        624.         0.        0.191       0.191       0.053        0.
```

		------ SENSIBLE ------		-------- TOTAL -------		--- EXCESS SENSIBLE --		-- POWER -	------- PREHEAT ------		-- HOURS -	
		HEATING	COOLING	HEATING	COOLING	HEATING	COOLING	FANS&HX	HOT WATER	ELECTRIC	HEAT	COOL
	SUM	(MBTU)	(MBTU)	(MBTU)	(MBTU)	(MBTU)	(MBTU)	(KWH)	(MBTU)	(KWH)		
MON	PEAK	(KBTU/HR)	(KBTU/HR)	(KBTU/HR)	(KBTU/HR)	(KBTU/HR)	(KBTU/HR)	(KW)	(KBTU/HR)	(KW)		
JAN	SUM	-1.447	0.000	-1.972	0.000	0.000	0.000	69.166	0.000	0.000	172	0
	PEAK	-25.585	0.000	-38.649	0.000	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	27/18	0/ 0	27/18	0/ 0	0/ 0	0/ 0	2/13	0/ 0	0/ 0		
FEB	SUM	-0.407	0.000	-0.482	0.000	0.000	0.000	45.812	0.000	0.000	116	0
	PEAK	-18.563	0.000	-18.651	0.000	0.000	0.000	0.424	0.000	0.000		
	DAY/HR	8/ 9	0/ 0	8/ 9	0/ 0	0/ 0	0/ 0	1/ 9	0/ 0	0/ 0		
MAR	SUM	-0.045	0.011	-0.052	0.003	0.000	0.000	20.515	0.000	0.000	49	3
	PEAK	-12.904	4.618	-13.329	2.515	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	3/ 9	31/14	3/ 9	31/14	0/ 0	0/ 0	14/11	0/ 0	0/ 0		
APR	SUM	-0.044	0.010	-0.095	0.002	0.000	0.000	25.705	0.000	0.000	61	4
	PEAK	-5.095	3.125	-9.051	2.331	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	1/11	7/14	18/18	3/14	0/ 0	0/ 0	1/11	0/ 0	0/ 0		
MAY	SUM	-0.050	0.169	-0.117	0.116	0.000	0.000	34.665	0.000	0.000	47	37
	PEAK	-5.576	7.531	-8.621	16.570	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	15/11	5/14	13/16	30/18	0/ 0	0/ 0	3/12	0/ 0	0/ 0		
JUN	SUM	-0.007	0.439	-0.011	0.937	0.000	0.000	37.718	0.000	0.000	3	84
	PEAK	-3.483	7.717	-6.020	24.328	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	24/11	6/17	24/11	20/15	0/ 0	0/ 0	3/13	0/ 0	0/ 0		
JUL	SUM	0.000	0.633	0.000	1.711	0.000	0.000	43.884	0.000	0.000	0	101
	PEAK	0.000	10.188	0.000	26.274	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	0/ 0	9/17	0/ 0	2/15	0/ 0	0/ 0	1/11	0/ 0	0/ 0		
AUG	SUM	-0.001	0.276	0.000	1.010	0.000	0.000	29.463	0.000	0.000	2	66
	PEAK	-0.937	6.194	-0.343	31.642	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	19/ 9	21/15	19/ 9	4/17	0/ 0	0/ 0	1/13	0/ 0	0/ 0		
SEP	SUM	-0.019	0.149	-0.030	0.249	0.000	0.000	22.103	0.000	0.000	23	30
	PEAK	-4.313	7.966	-7.154	14.486	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	30/11	27/17	30/11	6/14	0/ 0	0/ 0	4/14	0/ 0	0/ 0		
OCT	SUM	-0.104	0.007	-0.174	0.008	0.000	0.000	34.130	0.000	0.000	84	2
	PEAK	-7.651	3.746	-12.112	4.233	0.000	0.000	0.434	0.000	0.000		
	DAY/HR	15/11	4/16	15/11	4/16	0/ 0	0/ 0	4/15	0/ 0	0/ 0		
NOV	SUM	-0.048	0.000	-0.076	0.000	0.000	0.000	25.519	0.000	0.000	65	0
	PEAK	-4.145	0.000	-7.031	0.000	0.000	0.000	0.399	0.000	0.000		
	DAY/HR	13/11	0/ 0	13/11	0/ 0	0/ 0	0/ 0	26/13	0/ 0	0/ 0		

PowerDOE Default Minimum Project   DOE-2.2-42h   12/15/2003   16:44:20 BDL RUN 1

REPORT- ERV Energy Recovery Summary for: VAV AH#1   WEATHER FILE- Chicago   IL TMY2
--(CONTINUED)--------

DEC	SUM	-0.397	0.000	-0.470	0.000	0.000	0.000	39.035	0.000	0.000	99	0
	PEAK	-28.248	0.000	-31.666	0.000	0.000	0.000	0.418	0.000	0.000		
	DAY/HR	31/ 9	0/ 0	31/11	0/ 0	0/ 0	0/ 0	31/ 9	0/ 0	0/ 0		
		=========	=========	=========	=========	=========	=========	=========	=========	=========	====	====
YR	SUM	-2.569	1.693	-3.479	4.035	0.000	0.000	427.715	0.000	0.000	721	327
	PEAK	-28.248	10.188	-38.649	31.642	0.000	0.000	0.434	0.000	0.000		
	MON/DAY	12/31	7/ 9	1/27	8/ 4	0/ 0	0/ 0	1/ 2	0/ 0	0/ 0		

```
                   --- EXHAUST OUTLET ---  --- MAKE-UP OUTLET ---  CONDENSATE
                     WET        FROSTED      WET        FROSTED     CONTROL
                   ----------  ----------  ----------  ----------  ----------
ANNUAL HOURS:           0           4           0           3           7
```

REFG Refrigeration Equipment Summary in <system name>

This report gives monthly energy use for each system in which there is refrigerated case work.

ZONAL SENSIBLE ENERGY

is the sensible heat gain to the zone from the refrigerated case work.

ZONAL LATENT ENERGY

is the latent heat gain to the zone from the refrigerated case work.

CONDENSER RECOVERED ENERGY

is the energy recovered from the condensers and used for space heating in the heat recovery mode.

CONDENSER REJECTED ENERGY

is the energy rejected from the condensers.

ELECTRIC COMPRESSOR ENERGY

is the electrical energy consumed by the compressors.

ELECTRIC DEFROST ENERGY

is the electrical energy consumed by the defrosters.

ELECTRIC AUXILIARY ENERGY

is the electrical energy consumed by lights, fans, and anti-sweat heaters in the refrigerated cases.

ELECTRIC TOTAL ENERGY

is the total electric energy used by the refrigerated case work.

```
OFFICE BUILDING & DELI/RESTAURANT      ELECTROCHROMIC GLAZING IN ATRIUM     DOE-2.1E-092  Wed Oct  8 16:27:41 1997SDL RUN  3
VAV SYSTEM IN OFFICE & PSZ IN ATRIUM   GAS ENGINE DRIVEN CHILLER & HEAT RECY   SAMP3.INP  RUN 3
REPORT- REFG  REFRIGERATION EQUIPMENT SUMMARY IN     FS-SYS1       FOR ATZ1               WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------
          - - -  Z O N A L  - - -     -  C O N D E N S E R  -     - - - - - - - - - E L E C T R I C - - - - - - - - -

          SENSIBLE      LATENT       RECOVERED     REJECTED      COMPRESSOR      DEFROST     AUXILIARY         TOTAL
          ENERGY        ENERGY       ENERGY        ENERGY        ENERGY          ENERGY      ENERGY            ENERGY
  MONTH   (MBTU)        (MBTU)       (MBTU)        (MBTU)        (KWH)           (KWH)       (KWH)             (KWH)
  JAN     -8.044        -0.205        6.872         8.454        1793.721         35.586      424.873          2254.171
  FEB     -7.333        -0.139        6.118         7.759        1623.323         28.050      363.958          2015.326
  MAR     -8.388        -0.384        6.356         9.848        1876.455         58.974      507.071          2442.493
  APR     -8.317        -0.608        2.966        13.260        1837.378         84.105      515.206          2436.680
  MAY     -8.497        -0.895        1.886        15.085        1908.137        115.087      521.514          2544.724
  JUN     -8.742        -1.101        0.099        17.615        1980.749        136.389      516.831          2633.956
  JUL     -9.068        -1.266        0.000        18.899        2173.137        154.434      528.234          2855.792
  AUG     -9.032        -1.291        0.000        18.752        2132.244        157.062      528.234          2817.528
  SEP     -8.495        -0.887        0.678        16.155        1874.964        113.648      510.110          2498.710
  OCT     -8.406        -0.701        2.733        13.758        1860.607         94.491      520.973          2476.060
  NOV     -7.877        -0.458        5.338         9.977        1763.958         67.666      481.192          2312.804
  DEC     -8.047        -0.262        6.928         8.507        1806.185         46.456      467.373          2320.006
          ---------     ---------    ---------     ---------     ----------      ---------   ---------         ----------

  TOTAL   -100.245      -8.196        39.975       158.068       22630.859       1091.948    5885.571          29608.250
```

PLANT REPORTS

PV-A Plant Design Parameters

This report summarizes the design information for each component simulated in the central plant(s)

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system      Show All Reports
REPORT- PV-A Plant Design Parameters                                        WEATHER FILE- TRY  CHICAGO
---------------------------------------------------------------------------------------------------------------------

    *** CIRCULATION LOOPS ***

       HEATING     COOLING      LOOP        TOTAL       SUPPLY      SUPPLY      RETURN      RETURN      LOOP      FLUID HEAT
       CAPACITY    CAPACITY     FLOW        HEAD      UA PRODUCT   LOSS DT    UA PRODUCT   LOSS DT     VOLUME     CAPACITY
      (MBTU/HR)   (MBTU/HR) (GAL/MIN   )    (FT)      (BTU/HR-F)     (F)      (BTU/HR-F)     (F)      ( GAL )    (BTU/LB-F)
      ----------  ---------- ----------  ----------  ----------  ----------  ----------  ----------  ----------  ----------

    Heating-Loop
         -0.430      0.000       21.5        36.6        0.0        0.00         0.0        0.00        32.3        1.00

    Cooling-Loop
          0.000      0.244       48.2        56.6        0.0        0.00         0.0        0.00        72.3        1.00

    *** PUMPS ***                                             HEAD       CAPACITY                  MECHANICAL    MOTOR
                                           FLOW       HEAD   SETPOINT     CONTROL       POWER     EFFICIENCY   EFFICIENCY
                 ATTACHED TO            (GAL/MIN   )   (FT)     (FT)                     (KW)        (FRAC)       (FRAC)
      --------------------------------  ----------  ---------- ----------  ----------  ----------  ----------  ----------

    Heating-Pump                1 PUMP(s)
       Heating-Loop                        21.5        43.9        0.0     ONE-SPEED      0.331       0.770        0.700
       PRIMARY LOOP

    Cooling-Pump                1 PUMP(s)
       Cooling-Loop                        48.2        67.9        0.0     ONE-SPEED      1.001       0.770        0.800
       PRIMARY LOOP

    *** PRIMARY EQUIPMENT ***                         CAPACITY     FLOW         EIR         HIR      AUXILIARY
       EQUIPMENT TYPE            ATTACHED TO          (MBTU/HR) (GAL/MIN   )   (FRAC)      (FRAC)       (KW)
      ----------------  --------------------------------  ----------  ----------  ----------  ----------  ----------

    Boiler-1
      HW-BOILER        Heating-Loop                      -0.430       21.5        0.000       1.250       0.000

    Chiller-1
      ELEC-HERM-REC    Cooling-Loop                       0.244       48.7        0.274       0.000       0.000
```

Circulation-Loops

For each circulation loop simulated, the report lists the loop's U-name, and:

HEATING CAPACITY

reports the non-coincident heating capacity. Depending on the value of the loop's SIZING-OPTION, the value represents either the sum of all loop demanders (SECONDARY), or loop suppliers (PRIMARY).

COOLING CAPACITY

reports the non-coincident heating capacity. Depending on the value of the loop's SIZING-OPTION, the value represents either the sum of all loop demanders (SECONDARY), or loop suppliers (PRIMARY).

LOOP FLOW

is the flow at the larger of the HEATING-CAPACITY or COOLING-CAPACITY, at the design loop temperature change.

TOTAL HEAD

is the sum of the maximum demander head (friction and static), the piping head (friction and static), and maximum primary equipment heat (friction and static).

SUPPLY UA PRODUCT

is the loss coefficient of the supply piping.

SUPPLY LOSS DT

is the design temperature change of the supply piping due to thermal losses.

RETURN UA PRODUCT

is the loss coefficient of the return piping.

RETURN LOSS DT

is the design temperature change of the return piping due to thermal losses.

LOOP VOLUME

is the volume of fluid within the circulation loop

FLUID HEAT CAPACITY

is the heat capacity of the fluid within the circulation loop – used to calculate the thermal effect of a change in supply/return temperature.

Pumps

For each pump simulated, the report lists the pump's U-name, the number of identical pumps, and:

ATTACHED TO

lists the U-Name of the circulation loop or the primary equipment unit (boiler, chiller, etc.) to which this pump is attached. Also listed is the function of the pump.

FLOW

is the design flow of the pump,

HEAD

is the design head of the pump

HEAD SETPOINT

is the user-specified head setpoint for the pump; should be non-zero only if a loop is powered by more than one pump attached to equipment (instead of directly to the loop), and the pumps must operate at different heads.

CAPACITY CONTROL

specifies the capacity control mechanism for the pump. ONE-SPEED implies that the pump simply rides its curve. TWO-SPEED implies that the pump has two-speeds, but will also ride its curve as required at a given speed. If more that one pump is specified, pumps will also stage.

POWER

is the design electrical power of the pump.

MECHANICAL EFFICIENCY

is the mechanical efficiency of the impeller.

MOTOR EFFICIENCY

is the efficiency of the pump's motor.

Primary Equipment

For each boiler or chiller simulated, the report lists the component's U-name, and:

EQUIPMENT TYPE

lists the type of equipment which is identical to the TYPE code-word originally specified by the user.

ATTACHED TO

lists the circulation-loop(s) to which the equipment is attached. If a component is attached to more than one loop, each loop will be listed.

CAPACITY

is the nominal supply capacity or demand load of the equipment, relative to the loop(s) to which it is attached. For example, an absorption chiller has a given capacity it can supply to a chilled-water loop, a demand on a hot-water loop, and an additional demand on a condenser-water loop.

FLOW

is the nominal flow of the component on the given attachment.

EIR

is the electric input ratio.

HIR

is the heat input ratio

AUXILIARY

is any auxiliary power required by the component.

PS-A Plant Energy Utilization

This report shows monthly site energy use and demand for the central plant disaggregated into various categories. It also gives the total source energy. Thermal quantities are given in MBtu (English) or MWh (metric). Electrical quantities are given in MWh.

TOTAL HEAT LOAD

Total heating energy that the plant must provide. It is calculated as load from SYSTEMS + load from PLANT (absorption chillers + steam turbines + heat dissipated from storage tanks + domestic hot water + heat stored in tanks but not used) + circulation loop losses. The values here are identical to those under HEATING ENERGY in the SS-D report (Building HVAC Load Summary) except that the heat energy delivered to an absorption chiller, steam turbine, domestic hot water, circulation-loop thermal losses, and pump heat is included. Also included is the heat input to a storage tank from a boiler.

TOTAL COOLING LOAD

Total cooling energy that the plant must provide. It is equal to the value shown under COOLING ENERGY in the SS-D report plus tank and circulation loop losses, and pump heat.

TOTAL ELECTR LOAD

Total electrical energy consumed by lights, equipment and system fans plus the additional energy consumed by chiller motors, pumps, cooling towers, and any other electrical site use.

RECVRED ENERGY

Recovered heat used to reduce heating loads. It includes waste heat from turbines, diesels and chillers. It does not include the superheat of DX units recovered directly to domestic water heaters.

WASTED RECVRABL ENERGY

Heat that could have been recovered if had there been a need for it.

FUEL INPUT COOLING

Fuel used to drive engine chillers and gas fired absorption chiller/heaters, and regeneration fuel for desiccant cooling systems.

ELEC INPUT COOLING

Electric energy used to drive chillers and to supply power to heat rejection equipment. It excludes pumps.

FUEL INPUT HEATING

Fuel used for heating by boilers, furnaces and domestic water heaters.

ELEC INPUT HEATING

Electrical energy used in association with supplying heating, including the electrical consumption by draft fans, electric boilers and electric domestic water heaters. It excludes pumps.

FUEL INPUT ELEC

Fuel used by diesel and gas turbine generators.

TOTAL FUEL INPUT

Total fuel use.

TOTAL SITE ENERGY

The sum of purchased fuel, electricity, chilled water and steam.

TOTAL SOURCE ENERGY

The energy used at the source. For each ELEC-METER, FUEL-METER, etc., the energy consumption at the site is divided by the corresponding SOURCE-SITE-EFF to arrive at the energy consumed and transmitted by the generating station; the results are summed. To avoid double-counting energy, submeters are excluded in this calculation.

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system      Show All Reports
REPORT- PS-A Plant Energy Utilization                                                      WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------

                                                                                                                *
                                                 S I T E   E N E R G Y                                          *   SOURCE
                                                                                                                *
            2        3        4        5        6        7        8        9       10       11       12       13 *    14
                                                                                                                *
          TOTAL    TOTAL    TOTAL             WASTED   FUEL     ELEC     FUEL     ELEC     FUEL    TOTAL    TOTAL  *  TOTAL
          HEAT    COOLING   ELECTR   RCVRED  RCVRABL   INPUT    INPUT    INPUT    INPUT    INPUT    FUEL    SITE   * SOURCE
          LOAD     LOAD     LOAD    ENERGY   ENERGY   COOLING  COOLING  HEATING  HEATING  ELECT    INPUT   ENERGY * ENERGY
  MONTH  (MBTU)   (MBTU)   (MWH)    (MBTU)   (MBTU)   (MBTU)   (MWH)    (MBTU)   (MWH)    (MBTU)   (MBTU)  (MBTU)  * (MBTU)
  -----  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  ------- * -------
                                                                                                                *
   JAN    -33.9      0.0      3.5      0.0      0.0      0.0      0.0     58.8      0.0      0.0     58.8     70.7 *    94.5
                                                                                                                *
   FEB    -26.2      0.0      3.1      0.0      0.0      0.0      0.0     47.1      0.0      0.0     47.1     57.6 *    78.4
                                                                                                                *
   MAR    -14.0      0.3      3.3      0.0      0.0      0.0      0.0     27.0      0.0      0.0     27.0     38.2 *    60.5
                                                                                                                *
   APR     -2.9      2.4      3.6      0.0      0.0      0.0      0.3      7.4      0.0      0.0      7.4     19.6 *    44.0
                                                                                                                *
   MAY     -0.3      6.1      3.9      0.0      0.0      0.0      0.6      1.4      0.0      0.0      1.4     14.8 *    41.5
                                                                                                                *
   JUN      0.0     14.3      4.9      0.0      0.0      0.0      1.4      0.0      0.0      0.0      0.0     16.6 *    49.8
                                                                                                                *
   JUL      0.0     27.2      6.4      0.0      0.0      0.0      2.6      0.0      0.0      0.0      0.0     21.7 *    65.2
                                                                                                                *
   AUG      0.0     21.1      5.6      0.0      0.0      0.0      2.0      0.0      0.0      0.0      0.0     19.1 *    57.3
                                                                                                                *
   SEP     -0.2      9.8      4.3      0.0      0.0      0.0      1.0      0.7      0.0      0.0      0.7     15.4 *    45.0
                                                                                                                *
   OCT     -2.5      3.2      3.7      0.0      0.0      0.0      0.4      6.6      0.0      0.0      6.6     19.3 *    44.7
                                                                                                                *
   NOV    -11.2      0.0      2.9      0.0      0.0      0.0      0.0     22.5      0.0      0.0     22.5     32.3 *    52.0
                                                                                                                *
   DEC    -24.8      0.0      3.4      0.0      0.0      0.0      0.0     45.3      0.0      0.0     45.3     57.0 *    80.5
                                                                                                                *
         =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ======= * =======
  TOTAL  -116.0     84.3     48.5      0.0      0.0      0.0      8.4    216.8      0.0      0.0    216.8    382.3 *   713.3
```

PS-B Utility and Fuel Use Summary

This report shows the monthly total consumption and peak hourly consumption (and associated time of occurrence) for all of the electric meters, fuel meters, etc., including submeters.

Usage is displayed in the actual units of consumption (kWh, therms, etc.).

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- PS-B Utility and Fuel Use Summary                                        WEATHER FILE- TRY  CHICAGO
---------------------------------------------------------------------------------------------------------------------

                 JAN     FEB     MAR     APR     MAY     JUN     JUL     AUG     SEP     OCT     NOV     DEC    TOTAL
               ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- -------

  EM1  ELECTRICITY
KWH             3482.   3061.   3272.   3574.   3919.   4864.   6367.   5592.   4333.   3721.   2878.   3435.  48498.
MAX KW           13.1    13.1    17.5    22.7    26.9    30.4    35.0    29.7    27.6    18.9    13.1    13.1    35.0
DAY/HR          13/11   24/11    3/15   28/15   21/14   20/16   14/14   19/16   11/15   31/15   17/11   22/11    7/14

FUEL NATURAL-GAS
THERM            588.    471.    270.     74.     14.      0.      0.      0.      7.     66.    225.    453.   2168.
MAX THERM/HR      4.0     3.7     3.8     2.8     1.9     0.0     0.0     0.0     1.9     2.9     3.5     3.8     4.0
DAY/HR           2/ 8    4/ 8   24/ 8    8/ 8    9/ 8    0/ 0    0/ 0    0/ 0   23/ 8   20/ 8   12/ 8   10/ 8    1/ 2
```

PS-C Equipment Loads and Energy Use

For each central plant component, this report lists the unit's yearly heating and/or cooling load, the electrical and fuel consumption, and performance information in a bin format. This report is for the central plant equipment comonents only; report PS-D summarizes the performance of circulation loops.

Bin information is presented in terms of the number of hours the load, fuel consumption, etc. fell into the appropriate part load bin. The part load is calculated in terms of the hourly load divided by the design capacity or consumption.

COOL LOAD

is the total cooling load placed on the component during the run. For cooling towers, the cooling load is the heat-rejection load.

HEAT LOAD

is the total heating load placed on the component during the run.

ELEC USED

is the total electrical demand of the component during the run.

FUEL USED

is the total fuel demand of the component during the run. For consistency across components, fuel consumption is reported in Btu's rather than units of consumption, unlike the meter-based reports.

```
Simple Structure Run 3, Chicago          Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system          Show All Reports
REPORT- PS-C Equipment Loads and Energy Use                                            WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------------


            COOL LOAD   HEAT LOAD   ELEC USE    FUEL USE     ----  Number of hours within each PART LOAD range  ----  TOTAL
        SUM  (MBTU)      (MBTU)      (KWH)       (MBTU)       00   10   20   30   40   50   60   70   80   90   100   RUN
MON    PEAK  (KBTU/HR)   (KBTU/HR)   (KW)        (KBTU/HR)    10   20   30   40   50   60   70   80   90  100    +   HOURS
---    ----  ----------  ----------  ----------  ----------   ----  ---  ---  ---  ---  ---  ---  ---  ---  ---  ----  ----

Boiler-1
        SUM               -116.0                  216.8 LOAD 713  765  235   50   41   30   13    0    0    0    0  1847
       PEAK               -299.2                  396.5 FUEL 231  741  568  177   35   46   45    4    0    0    0  1847
     MON/DAY                1/ 2                    1/ 2

Chiller-1
        SUM    84.3                   8439.4             LOAD 166  234  195  198  161   98   40   26    1    0    0  1119
       PEAK   201.3                     18.9             ELEC   0  199  222  212  183  153   85   41   23    1    0  1119
     MON/DAY   7/14                     7/14

Heating-Pump
        SUM                            713.3             FLOW   0    0    0    0    0    0    0    0    0    0 2158  2158
       PEAK                              0.3              RPM   0    0    0    0    0    0    0    0    0    0 2158  2158
     MON/DAY                            1/ 1             ELEC   0    0    0    0    0    0    0    0    0    0 2158  2158

Cooling-Pump
        SUM                           1119.8             FLOW   0    0    0    0    0    0    0    0    0    0 1119  1119
       PEAK                              1.0              RPM   0    0    0    0    0    0    0    0    0    0 1119  1119
     MON/DAY                            3/ 3             ELEC   0    0    0    0    0    0    0    0    0    0 1119  1119
```

PS-D Circulation Loop Loads

This report summarizes the performance of all the circulation-loops. Only loop performance is reported here; report PS-C summarizes the performance of the primary equipment attached to the loops.

For each central plant component, this report lists the unit's yearly coil/process load (actual demands), the thermal heat gain of the piping, the net load including the effect of pump heat, and the overload, if any. Additional lines report the peaks of these quantities and the time the peak occurred.

Bin information is presented in terms of the number of hours the load, and flow fell into the appropriate part load bin. The part load ratio is calculated in terms of the hourly value divided by the design value.

```
Simple Structure Run 3, Chicago         Divide into zones; add plenum              DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system         Show All Reports
REPORT- PS-D Circulation Loop Loads                                                       WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------------
           COIL LOAD  PIPE GAIN  NET LOAD   OVERLOAD      --------  Number of hours within each PART LOAD range  ---------  TOTAL
       SUM  (MBTU)     (MBTU)     (MBTU)     (MBTU)       00    10    20    30    40    50    60    70    80    90   100    RUN
MON  PEAK  (KBTU/HR)  (KBTU/HR)  (KBTU/HR)  (KBTU/HR)     10    20    30    40    50    60    70    80    90   100    +    HOURS
---  ----  ---------- ---------- ---------- ----------    ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----


Heating-Loop
       SUM    -117.7        0.0    -116.0        0.0 HEAT 713   765   235    50    41    30    13     0     0     0     0  1847
      PEAK    -302.6        0.0    -299.2        0.0 FLOW   0     0     0     0     0     0     0     0     0     0  2158  2158
   MON/DAY      1/ 2       0/ 0      1/ 2       0/ 0

Cooling-Loop
       SUM      81.3        0.0      84.3        0.0 COOL 156   217   191   207   166   115    50    16     1     0     0  1119
      PEAK     198.8        0.0     201.3        0.0 FLOW   0     0     0     0     0     0     0     0     0     0  1119  1119
   MON/DAY      7/14       0/ 0      7/14       0/ 0
```

PS-E Energy End-Use Summary for all <Electric/Fuel> Meters

There are up to four PS-E reports, one for electricity usage, one for fuel usage, one for steam utility usage (if one or more steam meters is defined), and one for chilled-water utility usage (if one or more chilled-water meters is defined). For each month, these reports list, for different end uses, the total usage, the peak usage, and the day/hour during which the peak occurred. Also listed, for each end-use, is that end-use's consumption at the time of the total peak consumption, and the percentage of the total peak that end-use represents.

No distinction is made between the various fuel types that may be present, or different electrical meters. However, the energy consumption of submeters is not double counted. In other words, this report summarizes the demands of meters that draw energy from utilities.

Fuel consumed by electric generators and consumed on-site is allocated to the building end-uses. However, the portion of fuel used to generate power that is sold to a utility, if any, is not allocated to any of these categories, but is included in the total. In this case, the total will not match the sum of the reported end-uses.

The end uses listed across the top of this report are as follows:

LIGHTS	Overhead lighting.
TASK LIGHTS	Task lighting.
MISC EQUIP	Plug loads.
SPACE HEATING	Space heating by boilers, furnaces, etc.)
SPACE COOLING	Space cooling by chillers, etc.
HEAT REJECT	Cooling towers and other heat rejection devices.
PUMPS & AUX	Circulation pumps and auxiliary power consumed by various components.
VENT FANS	Supply, return and exhaust fans.
REFRIG DISPLAY	Refrigerated display cases, and associated refrigeration systems.
HT PUMP SUPPLEM	Supplemental heat pump energy.
DOMESTIC HOT WTR	Domestic hot water.
EXT USAGE	Energy usage exterior to building, such as for exterior lighting.

The following descriptions are for electrical consumption. Identical descriptors apply to fuel, steam, and chilled-water meter reports.

kWh

The total power consumed for each end-use during the month

Max kW

The maximum power consumption for each end-use and total during the month. This is the peak consumption per end-use; the peak for a given end-use may not be coincident with the peak for the meter, or with the peaks for other end-uses. The meter's peak is in the last column.

Day/Hr

The day and hour at which the peak and total end-use consumption occurred

Peak Enduse

The power consumption of each end-use at the time of the meter's peak (coincident peak of all demands on the meter)

Peak Pct

The percent of each end-use's consumption at the meter's peak.

```
Main Facility with shading                                          DOE-B2.2-031   7/03/2000   15:10:48  BDL RUN  1

REPORT- PS-E Energy End-Use Summary for all Electric Meters                        WEATHER FILE- CZ10RV2 WYEC2
-----------------------------------------------------------------------------------------------------------------

                     TASK      MISC     SPACE     SPACE     HEAT    PUMPS     VENT    REFRIG  HT PUMP   DOMEST    EXT
            LIGHTS   LIGHTS    EQUIP    HEATING   COOLING   REJECT  & AUX     FANS    DISPLAY SUPPLEM   HOT WTR   USAGE    TOTAL
            -------  -------   -------  -------   -------   ------- -------   -------  ------- -------   -------   -------  --------

JAN
KWH         141212.     0.     96675.      0.     51025.     568.   31795.   128810.     0.       0.       0.       0.    450087.
MAX KW       477.8     0.0     220.6      0.0     510.9       8.4    161.4    362.4     0.0      0.0      0.0      0.0    1740.7
DAY/HR       2/ 9     0/ 0     2/ 9      0/ 0     29/15     30/15     2/ 8     2/ 9     0/ 0     0/ 0     0/ 0     0/ 0     29/15
PEAK ENDUSE  477.8     0.0     220.6      0.0     510.9       8.2    161.4    361.9     0.0      0.0      0.0      0.0
PEAK PCT      27.4     0.0      12.7      0.0      29.3       0.5      9.3     20.8     0.0      0.0      0.0      0.0

FEB
KWH         135851.     0.     91003.      0.     60000.     684.   33116.   113613.     0.       0.       0.       0.    434269.
MAX KW       477.8     0.0     220.6      0.0     468.2       6.9    161.4    362.5     0.0      0.0      0.0      0.0    1697.2
DAY/HR       1/ 9     0/ 0     1/ 9      0/ 0      7/14      6/12     1/ 9     7/17     0/ 0     0/ 0     0/ 0     0/ 0      7/14
PEAK ENDUSE  477.8     0.0     220.6      0.0     468.2       6.9    161.4    362.4     0.0      0.0      0.0      0.0
PEAK PCT      28.2     0.0      13.0      0.0      27.6       0.4      9.5     21.4     0.0      0.0      0.0      0.0

MAR
KWH         186974.     0.    114574.      0.     65776.     754.   36467.   133184.     0.       0.       0.       0.    537729.
MAX KW       477.8     0.0     220.6      0.0     473.8       6.4    161.4    362.8     0.0      0.0      0.0      0.0    1702.5
DAY/HR       1/ 9     0/ 0     1/ 9      0/ 0     23/14     23/14     3/11     23/17    0/ 0     0/ 0     0/ 0     0/ 0     23/14
PEAK ENDUSE  477.8     0.0     220.6      0.0     473.8       6.4    161.4    362.6     0.0      0.0      0.0      0.0
PEAK PCT      28.1     0.0      13.0      0.0      27.8       0.4      9.5     21.3     0.0      0.0      0.0      0.0

APR
KWH         156874.     0.    101780.      0.     78083.    1059.   37505.   123797.     0.       0.       0.       0.    499100.
MAX KW       477.8     0.0     220.6      0.0     498.0       8.1    161.4    363.2     0.0      0.0      0.0      0.0    1728.8
DAY/HR       2/ 9     0/ 0     2/ 9      0/ 0     27/15     25/15     2/ 7     5/17     0/ 0     0/ 0     0/ 0     0/ 0     27/15
PEAK ENDUSE  477.8     0.0     220.6      0.0     498.0       8.0    161.4    363.0     0.0      0.0      0.0      0.0
PEAK PCT      27.6     0.0      12.8      0.0      28.8       0.5      9.3     21.0     0.0      0.0      0.0      0.0

MAY
KWH         141212.     0.     96675.      0.    103177.    1466.   46895.   128896.     0.       0.       0.       0.    518324.
MAX KW       477.8     0.0     220.6      0.0     523.6       9.3    161.4    363.7     0.0      0.0      0.0      0.0    1755.7
DAY/HR       1/ 9     0/ 0     1/ 9      0/ 0      7/16     11/15     1/ 6     7/16     0/ 0     0/ 0     0/ 0     0/ 0      7/16
PEAK ENDUSE  477.8     0.0     220.6      0.0     523.6       8.7    161.4    363.7     0.0      0.0      0.0      0.0
PEAK PCT      27.2     0.0      12.6      0.0      29.8       0.5      9.2     20.7     0.0      0.0      0.0      0.0
JUN
KWH         136010.     0.     93209.      0.    138801.    2137.   52560.   128345.     0.       0.       0.       0.    551064.
MAX KW       477.8     0.0     220.6      0.0     598.8       9.4    161.4    365.9     0.0      0.0      0.0      0.0    1811.3
DAY/HR       1/ 9     0/ 0     1/ 9      0/ 0     25/19     25/14     1/10     25/16    0/ 0     0/ 0     0/ 0     0/ 0     25/14
PEAK ENDUSE  477.8     0.0     220.6      0.0     576.5       9.4    161.4    365.7     0.0      0.0      0.0      0.0
PEAK PCT      26.4     0.0      12.2      0.0      31.8       0.5      8.9     20.2     0.0      0.0      0.0      0.0

JUL
KWH         137125.     0.     95478.      0.    157616.    2630.   51943.   124357.     0.       0.       0.       0.    569150.
MAX KW       477.8     0.0     220.6      0.0     649.8      12.0    161.4    368.1     0.0      0.0      0.0      0.0    1882.2
DAY/HR       2/ 9     0/ 0     2/ 9      0/ 0     27/10     13/17     2/ 8     9/16     0/ 0     0/ 0     0/ 0     0/ 0     27/10
PEAK ENDUSE  477.8     0.0     220.6      0.0     649.8       9.4    161.4    363.4     0.0      0.0      0.0      0.0
PEAK PCT      25.4     0.0      11.7      0.0      34.5       0.5      8.6     19.3     0.0      0.0      0.0      0.0

AUG
KWH         123853.     0.     77579.      0.    166968.    2703.   57781.   134304.     0.       0.       0.       0.    563190.
MAX KW       477.8     0.0     157.6      0.0     749.4      11.6    161.4    366.9     0.0      0.0      0.0      0.0    1796.5
DAY/HR       1/15     0/ 0     1/13      0/ 0      7/12     14/15     1/ 6     13/16    0/ 0     0/ 0     0/ 0     0/ 0     14/15
PEAK ENDUSE  477.8     0.0     157.6      0.0     621.8      11.6    161.4    366.4     0.0      0.0      0.0      0.0
PEAK PCT      26.6     0.0       8.8      0.0      34.6       0.6      9.0     20.4     0.0      0.0      0.0      0.0
```

```
Main Facility with shading                                DOE-B2.2-031   7/03/2000   15:10:48  BDL RUN  1

REPORT- PS-E Energy End-Use Summary for all Electric Meters          WEATHER FILE- CZ10RV2 WYEC2
--------------------------------------------------------------------------------------------(CONTINUED)--------

SEP
KWH           127834.      0.   90814.      0.  125650.   1852.   48458.  118421.      0.      0.      0.      0.   513032.
MAX KW          477.8     0.0    220.6     0.0    620.0    10.8    161.4    368.5     0.0     0.0     0.0     0.0    1858.8
DAY/HR           4/ 9     0/ 0     4/ 9     0/ 0    24/15   24/15    1/ 7    24/14    0/ 0    0/ 0    0/ 0    0/ 0     24/15
PEAK ENDUSE     477.8     0.0    220.6     0.0    620.0    10.8    161.4    368.3     0.0     0.0     0.0     0.0
PEAK PCT         25.7     0.0     11.9     0.0     33.4     0.6      8.7     19.8     0.0     0.0     0.0     0.0

OCT
KWH           141212.      0.   96675.      0.  110244.   1434.   46756.  129054.      0.      0.      0.      0.   525377.
MAX KW          477.8     0.0    220.6     0.0    600.4     7.8    161.4    365.4     0.0     0.0     0.0     0.0    1823.4
DAY/HR           1/ 9     0/ 0     1/ 9     0/ 0     3/18   18/15    1/ 9    15/15    0/ 0    0/ 0    0/ 0    0/ 0      2/17
PEAK ENDUSE     477.8     0.0    220.6     0.0    591.2     7.7    161.4    364.7     0.0     0.0     0.0     0.0
PEAK PCT         26.2     0.0     12.1     0.0     32.4     0.4      8.9     20.0     0.0     0.0     0.0     0.0

NOV
KWH           131444.      0.   92012.      0.   68926.    853.   34454.  118747.      0.      0.      0.      0.   446438.
MAX KW          477.8     0.0    220.6     0.0    500.0     8.3    161.4    363.0     0.0     0.0     0.0     0.0    1719.0
DAY/HR           1/ 9     0/ 0     1/ 9     0/ 0     6/13    6/13    1/ 9     7/15    0/ 0    0/ 0    0/ 0    0/ 0      9/14
PEAK ENDUSE     477.8     0.0    220.6     0.0    489.9     6.7    161.4    362.7     0.0     0.0     0.0     0.0
PEAK PCT         27.8     0.0     12.8     0.0     28.5     0.4      9.4     21.1     0.0     0.0     0.0     0.0

DEC
KWH           133515.      0.   94280.      0.   53490.    526.   32873.  123048.      0.      0.      0.      0.   437734.
MAX KW          477.8     0.0    220.6     0.0    454.1     5.9    161.4    362.5     0.0     0.0     0.0     0.0    1681.9
DAY/HR           3/ 9     0/ 0     3/ 9     0/ 0    28/15   28/15    1/10    26/ 9    0/ 0    0/ 0    0/ 0    0/ 0     28/15
PEAK ENDUSE     477.8     0.0    220.6     0.0    454.1     5.9    161.4    362.1     0.0     0.0     0.0     0.0
PEAK PCT         28.4     0.0     13.1     0.0     27.0     0.4      9.6     21.5     0.0     0.0     0.0     0.0
              =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ========

KWH          1693116.      0. 1140756.      0. 1179757.  16667.  510603. 1504578.      0.      0.      0.      0.  6045495.
MAX KW          477.8     0.0    220.6     0.0    749.4    12.0    161.4    368.5     0.0     0.0     0.0     0.0    1882.2
MON/DY           1/ 2     0/ 0     1/ 2     0/ 0     8/ 7    7/13    1/ 2     9/24    0/ 0    0/ 0    0/ 0    0/ 0      7/27
PEAK ENDUSE     477.8     0.0    220.6     0.0    649.8     9.4    161.4    363.4     0.0     0.0     0.0     0.0
PEAK PCT         25.4     0.0     11.7     0.0     34.5     0.5      8.6     19.3     0.0     0.0     0.0     0.0
```

<u>TDV2 TDV Energy End-Use Summary for All <Electric/Fuel> Meters</u>

This report is a summation of the individual TDV3 reports that print for each electric and fuel meter. There are up to two TDV2 reports, one for electricity usage and one for fuel usage. This report prints automatically for electric and fuel meters whenever the PS-E reports are specified, and time-dependent valuation is enabled. Time-dependent valuation (TDV) is automatically enabled whenever the weather file is one of California's official compliance weather files; CZ01 thru CZ16 (See *Time-Dependent Valuation* in the Dictionary for more information). As California does not recognize steam or chilled-water utilities in compliance analysis, no reports are provided for those meter types.

No distinction is made between the various fuel types that may be present, or different electrical meters. However, the energy consumption of submeters is not double counted. In other words, this report summarizes the demands of meters that draw energy from utilities.

For each month, these reports list, for different TDV-weighted source end uses, the total usage, the peak usage, and the day/hour during which the peak occurred. Also listed, for each end-use, is the average load-weighted TDV multiplier for each end-use.

Fuel consumed by electric generators and consumed on-site is allocated to the building end-uses. However, the portion of fuel used to generate power that is sold to a utility, if any, is not allocated to any of these categories, but is included in the total. In this case, the total will not match the sum of the reported end-uses.

The end uses listed across the top of this report are as follows. By default, all exterior usage is excluded from this report, but end-use categories may be added or deleted via the MASTER-METERS:EXCLUDE-FROM-TDV keyword.

LIGHTS	Overhead lighting.
TASK LIGHTS	Task lighting.
MISC EQUIP	Plug loads.
SPACE HEATING	Space heating by boilers, furnaces, etc.)
SPACE COOLING	Space cooling by chillers, etc.
HEAT REJECT	Cooling towers and other heat rejection devices.
PUMPS & AUX	Circulation pumps and auxiliary power consumed by various components.
VENT FANS	Supply, return and exhaust fans.
REFRIG DISPLAY	Refrigerated display cases, and associated refrigeration systems.
HT PUMP SUPPLEM	Supplemental heat pump energy.
DOMESTIC HOT WTR	Domestic hot water.
EXT USAGE	Energy usage exterior to building, such as for exterior lighting.

The following descriptions are for electrical consumption. Identical descriptors apply to fuel reports.

TDV-MBTU

The total site energy consumed for each end-use during the month, converted to 'TDV energy'. TDV energy is calculated hourly by taking the actual site energy consumed by an end-use, and multiplying by the hourly value of the California Energy Commission's 'TDV energy' multiplier. This multiplier roughly converts site energy to source energy, but takes into account the impact of season, outdoor temperature and time of day on the cost to produce and deliver the site energy.

Max TDV-MBtu

The TDV energy for each end-use and total during the month. This is the peak consumption per end-use; the peak for a given end-use may not be coincident with the peak for the meter, or with the peaks for other end-uses. The meter's peak is in the last column.

Day/Hr

The day and hour at which the peak and total end-use consumption occurred

TDV-kBtu/kWh

The load-weighted average TDV energy factor for the month. This is calculated by summing the hourly site-energy consumption multiplied by the hourly TDV energy factor, and dividing by the sum of the site-energy consumption. Compared to the unweighted average value (next row), this value gives an indication of how heavily the power consumption of each end-use coincides with the time periods where the time-of-use penalty is the worst. For example, if the average monthly TDV factor is 18, and the load-weighted factor for the cooling end-use category is 35, this is an indication that the building is demanding the majority of its cooling energy during the on-peak times when the TDV factor is the greatest. Changes to the building and/or the HVAC system may be justified to reduce this impact.

```
Medium Office Building                  Sample Output                          DOE-2.2-44    9/24/2004    16:59:32  BDL RUN  1

REPORT- TDV2 TDV Energy End-Use Summary for All Electric Meters                             WEATHER FILE- CZ12RV2 WYEC2
--------------------------------------------------------------------------------------------------------------------------

                TASK     MISC    SPACE    SPACE    HEAT    PUMPS    VENT    REFRIG  HT PUMP  DOMEST   EXT
        LIGHTS  LIGHTS   EQUIP   HEATING  COOLING  REJECT  & AUX    FANS    DISPLAY SUPPLEM  HOT WTR  USAGE    TOTAL
        ------- -------  ------- -------  -------  ------- -------  ------- ------- -------  -------  -------  --------

JAN
TDV-MBTU       189.1     0.0    94.6      0.0     10.2     0.0    13.5    33.1     0.0     0.0     0.0     0.0    340.5
MAX TDV-MBTU    0.75     0.00    0.38     0.00     0.15    0.00    0.07    0.23    0.00    0.00    0.00    0.00     1.41
DAY/HR          8/11     0/ 0    8/11     0/ 0    23/16    0/ 0   23/16    2/ 8    0/ 0    0/ 0    0/ 0    0/ 0    23/16
TDV-KBTU/KWH   17.07     0.00   17.07     0.00    17.13    0.00   17.11   17.07    0.00    0.00    0.00    0.00    17.07

FEB
TDV-MBTU       164.2     0.0    82.1      0.0     17.4     0.0    13.4    28.2     0.0     0.0     0.0     0.0    305.3
MAX TDV-MBTU    0.72     0.00    0.36     0.00     0.32    0.00    0.08    0.14    0.00    0.00    0.00    0.00     1.54
DAY/HR          5/11     0/ 0    5/11     0/ 0    28/16   28/16   26/17   11/ 7    0/ 0    0/ 0    0/ 0    0/ 0    28/17
TDV-KBTU/KWH   16.33     0.00   16.33     0.00    16.46   16.30   16.40   16.35    0.00    0.00    0.00    0.00    16.34

MAR
TDV-MBTU       170.0     0.0    85.0      0.0     22.0     0.0    14.8    29.1     0.0     0.0     0.0     0.0    320.9
MAX TDV-MBTU    0.67     0.00    0.34     0.00     0.31    0.00    0.08    0.12    0.00    0.00    0.00    0.00     1.46
DAY/HR          5/11     0/ 0    5/11     0/ 0    20/16   20/16   19/17    5/ 7    0/ 0    0/ 0    0/ 0    0/ 0    20/16
TDV-KBTU/KWH   15.24     0.00   15.24     0.00    15.35   15.48   15.29   15.27    0.00    0.00    0.00    0.00    15.25

APR
TDV-MBTU       166.5     0.0    83.2      0.0     34.0     0.3    15.8    27.7     0.0     0.0     0.0     0.0    327.4
MAX TDV-MBTU    0.64     0.00    0.32     0.00     0.43    0.01    0.08    0.11    0.00    0.00    0.00    0.00     1.59
DAY/HR          1/14     0/ 0    1/14     0/ 0    30/17   30/17   30/14   30/17    0/ 0    0/ 0    0/ 0    0/ 0    30/17
TDV-KBTU/KWH   14.53     0.00   14.53     0.00    14.62   14.73   14.52   14.47    0.00    0.00    0.00    0.00    14.54

MAY
TDV-MBTU       172.0     0.0    86.0      0.0     72.2     1.2    20.7    31.7     0.0     0.0     0.0     0.0    383.8
MAX TDV-MBTU    1.68     0.00    0.84     0.00     1.33    0.05    0.23    0.35    0.00    0.00    0.00    0.00     4.45
DAY/HR         30/17     0/ 0   30/17     0/ 0    30/17   30/17   31/16   30/17    0/ 0    0/ 0    0/ 0    0/ 0    30/17
TDV-KBTU/KWH   15.42     0.00   15.42     0.00    17.12   19.38   16.12   15.92    0.00    0.00    0.00    0.00    15.80

JUN
TDV-MBTU       176.9     0.0    88.4      0.0    106.4     2.8    22.6    34.6     0.0     0.0     0.0     0.0    431.7
MAX TDV-MBTU    2.28     0.00    1.14     0.00     2.10    0.07    0.28    0.57    0.00    0.00    0.00    0.00     6.44
DAY/HR         17/17     0/ 0   17/17     0/ 0    17/17   17/17   17/17   17/17    0/ 0    0/ 0    0/ 0    0/ 0    17/17
TDV-KBTU/KWH   16.04     0.00   16.04     0.00    18.23   19.79   16.76   16.81    0.00    0.00    0.00    0.00    16.65

JUL
TDV-MBTU       260.4     0.0   130.2      0.0    191.8     6.5    33.9    55.0     0.0     0.0     0.0     0.0    677.9
MAX TDV-MBTU    2.80     0.00    1.40     0.00     2.96    0.14    0.36    0.76    0.00    0.00    0.00    0.00     8.41
DAY/HR         24/17     0/ 0   24/17     0/ 0    24/17   24/16   24/17   24/17    0/ 0    0/ 0    0/ 0    0/ 0    24/17
TDV-KBTU/KWH   22.62     0.00   22.62     0.00    26.55   29.64   23.42   24.30    0.00    0.00    0.00    0.00    23.85

AUG
TDV-MBTU       319.5     0.0   159.8      0.0    227.9     7.2    42.1    68.2     0.0     0.0     0.0     0.0    824.7
MAX TDV-MBTU    3.50     0.00    1.75     0.00     3.55    0.15    0.44    0.97    0.00    0.00    0.00    0.00    10.33
DAY/HR         20/17     0/ 0   20/17     0/ 0    20/17   20/17   20/17    7/17    0/ 0    0/ 0    0/ 0    0/ 0    20/17
TDV-KBTU/KWH   28.64     0.00   28.64     0.00    34.81   39.77   29.81   30.94    0.00    0.00    0.00    0.00    30.45

SEP
TDV-MBTU       274.1     0.0   137.1      0.0    146.5     3.7    33.3    51.7     0.0     0.0     0.0     0.0    646.4
MAX TDV-MBTU    2.84     0.00    1.42     0.00     2.63    0.11    0.35    0.68    0.00    0.00    0.00    0.00     8.02
DAY/HR          4/17     0/ 0    4/17     0/ 0     4/17    4/17    4/17    4/17    0/ 0    0/ 0    0/ 0    0/ 0     4/17
TDV-KBTU/KWH   24.86     0.00   24.86     0.00    28.39   31.36   25.91   25.74    0.00    0.00    0.00    0.00    25.74
```

```
Medium Office Building              Sample Output                    DOE-2.2-44    9/24/2004   16:59:32  BDL RUN  1

REPORT- TDV2 TDV End-Use Summary for all    Electric Meters                      WEATHER FILE- CZ12RV2 WYEC2
---------------------------------------------------------------------------------------------------------(CONTINUED)--------

OCT
TDV-MBTU       209.8      0.0   104.9      0.0    68.2      1.0    22.3    35.9      0.0      0.0      0.0      0.0    442.1
MAX TDV-MBTU    1.14     0.00    0.57     0.00    0.85     0.03    0.13    0.23     0.00     0.00     0.00     0.00     2.94
DAY/HR          3/17     0/ 0    3/17     0/ 0    3/17     3/17    3/17    3/17     0/ 0     0/ 0     0/ 0     0/ 0     3/17
TDV-KBTU/KWH   18.22     0.00   18.22     0.00   18.64    18.95   18.36   18.27     0.00     0.00     0.00     0.00    18.30

NOV
TDV-MBTU       173.9      0.0    86.9      0.0    23.4      0.1    15.2    30.2      0.0      0.0      0.0      0.0    329.6
MAX TDV-MBTU    0.79     0.00    0.39     0.00    0.42     0.01    0.09    0.16     0.00     0.00     0.00     0.00     1.78
DAY/HR          5/11     0/ 0    5/11     0/ 0    4/16     4/16    4/14    28/ 7    0/ 0     0/ 0     0/ 0     0/ 0     4/15
TDV-KBTU/KWH   17.72     0.00   17.72     0.00   17.83    17.66   17.81   17.78     0.00     0.00     0.00     0.00    17.74

DEC
TDV-MBTU       206.8      0.0   103.4      0.0    11.1      0.0    14.8    35.6      0.0      0.0      0.0      0.0    371.6
MAX TDV-MBTU    0.80     0.00    0.40     0.00    0.10     0.00    0.06    0.19     0.00     0.00     0.00     0.00     1.45
DAY/HR          3/11     0/ 0    3/11     0/ 0    4/14     0/ 0    4/14    26/ 7    0/ 0     0/ 0     0/ 0     0/ 0    17/14
TDV-KBTU/KWH   17.96     0.00   17.96     0.00   17.98     0.00   18.00   17.95     0.00     0.00     0.00     0.00    17.96
              =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ========

TDV-MBTU      2483.2      0.0  1241.6      0.0   931.0     22.9   262.3   461.0      0.0      0.0      0.0      0.0   5402.0
MAX TDV-MBTU    3.50     0.00    1.75     0.00    3.55     0.15    0.44    0.97     0.00     0.00     0.00     0.00    10.33
MON/DY          8/20     0/ 0    8/20     0/ 0    8/20     8/20    8/20    8/ 7     0/ 0     0/ 0     0/ 0     0/ 0     8/20
TDV-KBTU/KWH   18.75     0.00   18.75     0.00   23.29    28.54   19.69   19.49     0.00     0.00     0.00     0.00    19.54
```

PS-F Energy End-Use Summary for   <meter name>

There is one PS-F report for each meter defined, whether electricity, fuel, steam, and/or chilled-water. For each month, these reports list, for different end uses, the total usage, the peak usage, and the day/hour during which the peak occurred. Also listed, for each end-use, is that end-use's consumption at the time of the total peak consumption, and the percentage of the total peak that end-use represents.

Fuel consumed by electric generators and consumed on-site is allocated to the building end-uses. However, the portion of fuel used to generate power that is sold to a utility, if any, is not allocated to any of these categories, but is included in the total. In this case, the total will not match the sum of the reported end-uses.

The end uses listed across the top of this report are as follows:

LIGHTS	Overhead lighting.
TASK LIGHTS	Task lighting.
MISC EQUIP	Plug loads.
SPACE HEATING	Space heating by boilers, furnaces, etc.)
SPACE COOLING	Space cooling by chillers, etc.
HEAT REJECT	Cooling towers and other heat rejection devices.
PUMPS & AUX	Circulation pumps and auxiliary power consumed by various components.
VENT FANS	Supply, return and exhaust fans.
REFRIG DISPLAY	Refrigerated display cases, and associated refrigeration systems.
HT PUMP SUPPLEM	Supplemental heat pump energy.
DOMESTIC HOT WTR	Domestic hot water.
EXT USAGE	Energy usage exterior to building, such as for exterior lighting.

The following descriptions are for electrical consumption. Identical descriptors apply to fuel, steam, and chilled-water meter reports.

kWh

The total power consumed for each end-use during the month

Max kW

The maximum power consumption for each end-use and total during the month. This is the peak consumption per end-use; the peak for a given end-use may not be coincident with the peak for the meter, or with the peaks for other end-uses. The meter's peak is in the last column.

Day/Hr

The day and hour at which the peak and total end-use consumption occurred

Peak Enduse

The power consumption of each end-use at the time of the meter's peak (coincident peak of all demands on the meter)

Peak Pct

The percent of each end-use's consumption at the meter's peak.

Yearly Transformer Losses

The electric power lost due to the transformer inefficiency.

Main Facility with shading   DOE-B2.2-031   7/03/2000   15:10:48 BDL RUN 1

REPORT- PS-F Energy End-Use Summary for   EM1   WEATHER FILE- CZ10RV2 WYEC2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
JAN													
KWH	141212.	0.	96675.	0.	51025.	568.	31795.	128810.	0.	0.	0.	0.	450087.
MAX KW	477.8	0.0	220.6	0.0	510.9	8.4	161.4	362.4	0.0	0.0	0.0	0.0	1740.7
DAY/HR	2/ 9	0/ 0	2/ 9	0/ 0	29/15	30/15	2/ 8	2/ 9	0/ 0	0/ 0	0/ 0	0/ 0	29/15
PEAK ENDUSE	477.8	0.0	220.6	0.0	510.9	8.2	161.4	361.9	0.0	0.0	0.0	0.0	
PEAK PCT	27.4	0.0	12.7	0.0	29.3	0.5	9.3	20.8	0.0	0.0	0.0	0.0	
FEB													
KWH	135851.	0.	91003.	0.	60000.	684.	33116.	113613.	0.	0.	0.	0.	434269.
MAX KW	477.8	0.0	220.6	0.0	468.2	6.9	161.4	362.5	0.0	0.0	0.0	0.0	1697.2
DAY/HR	1/ 9	0/ 0	1/ 9	0/ 0	7/14	6/12	1/ 9	7/17	0/ 0	0/ 0	0/ 0	0/ 0	7/14
PEAK ENDUSE	477.8	0.0	220.6	0.0	468.2	6.9	161.4	362.4	0.0	0.0	0.0	0.0	
PEAK PCT	28.2	0.0	13.0	0.0	27.6	0.4	9.5	21.4	0.0	0.0	0.0	0.0	
MAR													
KWH	186974.	0.	114574.	0.	65776.	754.	36467.	133184.	0.	0.	0.	0.	537729.
MAX KW	477.8	0.0	220.6	0.0	473.8	6.4	161.4	362.8	0.0	0.0	0.0	0.0	1702.5
DAY/HR	1/ 9	0/ 0	1/ 9	0/ 0	23/14	23/15	3/11	23/17	0/ 0	0/ 0	0/ 0	0/ 0	23/14
PEAK ENDUSE	477.8	0.0	220.6	0.0	473.8	6.4	161.4	362.6	0.0	0.0	0.0	0.0	
PEAK PCT	28.1	0.0	13.0	0.0	27.8	0.4	9.5	21.3	0.0	0.0	0.0	0.0	
APR													
KWH	156874.	0.	101780.	0.	78083.	1059.	37505.	123797.	0.	0.	0.	0.	499100.
MAX KW	477.8	0.0	220.6	0.0	498.0	8.1	161.4	363.2	0.0	0.0	0.0	0.0	1728.8
DAY/HR	2/ 9	0/ 0	2/ 9	0/ 0	27/15	25/15	2/ 7	5/17	0/ 0	0/ 0	0/ 0	0/ 0	27/15
PEAK ENDUSE	477.8	0.0	220.6	0.0	498.0	8.0	161.4	363.0	0.0	0.0	0.0	0.0	
PEAK PCT	27.6	0.0	12.8	0.0	28.8	0.5	9.3	21.0	0.0	0.0	0.0	0.0	
MAY													
KWH	141212.	0.	96675.	0.	103177.	1466.	46895.	128896.	0.	0.	0.	0.	518324.
MAX KW	477.8	0.0	220.6	0.0	523.6	9.3	161.4	363.7	0.0	0.0	0.0	0.0	1755.7
DAY/HR	1/ 9	0/ 0	1/ 9	0/ 0	7/16	11/15	1/ 6	7/16	0/ 0	0/ 0	0/ 0	0/ 0	7/16
PEAK ENDUSE	477.8	0.0	220.6	0.0	523.6	8.7	161.4	363.7	0.0	0.0	0.0	0.0	
PEAK PCT	27.2	0.0	12.6	0.0	29.8	0.5	9.2	20.7	0.0	0.0	0.0	0.0	
JUN													
KWH	136010.	0.	93209.	0.	138801.	2137.	52560.	128345.	0.	0.	0.	0.	551064.
MAX KW	477.8	0.0	220.6	0.0	598.8	9.4	161.4	365.9	0.0	0.0	0.0	0.0	1811.3
DAY/HR	1/ 9	0/ 0	1/ 9	0/ 0	25/19	25/14	1/10	25/16	0/ 0	0/ 0	0/ 0	0/ 0	25/14
PEAK ENDUSE	477.8	0.0	220.6	0.0	576.5	9.4	161.4	365.7	0.0	0.0	0.0	0.0	
PEAK PCT	26.4	0.0	12.2	0.0	31.8	0.5	8.9	20.2	0.0	0.0	0.0	0.0	
JUL													
KWH	137125.	0.	95478.	0.	157616.	2630.	51943.	124357.	0.	0.	0.	0.	569150.
MAX KW	477.8	0.0	220.6	0.0	649.8	12.0	161.4	368.1	0.0	0.0	0.0	0.0	1882.2
DAY/HR	2/ 9	0/ 0	2/ 9	0/ 0	27/10	13/17	2/ 8	9/16	0/ 0	0/ 0	0/ 0	0/ 0	27/10
PEAK ENDUSE	477.8	0.0	220.6	0.0	649.8	9.4	161.4	363.4	0.0	0.0	0.0	0.0	
PEAK PCT	25.4	0.0	11.7	0.0	34.5	0.5	8.6	19.3	0.0	0.0	0.0	0.0	
AUG													
KWH	123853.	0.	77579.	0.	166968.	2703.	57781.	134304.	0.	0.	0.	0.	563190.
MAX KW	477.8	0.0	157.6	0.0	749.4	11.6	161.4	366.9	0.0	0.0	0.0	0.0	1796.5
DAY/HR	1/15	0/ 0	1/13	0/ 0	7/12	14/15	1/ 6	13/16	0/ 0	0/ 0	0/ 0	0/ 0	14/15
PEAK ENDUSE	477.8	0.0	157.6	0.0	621.8	11.6	161.4	366.4	0.0	0.0	0.0	0.0	
PEAK PCT	26.6	0.0	8.8	0.0	34.6	0.6	9.0	20.4	0.0	0.0	0.0	0.0	
SEP													
KWH	127834.	0.	90814.	0.	125650.	1852.	48458.	118421.	0.	0.	0.	0.	513032.
MAX KW	477.8	0.0	220.6	0.0	620.0	10.8	161.4	368.5	0.0	0.0	0.0	0.0	1858.8
DAY/HR	4/ 9	0/ 0	4/ 9	0/ 0	24/15	24/15	1/ 7	24/14	0/ 0	0/ 0	0/ 0	0/ 0	24/15
PEAK ENDUSE	477.8	0.0	220.6	0.0	620.0	10.8	161.4	368.3	0.0	0.0	0.0	0.0	
PEAK PCT	25.7	0.0	11.9	0.0	33.4	0.6	8.7	19.8	0.0	0.0	0.0	0.0	

Main Facility with shading   DOE-B2.2-031   7/03/2000   15:10:48 BDL RUN 1

REPORT- PS-F Energy End-Use Summary for   EM1   WEATHER FILE- CZ10RV2 WYEC2
--(CONTINUED)--------

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OCT
KWH           141212.       0.   96675.       0.  110244.    1434.   46756.  129054.       0.       0.       0.       0.   525377.
MAX KW          477.8      0.0    220.6      0.0    600.4      7.8    161.4    365.4      0.0      0.0      0.0      0.0    1823.4
DAY/HR           1/ 9     0/ 0     1/ 9     0/ 0     3/18    18/15     1/ 9    15/15     0/ 0     0/ 0     0/ 0     0/ 0      2/17
PEAK ENDUSE     477.8      0.0    220.6      0.0    591.2      7.7    161.4    364.7      0.0      0.0      0.0      0.0
PEAK PCT         26.2      0.0     12.1      0.0     32.4      0.4      8.9     20.0      0.0      0.0      0.0      0.0

NOV
KWH           131444.       0.   92012.       0.   68926.     853.   34454.  118747.       0.       0.       0.       0.   446438.
MAX KW          477.8      0.0    220.6      0.0    500.0      8.3    161.4    363.0      0.0      0.0      0.0      0.0    1719.0
DAY/HR           1/ 9     0/ 0     1/ 9     0/ 0     6/13     6/13     1/ 9     7/15     0/ 0     0/ 0     0/ 0     0/ 0      9/14
PEAK ENDUSE     477.8      0.0    220.6      0.0    489.9      6.7    161.4    362.7      0.0      0.0      0.0      0.0
PEAK PCT         27.8      0.0     12.8      0.0     28.5      0.4      9.4     21.1      0.0      0.0      0.0      0.0

DEC
KWH           133515.       0.   94280.       0.   53490.     526.   32873.  123048.       0.       0.       0.       0.   437734.
MAX KW          477.8      0.0    220.6      0.0    454.1      5.9    161.4    362.5      0.0      0.0      0.0      0.0    1681.9
DAY/HR           3/ 9     0/ 0     3/ 9     0/ 0    28/15    28/15     1/10    26/ 9     0/ 0     0/ 0     0/ 0     0/ 0     28/15
PEAK ENDUSE     477.8      0.0    220.6      0.0    454.1      5.9    161.4    362.1      0.0      0.0      0.0      0.0
PEAK PCT         28.4      0.0     13.1      0.0     27.0      0.4      9.6     21.5      0.0      0.0      0.0      0.0
              =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ========

KWH          1693116.       0. 1140756.       0. 1179757.   16667.  510603. 1504578.       0.       0.       0.       0.  6045495.
MAX KW          477.8      0.0    220.6      0.0    749.4     12.0    161.4    368.5      0.0      0.0      0.0      0.0    1882.2
MON/DY           1/ 2     0/ 0     1/ 2     0/ 0     8/ 7     7/13     1/ 2     9/24     0/ 0     0/ 0     0/ 0     0/ 0      7/27
PEAK ENDUSE     477.8      0.0    220.6      0.0    649.8      9.4    161.4    363.4      0.0      0.0      0.0      0.0
PEAK PCT         25.4      0.0     11.7      0.0     34.5      0.5      8.6     19.3      0.0      0.0      0.0      0.0


      YEARLY TRANSFORMER LOSSES =      0.0 KWH
```

TDV3 TDV End-Use Summary for <meter name>

This report is created automatically for each electric and fuel meter whenever the PS-F reports are specified, and time-dependent valuation is enabled. Time-dependent valuation (TDV) is automatically enabled whenever the weather file is one of California's official compliance weather files; CZ01 thru CZ16 (See *Time-Dependent Valuation* in the Dictionary for more information). As California does not recognize steam or chilled-water utilities in compliance analysis, no reports are provided for those meter types.

For each month, these reports list, for different TDV-weighted source end uses, the total usage, the peak usage, and the day/hour during which the peak occurred. Also listed, for each end-use, is the average load-weighted TDV multiplier for each end-use, and the unweighted maximum, minimum, and average TDV multiplier for the month. Fuel consumed by electric generators and consumed on-site is allocated to the building end-uses. However, the portion of fuel used to generate power that is sold to a utility, if any, is not allocated to any of these categories, but is included in the total. In this case, the total will not match the sum of the reported end-uses.

The end uses listed across the top of this report are as follows. By default, all exterior usage is excluded from this report, but end-use categories may be added or deleted via the MASTER-METERS:EXCLUDE-FROM-TDV keyword.

LIGHTS	Overhead lighting.
TASK LIGHTS	Task lighting.
MISC EQUIP	Plug loads.
SPACE HEATING	Space heating by boilers, furnaces, etc.)
SPACE COOLING	Space cooling by chillers, etc.
HEAT REJECT	Cooling towers and other heat rejection devices.
PUMPS & AUX	Circulation pumps and auxiliary power consumed by various components.
VENT FANS	Supply, return and exhaust fans.
REFRIG DISPLAY	Refrigerated display cases, and associated refrigeration systems.
HT PUMP SUPPLEM	Supplemental heat pump energy.
DOMESTIC HOT WTR	Domestic hot water.
EXT USAGE	Energy usage exterior to building, such as for exterior lighting.

The following descriptions are for electrical consumption. Identical descriptors apply to fuel reports.

TDV-MBTU

The total site energy consumed for each end-use during the month, converted to "TDV energy". TDV energy is calculated hourly by taking the actual site energy consumed by an end-use, and multiplying by the hourly value of the California Energy Commission's "TDV energy" multiplier. This multiplier roughly converts site energy to source energy, but takes into account the impact of season, outdoor temperature and time of day on the cost to produce and deliver the site energy.

Max TDV-MBtu

The TDV energy for each end-use and total during the month. This is the peak consumption per end-use; the peak for a given end-use may not be coincident with the peak for the meter, or with the peaks for other end-uses. The meter's peak is in the last column.

Day/Hr

The day and hour at which the peak and total end-use consumption occurred

TDV-kBtu/kWh

The load-weighted average TDV energy factor for the month. This is calculated by summing the hourly site-energy consumption multiplied by the hourly TDV energy factor, and dividing by the sum of the site-energy consumption.

Compared to the unweighted average value (next row), this value gives an indication of how heavily the power consumption of each end-use coincides with the time periods where the time-of-use penalty is the worst. For example, if the average monthly TDV factor is 18, and the load-weighted factor for the cooling end-use category is 35, this is an indication that the building is demanding the majority of its cooling energy during the on-peak times when the TDV factor is the greatest. Changes to the building and/or the HVAC system may be justified to reduce this impact.

Unweighted Max/Min/Avg

The maximum, minimum, and average TDV energy factor for the month. While the average reported in the row above is weighted by the actual loads, this average is simply the unweighted average per month. Comparing the load-weighted average with these values can give the user an idea of how heavily the consumption is weighted toward the on-peak times.

Yearly Transformer Losses

The electric power lost due to the transformer inefficiency, converted to TDV energy.

Medium Office Building   Sample Output   DOE-2.2-44   9/20/2004   16:44:30 BDL RUN 1

REPORT- TDV3 TDV End-Use Summary for   EM1   WEATHER FILE- CZ12RV2 WYEC2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
JAN													
TDV-MBTU	0.0	0.0	94.6	0.0	0.0	0.0	13.5	33.1	0.0	0.0	0.0	0.0	141.2
MAX TDV-MBTU	0.00	0.00	0.38	0.00	0.00	0.00	0.07	0.23	0.00	0.00	0.00	0.00	0.56
DAY/HR	0/ 0	0/ 0	8/11	0/ 0	0/ 0	0/ 0	23/16	2/ 8	0/ 0	0/ 0	0/ 0	0/ 0	2/ 9
TDV-KBTU/KWH	0.00	0.00	17.07	0.00	0.00	0.00	17.11	17.07	0.00	0.00	0.00	0.00	7.08
UNWEIGHTED													
MAX/MIN/AVG	19.36	13.33	16.26										
FEB													
TDV-MBTU	0.0	0.0	82.1	0.0	0.0	0.0	13.4	28.2	0.0	0.0	0.0	0.0	123.7
MAX TDV-MBTU	0.00	0.00	0.36	0.00	0.00	0.00	0.08	0.14	0.00	0.00	0.00	0.00	0.54
DAY/HR	0/ 0	0/ 0	5/11	0/ 0	0/ 0	28/16	26/17	11/ 7	0/ 0	0/ 0	0/ 0	0/ 0	26/17
TDV-KBTU/KWH	0.00	0.00	16.33	0.00	0.00	16.30	16.40	16.35	0.00	0.00	0.00	0.00	6.62
UNWEIGHTED													
MAX/MIN/AVG	18.44	12.92	15.57										
MAR													
TDV-MBTU	0.0	0.0	85.0	0.0	0.0	0.0	14.8	29.1	0.0	0.0	0.0	0.0	128.9
MAX TDV-MBTU	0.00	0.00	0.34	0.00	0.00	0.00	0.08	0.12	0.00	0.00	0.00	0.00	0.51
DAY/HR	0/ 0	0/ 0	5/11	0/ 0	0/ 0	20/16	19/17	5/ 7	0/ 0	0/ 0	0/ 0	0/ 0	19/17
TDV-KBTU/KWH	0.00	0.00	15.24	0.00	0.00	15.48	15.29	15.27	0.00	0.00	0.00	0.00	6.13
UNWEIGHTED													
MAX/MIN/AVG	17.14	12.35	14.61										
APR													
TDV-MBTU	0.0	0.0	83.2	0.0	0.0	0.3	15.8	27.7	0.0	0.0	0.0	0.0	126.9
MAX TDV-MBTU	0.00	0.00	0.32	0.00	0.00	0.01	0.08	0.11	0.00	0.00	0.00	0.00	0.52
DAY/HR	0/ 0	0/ 0	1/14	0/ 0	0/ 0	30/17	30/14	30/17	0/ 0	0/ 0	0/ 0	0/ 0	30/17
TDV-KBTU/KWH	0.00	0.00	14.53	0.00	0.00	14.73	14.52	14.47	0.00	0.00	0.00	0.00	5.64
UNWEIGHTED													
MAX/MIN/AVG	15.27	11.25	13.84										
MAY													
TDV-MBTU	0.0	0.0	86.0	0.0	0.0	1.2	20.7	31.7	0.0	0.0	0.0	0.0	139.6
MAX TDV-MBTU	0.00	0.00	0.84	0.00	0.00	0.05	0.23	0.35	0.00	0.00	0.00	0.00	1.43
DAY/HR	0/ 0	0/ 0	30/17	0/ 0	0/ 0	30/17	31/16	30/17	0/ 0	0/ 0	0/ 0	0/ 0	30/17
TDV-KBTU/KWH	0.00	0.00	15.42	0.00	0.00	19.38	16.12	15.92	0.00	0.00	0.00	0.00	5.75
UNWEIGHTED													
MAX/MIN/AVG	46.15	9.15	13.85										
JUN													
TDV-MBTU	0.0	0.0	88.4	0.0	0.0	2.8	22.6	34.6	0.0	0.0	0.0	0.0	148.4
MAX TDV-MBTU	0.00	0.00	1.14	0.00	0.00	0.07	0.28	0.57	0.00	0.00	0.00	0.00	2.06
DAY/HR	0/ 0	0/ 0	17/17	0/ 0	0/ 0	17/17	17/17	17/17	0/ 0	0/ 0	0/ 0	0/ 0	17/17
TDV-KBTU/KWH	0.00	0.00	16.04	0.00	0.00	19.79	16.76	16.81	0.00	0.00	0.00	0.00	5.73
UNWEIGHTED													
MAX/MIN/AVG	54.08	8.88	14.17										
JUL													
TDV-MBTU	0.0	0.0	130.2	0.0	0.0	6.5	33.9	55.0	0.0	0.0	0.0	0.0	225.7
MAX TDV-MBTU	0.00	0.00	1.40	0.00	0.00	0.14	0.36	0.76	0.00	0.00	0.00	0.00	2.65
DAY/HR	0/ 0	0/ 0	24/17	0/ 0	0/ 0	24/16	24/17	24/17	0/ 0	0/ 0	0/ 0	0/ 0	24/17
TDV-KBTU/KWH	0.00	0.00	22.62	0.00	0.00	29.64	23.42	24.30	0.00	0.00	0.00	0.00	
7.94													
UNWEIGHTED													
MAX/MIN/AVG	66.52	11.05	18.52										
AUG													
TDV-MBTU	0.0	0.0	159.8	0.0	0.0	7.2	42.1	68.2	0.0	0.0	0.0	0.0	277.3
MAX TDV-MBTU	0.00	0.00	1.75	0.00	0.00	0.15	0.44	0.97	0.00	0.00	0.00	0.00	3.27
DAY/HR	0/ 0	0/ 0	20/17	0/ 0	0/ 0	20/17	20/17	7/17	0/ 0	0/ 0	0/ 0	0/ 0	20/17
TDV-KBTU/KWH	0.00	0.00	28.64	0.00	0.00	39.77	29.81	30.94	0.00	0.00	0.00	0.00	10.24
UNWEIGHTED													
MAX/MIN/AVG	83.07	13.36	23.05										

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Medium Office Building            Sample Output                     DOE-2.2-44    9/20/2004    16:44:30  BDL RUN  1

REPORT- TDV3 TDV End-Use Summary for       EM1                          WEATHER FILE- CZ12RV2 WYEC2
------------------------------------------------------------------------------------------------------(CONTINUED)--------

SEP
TDV-MBTU        0.0      0.0    137.1      0.0      0.0      3.7     33.3     51.7      0.0      0.0      0.0      0.0    225.8
MAX TDV-MBTU    0.00     0.00     1.42     0.00     0.00     0.11     0.35     0.68     0.00     0.00     0.00     0.00     2.55
DAY/HR          0/ 0     0/ 0     4/17     0/ 0     0/ 0     4/17     4/17     4/17     0/ 0     0/ 0     0/ 0     0/ 0     4/17
TDV-KBTU/KWH    0.00     0.00    24.86     0.00     0.00    31.36    25.91    25.74     0.00     0.00     0.00     0.00     8.99
UNWEIGHTED
  MAX/MIN/AVG  67.42    15.30    21.86

OCT
TDV-MBTU        0.0      0.0    104.9      0.0      0.0      1.0     22.3     35.9      0.0      0.0      0.0      0.0    164.1
MAX TDV-MBTU    0.00     0.00     0.57     0.00     0.00     0.03     0.13     0.23     0.00     0.00     0.00     0.00     0.95
DAY/HR          0/ 0     0/ 0     3/17     0/ 0     0/ 0     3/17     3/17     3/17     0/ 0     0/ 0     0/ 0     0/ 0     3/17
TDV-KBTU/KWH    0.00     0.00    18.22     0.00     0.00    18.95    18.36    18.27     0.00     0.00     0.00     0.00     6.79
UNWEIGHTED
  MAX/MIN/AVG  26.95    12.65    17.20

NOV
TDV-MBTU        0.0      0.0     86.9      0.0      0.0      0.1     15.2     30.2      0.0      0.0      0.0      0.0    132.4
MAX TDV-MBTU    0.00     0.00     0.39     0.00     0.00     0.01     0.09     0.16     0.00     0.00     0.00     0.00     0.60
DAY/HR          0/ 0     0/ 0     5/11     0/ 0     0/ 0     4/16     4/14    28/ 7     0/ 0     0/ 0     0/ 0     0/ 0     4/15
TDV-KBTU/KWH    0.00     0.00    17.72     0.00     0.00    17.66    17.81    17.78     0.00     0.00     0.00     0.00     7.12
UNWEIGHTED
  MAX/MIN/AVG  20.34    13.76    16.89

DEC
TDV-MBTU        0.0      0.0    103.4      0.0      0.0      0.0     14.8     35.6      0.0      0.0      0.0      0.0    153.7
MAX TDV-MBTU    0.00     0.00     0.40     0.00     0.00     0.00     0.06     0.19     0.00     0.00     0.00     0.00     0.57
DAY/HR          0/ 0     0/ 0     3/11     0/ 0     0/ 0     0/ 0     4/14    26/ 7     0/ 0     0/ 0     0/ 0     0/ 0    17/14
TDV-KBTU/KWH    0.00     0.00    17.96     0.00     0.00     0.00    18.00    17.95     0.00     0.00     0.00     0.00     7.43
UNWEIGHTED
  MAX/MIN/AVG  20.60    13.87    17.10
             =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ========

TDV-MBTU        0.0      0.0   1241.6      0.0      0.0     22.9    262.3    461.0      0.0      0.0      0.0      0.0   1987.8
MAX TDV-MBTU    0.00     0.00     1.75     0.00     0.00     0.15     0.44     0.97     0.00     0.00     0.00     0.00     3.27
MON/DY          0/ 0     0/ 0     8/20     0/ 0     0/ 0     8/20     8/20     8/ 7     0/ 0     0/ 0     0/ 0     0/ 0     8/20
TDV-KBTU/KWH    0.00     0.00    18.75     0.00     0.00    28.54    19.69    19.49     0.00     0.00     0.00     0.00     7.19
UNWEIGHTED
  MAX/MIN/AVG  83.07     8.88    16.92


     YEARLY TRANSFORMER LOSSES =      0.00 TDV-MBTU
```

PS-H Loads and Energy Usage for \<loop name>

For each circulation loop, this report summarizes relevant design information as well as monthly and yearly performance. This report is an expansion of the information provided in PV-A and PS-D; most of the information will be identical with the exception of the monthly performance. For this report to print, PS-H must be specified in PLANT-REPORTS, and the circulation loop's EQUIPMENT-REPORTS = YES.

The design information are the first entries in the report:

HEATING CAPACITY

reports the non-coincident heating capacity. Depending on the value of the loop's SIZING-OPTION, the value represents either the sum of all loop demanders (SECONDARY), or loop suppliers (PRIMARY).

COOLING CAPACITY

reports the non-coincident heating capacity. Depending on the value of the loop's SIZING-OPTION, the value represents either the sum of all loop demanders (SECONDARY), or loop suppliers (PRIMARY).

LOOP FLOW

is the flow at the larger of the HEATING-CAPACITY or COOLING-CAPACITY, at the design loop temperature change.

TOTAL HEAD

is the sum of the maximum demander head (friction and static), the piping head (friction and static), and maximum primary equipment heat (friction and static).

SUPPLY UA PRODUCT

is the loss coefficient of the supply piping.

SUPPLY LOSS DT

is the design temperature change of the supply piping due to thermal losses.

RETURN UA PRODUCT

is the loss coefficient of the return piping.

RETURN LOSS DT

is the design temperature change of the return piping due to thermal losses.

LOOP VOLUME

is the volume of fluid within the circulation loop

FLUID HEAT CAPACITY

is the heat capacity of the fluid within the circulation loop. It is used to calculate the thermal effect of a change in supply/return temperature.

Following the design data is the monthly and yearly performance summary:

COIL LOAD

is the total load of all demanders on the loop, including coils, primary equipment loads, and process loads.

PIPE GAIN

is the heat gain/loss of the piping.

NET LOAD

is the net load on the primary equipment, including the effects of thermal losses and pump heat.

OVERLOAD

is the load the circulation loop was unable to meet. Note that, even if the loop is highly overloaded, the overload reported here may not be very large. This is because the circulation loops feed overload information back up to the coils, so that the coil capacities (and supply air temperatures) become limited in subsequent hours (the program is not yet fully capable of iterating over the entire system to solve the problem in a single hour). This feedback to subsequent hours causes the zone temperatures to rise, which reduces the load, thereby reducing the "overload" on the central plant. As a result, it is important to review the performance data on the air-side of the HVAC system, particularly zone temperatures, to verify the overall performance of the HVAC system.

For each month and for the year, information is presented on the category total, peak monthly or yearly value, and the time when the peak occurred. Bin information is presented in terms of the number of hours the load, and flow fell into the appropriate part load bin. The part load bin is calculated in terms of the hourly value divided by the design value.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- PS-H Loads and Energy Usage for     Heating-Loop                           WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------
```

HEATING CAPACITY (MBTU/HR)	COOLING CAPACITY (MBTU/HR)	LOOP FLOW (GAL/MIN)	TOTAL HEAD (FT)	SUPPLY UA PRODUCT (BTU/HR-F)	SUPPLY LOSS DT (F)	RETURN UA PRODUCT (BTU/HR-F)	RETURN LOSS DT (F)	LOOP VOLUME (GAL)	FLUID HEAT CAPACITY (BTU/LB-F)
-0.430	0.000	21.5	36.6	0.0	0.00	0.0	0.00	32.3	1.00

```
                 COIL LOAD PIPE GAIN NET LOAD  OVERLOAD    -------- Number of hours within each PART LOAD range  --------- TOTAL
           SUM    (MBTU)    (MBTU)    (MBTU)    (MBTU)      00   10   20   30   40   50   60   70   80   90  100   RUN
MON  PEAK  (KBTU/HR) (KBTU/HR) (KBTU/HR) (KBTU/HR)          10   20   30   40   50   60   70   80   90  100    +  HOURS
---  ----  --------- --------- --------- ---------         ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----

JAN  SUM   -34.185    0.000   -33.886    0.000 HEAT  88  177  114   14   11    7    5    0    0    0    0  416
     PEAK  -302.628   0.000  -299.176    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  416  416
     DAY/HR   2/ 8    0/ 0      2/ 8     0/ 0

FEB  SUM   -26.459    0.000   -26.165    0.000 HEAT  78  221   45   12    4    8    4    0    0    0    0  372
     PEAK  -282.776   0.000  -279.307    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  372  372
     DAY/HR   4/ 8    0/ 0      4/ 8     0/ 0

MAR  SUM   -14.241    0.000   -14.036    0.000 HEAT 131   77   18    9   10    3    1    0    0    0    0  249
     PEAK  -288.752   0.000  -285.343    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  259  259
     DAY/HR  24/ 8    0/ 0     24/ 8     0/ 0

APR  SUM    -3.037    0.000    -2.912    0.000 HEAT  73   16    3    4    0    0    0    0    0    0    0   96
     PEAK  -165.791   0.000  -163.064    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  170  170
     DAY/HR   8/ 8    0/ 0      8/ 8     0/ 0

MAY  SUM    -0.417    0.000    -0.340    0.000 HEAT  23    2    0    0    0    0    0    0    0    0    0   25
     PEAK   -83.966   0.000   -82.054    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  104  104
     DAY/HR   9/ 8    0/ 0      9/ 8     0/ 0

JUN  SUM     0.000    0.000     0.000    0.000 HEAT   0    0    0    0    0    0    0    0    0    0    0    0
     PEAK     0.000    0.000     0.000    0.000 FLOW   0    0    0    0    0    0    0    0    0    0   17   17
     DAY/HR   0/ 0    0/ 0      0/ 0     0/ 0

JUL  SUM     0.000    0.000     0.000    0.000 HEAT   0    0    0    0    0    0    0    0    0    0    0    0
     PEAK     0.000    0.000     0.000    0.000 FLOW   0    0    0    0    0    0    0    0    0    0    0    0
     DAY/HR   0/ 0    0/ 0      0/ 0     0/ 0

AUG  SUM     0.000    0.000     0.000    0.000 HEAT   0    0    0    0    0    0    0    0    0    0    0    0
     PEAK     0.000    0.000     0.000    0.000 FLOW   0    0    0    0    0    0    0    0    0    0    4    4
     DAY/HR   0/ 0    0/ 0      0/ 0     0/ 0

SEP  SUM    -0.239    0.000    -0.162    0.000 HEAT   9    1    0    0    0    0    0    0    0    0    0   10
     PEAK   -86.821   0.000   -80.548    0.000 FLOW   0    0    0    0    0    0    0    0    0    0   69   69
     DAY/HR  23/ 8    0/ 0     23/ 8     0/ 0

OCT  SUM    -2.618    0.000    -2.499    0.000 HEAT  65   13    5    2    0    0    0    0    0    0    0   85
     PEAK  -176.753   0.000  -171.187    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  144  144
     DAY/HR  20/ 8    0/ 0     20/ 8     0/ 0

NOV  SUM   -11.372    0.000   -11.187    0.000 HEAT 127   69   15    3    4    5    0    0    0    0    0  223
     PEAK  -243.944   0.000  -240.548    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  232  232
     DAY/HR  28/ 8    0/ 0     28/ 8     0/ 0

DEC  SUM   -25.084    0.000   -24.791    0.000 HEAT 119  189   35    6   12    7    3    0    0    0    0  371
     PEAK  -278.370   0.000  -274.909    0.000 FLOW   0    0    0    0    0    0    0    0    0    0  371  371
     DAY/HR  26/ 8    0/ 0     26/ 8     0/ 0
========= ========= ========= =========    =======    ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ====

YR   SUM  -117.652    0.000  -115.978    0.000 HEAT 713  765  235   50   41   30   13    0    0    0    0 1847
     PEAK  -302.628   0.000  -299.176    0.000 FLOW   0    0    0    0    0    0    0    0    0    0 2158 2158
     MON/DAY  1/ 2    0/ 0      1/ 2     0/ 0
```

PS-H Loads and Energy Usage for \<pump name\>

For each pump, this report summarizes relevant design information as well as monthly and yearly performance. This report is an expansion of the information provided in PV-A and PS-C; most of the information will be identical with the exception of the monthly performance. For this report to print, PS-H must be specified in PLANT-REPORTS, and the pump's EQUIPMENT-REPORTS = YES.

The first entry lists the number of pumps this component represents. All quantities are for the sum of all pumps represented by this component. The next entries are design information:

ATTACHED TO

lists the U-Name of the circulation loop or the primary equipment unit (boiler, chiller, etc.) to which this pump is attached. Also listed is the function of the pump.

FLOW

is the design flow of the pump,

HEAD

is the design head of the pump

SETPOINT

is the user-specified head setpoint for the pump; should be non-zero only if a loop is powered by more than one pump attached to equipment (instead of directly to the loop), and the pumps must operate at different heads.

CAPACITY CONTROL

specifies the capacity control mechanism for the pump. ONE-SPEED implies that the pump simply rides its curve. TWO-SPEED implies that the pump has two-speeds, but will also ride its curve as required at a given speed. If more that one pump is specified, pumps will also stage.

POWER

is the design electrical power of the pump.

MECHANICAL EFFICIENCY

is the mechanical efficiency of the impeller.

MOTOR EFFICIENCY

is the efficiency of the pump's motor.

Following the design data is the monthly and yearly performance summary:

HEAT GAIN

is the heat gain to the pumped fluid caused by the action of the pump. All of the pump's energy is assumed to heat the fluid, other than the energy consumed in the motor inefficiency.

ENERGY USE

is the electrical consumption of the pump's motor.

For each month and for the year, information is presented on the category total, peak monthly or yearly value, and the time when the peak occurred. Bin information is presented in terms of the number of hours the flow and power consumption fell into the appropriate part load bin. The part load bin is calculated in terms of the hourly value divided by the design value.

The final entry reports the number of hours the pump could not meet the flow requirement. Usually, this value will be non-zero only if the pump encounters an unexpectedly large head. The most common cause of this will be when a component such as a chiller is allocated more than its design flow. In this case, the head loss through the chiller may be substantially higher than design, and the pump may not be able to deliver the required flow at the resulting head. Refer to the Topics Manual for more information on allocating flow to primary equipment units.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- PS-H Loads and Energy Usage for     Heating-Pump                         WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------
  NOTE:  DATA BELOW IS FOR THE SUM OF 1 PUMP(s)
                                                               CAPACITY               MECHANICAL   MOTOR
                                      FLOW       HEAD     SETPOINT    CONTROL     POWER   EFFICIENCY EFFICIENCY
               ATTACHED TO         (GAL/MIN  )   (FT)       (FT)                  (KW)     (FRAC)     (FRAC)
    -------------------------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
     Heating-Loop                      21.5       43.9        0.0    ONE-SPEED     0.331      0.770      0.700
     PRIMARY LOOP

             HEAT GAIN  ENERGY USE                  -------- Number of hours within each PART LOAD range  --------- TOTAL
         SUM   (MBTU)     (KWH)                      00   10   20   30   40   50   60   70   80   90  100   RUN
MON PEAK    (KBTU/HR)     (KW)                       10   20   30   40   50   60   70   80   90  100    +  HOURS
--- ----   ----------  ----------  ---------- ---------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----

JAN  SUM       0.3       137.5                FLOW   0    0    0    0    0    0    0    0    0    0  416  416
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  416  416
    DAY/HR    1/ 1       1/ 1                  ELEC   0    0    0    0    0    0    0    0    0    0  416  416

FEB  SUM       0.3       123.0                FLOW   0    0    0    0    0    0    0    0    0    0  372  372
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  372  372
    DAY/HR    1/16       1/16                  ELEC   0    0    0    0    0    0    0    0    0    0  372  372

MAR  SUM       0.2        85.6                FLOW   0    0    0    0    0    0    0    0    0    0  259  259
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  259  259
    DAY/HR    4/ 8       4/ 8                  ELEC   0    0    0    0    0    0    0    0    0    0  259  259

APR  SUM       0.1        56.2                FLOW   0    0    0    0    0    0    0    0    0    0  170  170
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  170  170
    DAY/HR    1/ 8       1/ 8                  ELEC   0    0    0    0    0    0    0    0    0    0  170  170

MAY  SUM       0.1        34.4                FLOW   0    0    0    0    0    0    0    0    0    0  104  104
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  104  104
    DAY/HR    1/ 9       1/ 9                  ELEC   0    0    0    0    0    0    0    0    0    0  104  104

JUN  SUM       0.0         5.6                FLOW   0    0    0    0    0    0    0    0    0    0   17   17
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0   17   17
    DAY/HR    2/ 9       2/ 9                  ELEC   0    0    0    0    0    0    0    0    0    0   17   17

JUL  SUM       0.0         0.0                FLOW   0    0    0    0    0    0    0    0    0    0    0    0
     PEAK     0.000      0.000                 RPM    0    0    0    0    0    0    0    0    0    0    0    0
    DAY/HR    0/ 0       0/ 0                  ELEC   0    0    0    0    0    0    0    0    0    0    0    0

AUG  SUM       0.0         1.3                FLOW   0    0    0    0    0    0    0    0    0    0    4    4
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0    4    4
    DAY/HR    4/ 9       4/ 9                  ELEC   0    0    0    0    0    0    0    0    0    0    4    4

SEP  SUM       0.1        22.8                FLOW   0    0    0    0    0    0    0    0    0    0   69   69
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0   69   69
    DAY/HR    2/ 9       2/ 9                  ELEC   0    0    0    0    0    0    0    0    0    0   69   69

OCT  SUM       0.1        47.6                FLOW   0    0    0    0    0    0    0    0    0    0  144  144
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  144  144
    DAY/HR    1/ 8       1/ 8                  ELEC   0    0    0    0    0    0    0    0    0    0  144  144

NOV  SUM       0.2        76.7                FLOW   0    0    0    0    0    0    0    0    0    0  232  232
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  232  232
    DAY/HR    3/ 9       3/ 9                  ELEC   0    0    0    0    0    0    0    0    0    0  232  232

DEC  SUM       0.3       122.6                FLOW   0    0    0    0    0    0    0    0    0    0  371  371
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0  371  371
    DAY/HR    1/ 1       1/ 1                  ELEC   0    0    0    0    0    0    0    0    0    0  371  371
             ==========  ========== ========== ========= ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ====

YR   SUM       1.7       713.3                FLOW   0    0    0    0    0    0    0    0    0    0 2158 2158
     PEAK     0.790      0.331                 RPM    0    0    0    0    0    0    0    0    0    0 2158 2158
   MON/DAY    1/ 1       1/ 1                  ELEC   0    0    0    0    0    0    0    0    0    0 2158 2158

  Hours pump could not meet flow requirements:   0
```

PS-H Loads and Energy Usage for <equipment name>

This report summarizes the performance of primary equipment components such as boilers, chillers, cooling towers, etc. The reports vary by component, but are very similar in format. This presentation uses a boiler as the example.For the component, this report summarizes relevant design information as well as monthly and yearly performance. This report is an expansion of the information provided in PV-A and PS-C; most of the information will be identical with the exception of the monthly performance. For this report to print, PS-H must be specified in PLANT-REPORTS, and the component's EQUIPMENT-REPORTS = YES.

The first set of data is design information:

EQUIPMENT TYPE

lists the type of equipment which is identical to the TYPE code-word originally specified by the user.

ATTACHED TO

lists the circulation-loop(s) to which the equipment is attached. If the component is attached to more than one loop, each loop will be listed.

CAPACITY

is the nominal supply capacity or demand load of the equipment, relative to the loop(s) to which it is attached.

FLOW

is the nominal flow of the component on the given attachment.

EIR

is the electric input ratio.

HIR

is the heat input ratio

AUXILIARY

is any auxiliary power required by the component.

Following the design data is the monthly and yearly performance summary:

HEAT LOAD

is the heating load this component supplies.

ELEC USE

is the electrical use of an electric boiler element, or the draft fan, fuel pump, etc. of a fuel boiler.

FUEL USE

is the fuel consumed by a fuel boiler.

AUX ENERGY

is any energy specified by the component's AUX-KW keyword

For each month and for the year, information is presented on the category total, peak monthly or yearly value, and the time when the peak occurred. Bin information is presented in terms of the number of hours the load, electric, and fuel consumption fell into the appropriate part load bin. The part load bin is calculated in terms of the hourly value divided by the design value.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- PS-H Loads and Energy Usage for     Boiler-1                                         WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------------

                                                  CAPACITY      FLOW        EIR        HIR     AUXILIARY
                                                 (MBTU/HR) (GAL/MIN  )    (FRAC)     (FRAC)      (KW)
     EQUIPMENT TYPE           ATTACHED TO        ---------- ----------  ---------- ---------- ----------
     ----------------    --------------------------  ---------- ----------  ---------- ---------- ----------

     HW-BOILER        Heating-Loop                    -0.430       21.5      0.000      1.250      0.000


            HEAT LOAD  ELEC USE   FUEL USE   AUX ENERGY   --------  Number of hours within each PART LOAD range  -------- TOTAL
       SUM  (MBTU)     (KWH)      (MBTU)     (KWH)        00   10   20   30   40   50   60   70   80   90  100   RUN
MON   PEAK  (KBTU/HR)  (KW)       (KBTU/HR)  (KW)         10   20   30   40   50   60   70   80   90  100    +   HOURS
---   ----  ---------- ---------  ---------- ----------   ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---

JAN   SUM    -33.886    0.000      58.804      0.000 LOAD  88  177  114   14   11    7    5    0    0    0    0   416
      PEAK  -299.176    0.000     396.535      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     2/ 8    0/ 0         2/ 8     0/ 0 FUEL  10  108  182   84    9   10   10    3    0    0    0   416
FEB   SUM    -26.165    0.000      47.102      0.000 LOAD  78  221   45   12    4    8    4    0    0    0    0   372
      PEAK  -279.307    0.000     374.429      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     4/ 8    0/ 0         4/ 8     0/ 0 FUEL  22  132  159   34    7    5   13    0    0    0    0   372

MAR   SUM    -14.036    0.000      27.007      0.000 LOAD 131   77   18    9   10    3    1    0    0    0    0   249
      PEAK  -285.343    0.000     381.164      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR    24/ 8    0/ 0        24/ 8     0/ 0 FUEL  41  113   59   16    2   13    4    1    0    0    0   249

APR   SUM     -2.912    0.000       7.377      0.000 LOAD  73   16    3    4    0    0    0    0    0    0    0    96
      PEAK  -163.064    0.000     282.962      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     8/ 8    0/ 0         8/ 8     0/ 0 FUEL  51   27    8    3    5    2    0    0    0    0    0    96

MAY   SUM     -0.340    0.000       1.418      0.000 LOAD  23    2    0    0    0    0    0    0    0    0    0    25
      PEAK   -82.054    0.000     187.941      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     9/ 8    0/ 0         9/ 8     0/ 0 FUEL  15    7    2    1    0    0    0    0    0    0    0    25

JUN   SUM      0.000    0.000       0.000      0.000 LOAD   0    0    0    0    0    0    0    0    0    0    0     0
      PEAK     0.000    0.000       0.000      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     0/ 0    0/ 0         0/ 0     0/ 0 FUEL   0    0    0    0    0    0    0    0    0    0    0     0

JUL   SUM      0.000    0.000       0.000      0.000 LOAD   0    0    0    0    0    0    0    0    0    0    0     0
      PEAK     0.000    0.000       0.000      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     0/ 0    0/ 0         0/ 0     0/ 0 FUEL   0    0    0    0    0    0    0    0    0    0    0     0

AUG   SUM      0.000    0.000       0.000      0.000 LOAD   0    0    0    0    0    0    0    0    0    0    0     0
      PEAK     0.000    0.000       0.000      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR     0/ 0    0/ 0         0/ 0     0/ 0 FUEL   0    0    0    0    0    0    0    0    0    0    0     0

SEP   SUM     -0.162    0.000       0.653      0.000 LOAD   9    1    0    0    0    0    0    0    0    0    0    10
      PEAK   -80.548    0.000     186.145      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR    23/ 8    0/ 0        23/ 8     0/ 0 FUEL   5    4    0    1    0    0    0    0    0    0    0    10

OCT   SUM     -2.499    0.000       6.582      0.000 LOAD  65   13    5    2    0    0    0    0    0    0    0    85
      PEAK  -171.187    0.000     292.324      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR    20/ 8    0/ 0        20/ 8     0/ 0 FUEL  45   24    5    7    2    2    0    0    0    0    0    85

NOV   SUM    -11.187    0.000      22.500      0.000 LOAD 127   69   15    3    4    5    0    0    0    0    0   223
      PEAK  -240.548    0.000     354.393      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR    28/ 8    0/ 0        12/ 8     0/ 0 FUEL  38  128   33    8    6    5    5    0    0    0    0   223

DEC   SUM    -24.791    0.000      45.314      0.000 LOAD 119  189   35    6   12    7    3    0    0    0    0   371
      PEAK  -274.909    0.000     375.958      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
     DAY/HR    26/ 8    0/ 0        10/ 8     0/ 0 FUEL   4  198  120   23    4    9   13    0    0    0    0   371
     ========  ===========  =======  ==========  ----====      ====  ==== ==== ==== ==== ==== ==== ==== ==== ==== ---- ----

YR    SUM   -115.978    0.000     216.756      0.000 LOAD 713  765  235   50   41   30   13    0    0    0    0  1847
      PEAK  -299.176    0.000       0.397      0.000 ELEC   0    0    0    0    0    0    0    0    0    0    0     0
    MON/DAY     1/ 2    0/ 0         1/ 2     0/ 0 FUEL 231  741  568  177   35   46   45    4    0    0    0  1847
```

BEPS Building Energy Performance

This report makes it possible to quickly review annual building energy use according to energy type (ELECTRICITY, NATURAL-GAS, etc.) and category of use (LIGHTS, SPACE HEATING, etc.). The energy types shown are those that you have specified with the ELEC-METER, FUEL-METER, STEAM-METER, and CHW-METER commands in PLANT. The categories of use (also called energy end uses) are defined under the description of Report PS-E.

The energy values in this report are all in the same units (MBtu in English units or MWh in metric units). This allows a direct comparison of end-use intensities. Report BEPU provides the same information as BEPS, but in "utility units," such as kWh, therms, etc. Energy is reported only for meters that draw or supply power across the building boundary. The consumption of submeters is excluded, so that energy is not double-counted.

TOTAL SITE ENERGY

is the overall energy use at the building site for all energy types and categories of use.

TOTAL SOURCE ENERGY

is the energy use at point of production. It is obtained by dividing site energy use by the user-specified value of SOURCE-SITE-EFF in the FUEL-METER, ELEC-METER, STEAM-METER and CHW-METER commands.

Site and source energy are given per unit of net area (the sum of the floor areas of conditioned zones) and per unit of gross area (the value of GROSS-AREA in the BUILD-PARAMETERS command in LOADS, which defaults to net area).

When a hot or cold storage tank is present, a note is printed on the BEPS report stating that the hot water storage tank can get energy from many sources. Any time there is residual energy in the storage tanks, the totals in the BEPS report will not agree with those in report PS-B, because the BEPS report includes only the energy used for the above categories, whereas PS-B includes the energy that is left in the tanks as well.

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE

is the percentage of hours when the temperature in any conditioned zone is outside of the zone thermostat's throttling range. This is a measure of the HVAC systems'ability to hold zone thermostat set points.

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED

is the percentage of hours that the central plant cannot meet the demand on the plant from the secondary systems. A large percentage here usually means that one or more pieces of primary equipment (boiler, chiller, etc.) is undersized.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- BEPS Building Energy Performance                                                        WEATHER FILE- TRY  CHICAGO
--------------------------------------------------------------------------------------------------------------------------

                        TASK     MISC    SPACE    SPACE     HEAT    PUMPS     VENT   REFRIG  HT PUMP   DOMEST    EXT
              LIGHTS   LIGHTS   EQUIP   HEATING  COOLING   REJECT   & AUX    FANS   DISPLAY  SUPPLEM  HOT WTR   USAGE     TOTAL
              -------  -------  ------- -------  -------   -------  -------  -------  -------  -------  -------  -------  --------
EM1  ELECTRICITY
   MBTU         74.7     0.0     44.7     0.0     28.8      0.0      6.3     11.0      0.0      0.0      0.0      0.0     165.5
FUEL NATURAL-GAS
   MBTU          0.0     0.0      0.0    216.8     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0     216.8
              =======  =======  ======= =======  =======   =======  =======  =======  =======  =======  =======  =======  ========

   MBTU         74.7     0.0     44.7    216.8    28.8      0.0      6.3     11.0      0.0      0.0      0.0      0.0     382.3


                TOTAL SITE ENERGY       382.28 MBTU    76.5 KBTU/SQFT-YR GROSS-AREA      76.5 KBTU/SQFT-YR NET-AREA
                TOTAL SOURCE ENERGY     713.33 MBTU   142.7 KBTU/SQFT-YR GROSS-AREA     142.7 KBTU/SQFT-YR NET-AREA

                PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE =  2.2
                PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED                =  0.0

                NOTE:  ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.
```

TDV1 TDV Energy Performance Summary

This report prints automatically whenever the BEPS report is specified, and time-dependent valuation is enabled. Time-dependent valuation (TDV) is automatically enabled whenever the weather file is one of California's official compliance weather files; CZ01 thru CZ16 (See *Time-Dependent Valuation* in the Dictionary for more information).

This report makes it possible to quickly review annual TDV energy use according to energy type (ELECTRICITY, NATURAL-GAS, or PROPANE) and category of use (LIGHTS, SPACE HEATING, etc.). The energy types shown are those that you have specified with the ELEC-METER and FUEL-METER commands. As California does not recognize steam or chilled-water in compliance analysis, no entries are provided for those meter types. Fuels other than natural gas or propane are recognized as being equivalent to propane. The categories of use (called energy end uses) are defined under the description of Report PS-E.

The energy values in this report are all in the same units (TDV-MBtu in English units or TDV-MWh in metric units). This allows a direct comparison of end-use intensities. Report BEPS provides the same information as TDV1, but in site units, and BEPU reports energy usage in "utility units," such as kWh, therms, etc. Energy is reported only for meters that draw or supply power across the building boundary. The consumption of submeters is excluded, so that energy is not double-counted.

TOTAL SITE ENERGY

is the overall energy use at the building site for all energy types and categories of use.

TOTAL TDV SOURCE ENERGY

The total site energy consumed for each end-use during the month, converted to 'TDV energy'. TDV energy is calculated hourly by taking the actual site energy consumed by an end-use, and multiplying by the hourly value of the California Energy Commission's 'TDV energy' multiplier. This multiplier roughly converts site energy to source energy, but takes into account the impact of season, outdoor temperature and time of day on the cost to produce and deliver the site energy.

Site and TDV energy are given per unit of net area (the sum of the floor areas of conditioned zones) and per unit of gross area (the value of GROSS-AREA in the BUILD-PARAMETERS command in LOADS, which defaults to net area).

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE

is the percentage of hours when the temperature in any conditioned zone is outside of the zone thermostat's throttling range. This is a measure of the HVAC systems' ability to hold zone thermostat set points.

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED

is the percentage of hours that the central plant cannot meet the demand on the plant from the secondary systems. A large percentage here usually means that one or more pieces of primary equipment (boiler, chiller, etc.) is undersized.

```
Medium Office Building              Sample Output                        DOE-2.2-44    9/20/2004   16:44:30  BDL RUN  1

REPORT- TDV1 TDV Energy Performance Summary                                          WEATHER FILE- CZ12RV2 WYEC2
---------------------------------------------------------------------------------------------------------------------

              TASK     MISC    SPACE    SPACE    HEAT    PUMPS    VENT    REFRIG   HT PUMP  DOMEST    EXT
     LIGHTS   LIGHTS   EQUIP   HEATING  COOLING  REJECT  & AUX    FANS    DISPLAY  SUPPLEM  HOT WTR   USAGE    TOTAL
     -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  --------
EM1  ELECTRICITY
  TDV-MBTU    0.0      0.0    1241.6     0.0      0.0     22.9    262.3    461.0      0.0      0.0      0.0      0.0     1987.8

FM1  NATURAL-GAS
  TDV-MBTU    0.0      0.0      0.0    471.3      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      471.3
              =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  =======  ========

  TDV-MBTU    0.0      0.0    1241.6   471.3      0.0     22.9    262.3    461.0      0.0      0.0      0.0      0.0     2459.1

                TOTAL SITE ENERGY       779.95 MBTU      25.0 KBTU/SQFT-YR GROSS-AREA      25.0 KBTU/SQFT-YR NET-AREA
                TOTAL   TDV ENERGY     2459.14 MBTU      78.8 KBTU/SQFT-YR GROSS-AREA      78.8 KBTU/SQFT-YR NET-AREA

                PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE =  3.3
                PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED                 =  0.0

                NOTE:  ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.
```

BEPU Building Utility Performance

This report is identical to the BEPS report, except that the end use breakdown for each of the energy types is given in the actual units of consumption, such as kWh or therms. In addition, the total site energy consumption (TOTAL ELECTRICITY, TOTAL NATURAL-GAS, etc.) is given for each energy type.

Note that report PS-A groups heat rejection energy with cooling, while BEPS, BEPU, PS-E, and PS-F report heat rejection energy as a separate category.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum          DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- BEPU Building Utility Performance                                              WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------

                     TASK     MISC    SPACE    SPACE    HEAT    PUMPS     VENT    REFRIG  HT PUMP  DOMEST    EXT
           LIGHTS   LIGHTS   EQUIP   HEATING  COOLING  REJECT   & AUX    FANS    DISPLAY  SUPPLEM  HOT WTR   USAGE    TOTAL
           -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  -------  --------
EM1  ELECTRICITY
   KWH      21902.      0.   13094.      0.    8439.      0.    1833.    3230.      0.      0.      0.      0.    48498.
FUEL NATURAL-GAS
   THERM        0.      0.      0.    2168.      0.      0.      0.      0.      0.      0.      0.      0.     2168.


           TOTAL ELECTRICITY       48498. KWH        9.700 KWH      /SQFT-YR GROSS-AREA   9.700 KWH      /SQFT-YR NET-AREA
           TOTAL NATURAL-GAS        2168. THERM      0.434 THERM    /SQFT-YR GROSS-AREA   0.434 THERM    /SQFT-YR NET-AREA


           PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE =  2.2
           PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED                = 0.0

           NOTE:  ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.
```

ECONOMICS REPORTS

EV-A Life-Cycle Costing Parameters

```
SIMPLE STRUCTURE RUN 3A, CHICAGO        INCREASED ROOF INSULATION
DESIGN-DAY SIZING OF VAV SYSTEM         SHOW ALL REPORTS
REPORT- EV-A  LIFE-CYCLE COSTING PARAMETERS
-------------------------------------------------------------------------------------------------------------


                               LIFE-CYCLE COSTING PARAMETERS
                               ----------------------------


                                  LABOR      MATERIALS
                    DISCOUNT     INFLATION   INFLATION      PROJECT
                      RATE         RATE        RATE          LIFE
                   (PERCENT)    (PERCENT)    (PERCENT)       (YRS)
                   ---------    ---------    ---------     --------

                       5.0          0.0          0.0         25.0




                   BUILDING COMPONENT COST INPUT DATA (CURRENT DOLLARS)
                   ---------------------------------------------------


                                                    UNIT      UNIT     UNIT                      UNIT
                                            UNIT    INSTALL   ANNUAL   MINOR      MINOR    MAJOR   MAJOR
                                            FIRST   -ATION    MAINT    OVERHAUL  OVERHAUL  OVERHAUL OVERHAUL
                         NUMBER             LIFE    COST      COST     COST      COST     INTERVAL COST   INTERVAL
COST NAME                OF UNITS  UNIT NAME (YRS)  ($)       ($)      ($)       ($)      (YRS)    ($)     (YRS)
---------                --------  --------- -----  -----     -------  ------    --------  -------- -------- --------

ROOF-INSUL                5000.0  SQFT      999.0   0.80      0.30     0.00      0.00     999.00   0.00    999.00
```

LIFE-CYCLE COSTING PARAMETERS

This section echoes data entered in the BASELINE command. For a discussion of life-cycle costing methods and associated terminology see "Life-Cycle Costing" in the DOE-2.2 Topics Manual.

DISCOUNT RATE

is the rate in percent used in calculating present value.

LABOR INFLATION RATE

is the annual inflation rate (relative to general inflation) of labor cost, in percent. Installation, maintenance, and overhaul costs are inflated at this rate in calculating present values.

MATERIALS INFLATION RATE

is the annual inflation rate (relative to general inflation) of material costs, in percent. Capital replacement costs are inflated at this rate in calculating present values.

PROJECT LIFE

is the period, in years, over which the life-cycle cost analysis is performed. This number can range from 1 to 25 years.

BUILDING COMPONENT COST INPUT DATA

This section echoes building (nonplant) component cost data input with each COMPONENT-COST command. The costs here are in current dollars, i.e., they correspond to the prices that apply at the start of the life-cycle analysis period.

COST NAME

is the U-name of the component.

NUMBER OF UNITS

multiplies all costs. Defaults to 1.0 if not specified.

UNIT NAME

is the name you assigned to the unit (such as SQFT or CUFT) to identify the size or type of the unit. This name is arbitrary and optional and is for user convenience only.

LIFE

is the life expectancy of the component, in years. It is used in calculating replacement costs. Defaults to 999 years if not specified.

UNIT FIRST COST

is the purchase price of each unit of the component, in dollars, exclusive of installation.

UNIT INSTALLATION COST

is the installation cost for each unit of the component, in dollars.

UNIT ANNUAL MAINT COST

is the yearly maintenance cost of each unit of the component, in dollars.

UNIT MINOR OVERHAUL COST

is the cost, in dollars, of a minor overhaul for each unit of the component.

MINOR OVERHAUL INTERVAL

is the number of years between minor overhauls.

UNIT MAJOR OVERHAUL COST

is the cost, in dollars, of a major overhaul for each unit of the component.

MAJOR OVERHAUL INTERVAL

is the number of years between major overhauls.

ES-A Annual Costs and Savings

This report gives the present value of energy and operations costs for each year of the project lifetime. Costs are given both for the baseline and for the building being analyzed in the present run. Operations include costs of annual maintenance and major and minor overhauls. For the building being analyzed in this run, operations costs are given separately for plant equipment and for the building (non-plant) components specified using COMPONENT-COST instructions.

ENERGY COST BASELINE

is the present value of the yearly baseline energy cost. These values echo those input using the BASELINE command.

ENERGY COST THIS RUN

is the present value of the yearly energy cost for the building being analyzed in this run.

ENERGY COST SAVINGS

is the difference between the above two quantities (1 minus 2).

OPRNS COST BASELINE

is the present value of the yearly baseline operations cost.

OPRNS COST--THIS RUN

gives the present value of the yearly operations cost for plant equipment and building components, and for the sum, for the building being analyzed in this run.

OPRNS COST SAVINGS

is OPRNS COST BASELINE minus OPRNS COST--THIS RUN, TOTAL.

TOTAL SAVINGS-ENERGY PLUS OPRNS

is the sum of ENERGY COST SAVINGS and OPRNS COST SAVINGS.

The bottom line of this report (TOTALS) gives the present value of the life cycle energy and operations costs and savings.

Note: You must enter baseline cost data using the BASELINE command. Otherwise, the "savings" values in this report will not be meaningful.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum        DOE-2.2-44a2   9/24/2004    18:18:14  BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- ES-A Annual Costs and Savings                                        WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------------------------------
```

	E N E R G Y ($)			O P E R A T I O N S ($)					TOTAL SAVINGS-
	ENERGY COST	ENERGY COST	ENERGY COST	OPRNS COST	OPRNS COST -- THIS RUN			OPRNS COST	ENERGY PLUS
YEAR	BASELINE	THIS RUN	SAVINGS	BASELINE	PLANT	BUILDING	TOTAL	SAVINGS	OPRNS
----	--------	--------	-------	--------	-----	--------	-----	-------	--------
1	4369.	4115.	254.	249.	249.	0.	249.	0.	254.
2	4431.	4177.	254.	238.	238.	0.	238.	0.	255.
3	4493.	4240.	253.	314.	226.	0.	226.	88.	341.
4	4557.	4305.	252.	216.	215.	0.	215.	1.	253.
5	4622.	4370.	252.	205.	205.	0.	205.	0.	251.
6	4688.	4437.	251.	272.	195.	0.	195.	77.	327.
7	4756.	4506.	250.	186.	186.	0.	186.	0.	250.
8	4824.	4575.	249.	412.	177.	0.	177.	235.	483.
9	4894.	4646.	248.	236.	169.	0.	169.	67.	315.
10	4966.	4718.	248.	161.	161.	0.	161.	0.	248.
11	5038.	4792.	246.	212.	153.	0.	153.	59.	305.
12	5113.	4867.	246.	146.	146.	0.	146.	0.	246.
13	5188.	4944.	244.	139.	139.	0.	139.	0.	245.
14	5265.	5022.	243.	828.	132.	0.	132.	696.	939.
15	5344.	5101.	243.	126.	126.	0.	126.	0.	243.
16	5424.	5182.	242.	279.	120.	0.	120.	159.	401.
17	5505.	5264.	241.	159.	114.	0.	114.	45.	285.
18	5588.	5348.	240.	109.	109.	0.	109.	0.	240.
19	5673.	5434.	239.	104.	104.	0.	104.	0.	239.
20	5759.	5521.	238.	531.	99.	0.	99.	432.	670.
21	5847.	5610.	237.	94.	94.	0.	94.	0.	237.
22	5936.	5701.	235.	124.	90.	0.	90.	34.	270.
23	6027.	5793.	234.	85.	85.	0.	85.	0.	234.
24	6120.	5887.	233.	189.	81.	0.	81.	108.	341.
25	6215.	5983.	232.	108.	77.	0.	77.	31.	263.
TOTALS($)	130642.	124539.	6103.	5722.	3691.	0.	3691.	2031.	8134.

ES-B Life-Cycle Non-Energy Costs

This report summarizes life cycle costs (other than for energy) for plant equipment and for each building component.

FIRST COST

is the initial purchase price, including installation.

REPLACEMENTS

is the present value of the life-cycle replacement costs.

OPERATIONS

is the present value of the life-cycle cost for annual maintenance and major and minor overhauls.

TOTAL

gives the sum of the previous three quantities.

INVESTMENT

is the sum of the first two quantities, FIRST COST and REPLACEMENTS. Note that the investment does not include operations or energy costs.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum         DOE-2.2-44a2  9/24/2004   18:18:14  BDL RUN  1
Design-day sizing of VAV system        Show All Reports
REPORT- ES-B Life-Cycle Non-Energy Costs                                                 WEATHER FILE- TRY  CHICAGO
-------------------------------------------------------------------------------------------------------------------------


                             LIFE-CYCLE BUILDING AND PLANT NON-ENERGY COSTS ($)
                             -------------------------------------------------



                                                                                    INVESTMENT
                                      FIRST COST                                    (FIRST COST
                                      (INCLUDING                                        PLUS
                       COST NAME      INSTALLATION)  REPLACEMENTS  OPERATIONS   TOTAL  REPLACEMENTS)
                       ---------      -------------  ------------  ----------   -----  -------------

                       ROOF-INSUL            5500.           0.          0.    5500.          5500.

                       PLANT EQUIPMENT      29273.           0.        3691.   32964.        29273.
                                      -------------  ------------  ----------   -----  -------------

                       TOTALS              34773.           0.        3691.   38464.        34773.
```

ES-C Life-Cycle Investment Savings

ENERGY SAVINGS

This section summarizes the annual energy use at the site and at the source for the baseline building and for the present building.

INVESTMENT STATISTICS:

INVESTMENT THIS RUN

is the total investment associated with the present building. This number is the same as the total investment in building components and plant equipment given in Report ES-B.

The following quantities are meaningful only if baseline costs and energy use have been specified.

BASELINE REPLACEMENT COSTS

gives the present value of life-cycle replacement costs for the baseline. This quantity is specified by the keyword REPLACE-COST of the BASELINE command.

INCREMENTAL INVESTMENT

is the INVESTMENT THIS RUN minus the sum of BASELINE REPLACEMENT COSTS and BASELINE FIRST COST (as given below under OVERALL LIFE-CYCLE COSTS).

COST SAVINGS

is the present value of the life cycle savings in energy and operations costs. This number is also given in Report ES-A.

RATIO OF SAVINGS TO INCREMENTAL INVESTMENT (SIR)

gives dollars saved per dollar invested. It is the ratio of COST SAVINGS and INCREMENTAL INVESTMENT. If this ratio is greater than 1.0, the investment may be cost effective.

DISCOUNTED PAYBACK PERIOD

is the number of years it takes for the accumulated cost savings to equal the incremental investment. The shorter the payback period, the more cost effective is the investment.

RATIO OF LIFE CYCLE ENERGY SAVINGS (AT SITE) TO INCREMENTAL INVESTMENT

gives the life-cycle site energy saved per incremental investment dollar.

RATIO OF LIFE CYCLE ENERGY SAVINGS (AT SOURCE) TO INCREMENTAL INVESTMENT

gives the life-cycle source energy saved (in units of per incremental investment dollar.

OVERALL LIFE-CYCLE COSTS

This section summarizes the life cycle costs and savings for the following categories: first cost (including installation), operations, replacements, energy, and sum of all these.

```
Simple Structure Run 3, Chicago         Divide into zones; add plenum         DOE-2.2-44a2   9/24/2004   18:18:14  BDL RUN  1
Design-day sizing of VAV system         Show All Reports
REPORT- ES-C Life-Cycle Investment Savings                                            WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------------
```

```
                                          ENERGY SAVINGS
                                          --------------


                       ANNUAL                  ANNUAL                  ANNUAL                ANNUAL
                    ENERGY USE              ENERGY USE               ENERGY                ENERGY
                     BASELINE                THIS RUN               SAVINGS               SAVINGS
                  (MBTU)   (MWH)          (MBTU)   (MWH)          (MBTU)   (MWH)            (PCT)
                  --------------          --------------          --------------          -------

        AT SITE   363.93  106.63          318.47   93.31          45.46   13.32             12.5

        AT SOURCE 709.67  207.93          671.09  196.63          38.58   11.30              5.4




                                       INVESTMENT STATISTICS
                                       ---------------------

                                     PROJECT LIFE   25.0 YEARS
                                                              RATIO OF                 RATIO OF
                                                            LIFE CYCLE               LIFE-CYCLE
                                              RATIO OF    ENERGY SAVINGS           ENERGY SAVINGS
                         BASELINE            SAVINGS TO   DISCOUNTED     (AT SITE)            (AT SOURCE)
          INVESTMENT   REPLACEMENT  INCREMENTAL    COST   INCREMENTAL    PAYBACK   TO INCREMENTAL        TO INCREMENTAL
          THIS RUN        COSTS     INVESTMENT  SAVINGS   INVESTMENT     PERIOD      INVESTMENT            INVESTMENT
            ($)            ($)         ($)        ($)        (SIR)       (YEARS)  (MBTU/$)     (MWH/$)   (MBTU/$)     (MWH/$)
          ----------   -----------  -----------  -------  -----------   ----------  ----------------------  --------------------

           34773.          0.         5475.      8134.        1.49       16.42      0.21        0.06      0.18        0.05




                                    OVERALL LIFE-CYCLE COSTS ($)
                                    ----------------------------


                        FIRST COST   OPRNS COST  REPLACEMENTS   ENERGY COST   T O T A L
                        ----------   ----------  ------------   -----------   ---------

           BASELINE       29298.        5722.          0.         130642.      165662.

           THIS RUN       34773.        3691.          0.         124539.      163003.
                        ----------   ----------  ------------   -----------   ---------

          SAVINGS($)      -5475.        2031.          0.           6103.        2659.
            (PCT)          -18.7         35.5         0.0            4.7          1.6
```

ES-D Energy Cost Summary

This report summarizes the yearly energy consumption and cost for all UTILITY-RATEs that have been defined.

UTILITY-RATE

lists the U-name of each UTILITY-RATE.

RESOURCE

lists the RESOURCE.

METERS

lists the meter names for each UTILITY-RATE.

METERED ENERGY

is the actual metered energy of the meters, not adjusted for any minimum energy requirements.

TOTAL CHARGE

is the total yearly charge.

VIRTUAL RATE

is the total yearly charge divided by the metered energy.

RATE USED ALL YEAR?

If NO, the rate was not used for all 12 billing cycles, either because the rate did not qualify all months, the QUAL-SCH was not active all months, or the run period was less than 12 months.

ENERGY COST/ GROSS BLDG AREA

ENERGY COST/ NET BLDG AREA

give the energy cost per unit area. Here, gross building area is the value of the keyword GROSS-AREA in the BUILD-PARAMETERS command in LOADS. NET BLDG AREA is the sum of the floor areas of the conditioned zones. If not specified, GROSS-AREA defaults to NET BDLG AREA.

The program does a check to ensure that all energy passed from PLANT is accounted for in one or more UTILITY-RATEs. If not, or if double counting of energy has occurred, a warning will be printed at the bottom of this report.

```
Simple Structure Run 3, Chicago      Divide into zones; add plenum        DOE-2.2b-027  Fri Jan  9 15:25:08 1998BDL RUN  1
Design-day sizing of VAV system      Show All Reports
REPORT- ES-D Energy Cost Summary                                          WEATHER FILE- TRY  CHICAGO
-----------------------------------------------------------------------------------------------------------------------

                                                  METERED        TOTAL      VIRTUAL
                                                   ENERGY       CHARGE         RATE      RATE USED
 UTILITY-RATE        RESOURCE         METERS       UNITS/YR        ($)      ($/UNIT)     ALL YEAR?
 ----------------    ----------------  ----------  ------------------  ----------  ----------  ---------
 ELEC-TARIFF         ELECTRICITY      EM1           48498. KWH        3059.      0.0631       YES
 GAS-RATE            NATURAL-GAS      FUEL           2168. THERM      1301.      0.6000       YES

                                                                     ==========
                                                                       4360.


                                     ENERGY COST/GROSS BLDG AREA:      0.87
                                       ENERGY COST/NET BLDG AREA:      0.87
```

ES-E Summary of Utility-Rate: <utility rate name>

This report summarizes the key costs for each UTILITY-RATE. The top of the report contains general information regarding the UTILITY-RATE as input by the user or defaulted (see description of UTILITY-RATE keywords in the Command/Keyword Dictionary). The remainder of the report summarizes costs by month.

Note that the values listed here for consumption and demand will be the summed consumption and maximum demand passed through the meters (METERED ENERGY and DEMAND columns) with any minimums and ratchets applied (BILLING ENERGY and BILLING DEMAND columns) for this billing period. These may not represent the value used to calculate the billing periods energy or demand charge (ENERGY CHARGE and DEMAND CHARGE columns) due to TOU or SEASONAL schedules assocated with charges. See Report ES-F for details on components of the energy and demand charge.

MONTH

is the billing period ending with the BILLING-DAY.

METERED ENERGY

is the energy in the meters as consumed in the building.

BILLING ENERGY

is the energy used for billing purposes. This amount may be greater than the metered energy if a minimum energy qualifier is used. This amount will be 0.0 if the UTILITY-RATE did not qualify for this month.

METERED DEMAND

is the maximum demand in the meters in this billing period as consumed in the building. The value will be either the hourly or daily demand as specified by the DEMAND-WINDOW.

BILLING DEMAND

is the demand used for billing purposes. This amount may be either greater or less than the metered demand depending on the minimum demand qualifier and/or ratchets. This value will be 0.0 if the UTILITY-RATE did not qualify for this month.

ENERGY CHARGE

are all energy charges, including BLOCK-CHARGEs.

DEMAND CHARGE

are all demand charges, including BLOCK-CHARGEs.

ENERGY CST ADJ

are the energy cost adjustments.

TAXES

are the sum of per unit and percentage taxes.

SURCHRG

are the sum of per unit and percentage surcharges.

FIXED CHARGE

are the MONTH-CHGS defined by the user.

MINIMUM CHARGE

is the minimum monthly charge as determined by the MIN-MON-CHG or the MIN-MON-DEM-CHG.

VIRTUAL RATE

is the total charge divided by the metered energy. This rate should not exceed the RATE-LIMITATION plus fixed charges.

TOTAL CHARGE

is the sum of all charges.

```
SIMPLE STRUCTURE RUN 3A, CHICAGO        INCREASED ROOF INSULATION              DOE-2.2b-027  Fri Jan  9 13:55:16 1998BDL RUN  1

REPORT- ES-E Summary of Utility-Rate:        ELEC-RATE                           WEATHER FILE- Chicago IL TMY2
-----------------------------------------------------------------------------------------------------------------------------

  UTILITY-RATE:  ELEC-RATE              RESOURCE:  ELECTRICITY       DEMAND-WINDOW:   15                    3413. BTU/KWH
                                        BILLING-DAY:  31             RATE-LIMITATION:   0.0000
                                        METERS:   EM1
                                        POWER-FACTOR:  0.80          EXCESS-KVAR-FRAC:  0.75          EXCESS-KVAR-CHG:   0.0000

   RATE-QUALIFICATIONS                      BLOCK-CHARGES                          DEMAND-RATCHETS       MIN-MON-RATCHETS
 --------------------------------    ------------------------------------      ----------------      ----------------
    MIN-ENERGY:          0.0            WINTER-OFF-PK      WINTER-DEMAND
    MAX-ENERGY:          0.0            WINTER-SHLDR       SUMMER-DEMAND
    MIN-DEMAND:          0.0            WINTER-ON-PK
    MAX-DEMAND:          0.0            SUMMER-OFF-PK
    QUALIFY-RATE:  ALL-MONTHS           SUMMER-SHLDR
    USE-MIN-QUAL:        NO             SUMMER-ON-PK
```

	METERED ENERGY	BILLING ENERGY	METERED DEMAND	BILLING DEMAND	ENERGY CHARGE	DEMAND CHARGE	ENERGY CST ADJ	TAXES	SURCHRG	FIXED CHARGE	MINIMUM CHARGE	VIRTUAL RATE	TOTAL CHARGE
MONTH	KWH	KWH	KW	KW	($)	($)	($)	($)	($)	($)	($)	($/UNIT)	($)
JAN	3427	3427	14.3	14.3	159	68	0	0	0	0	0	0.0664	227
FEB	2947	2947	14.1	14.1	137	68	0	0	0	0	0	0.0696	205
MAR	3231	3231	16.6	16.6	151	83	0	0	0	0	0	0.0722	233
APR	3436	3436	20.2	20.2	161	96	0	0	0	0	0	0.0747	257
MAY	4441	4441	29.1	29.1	240	294	0	0	0	0	0	0.1204	535
JUN	5193	5193	34.5	34.5	309	180	0	0	0	0	0	0.0942	489
JUL	6287	6287	39.9	39.9	374	222	0	0	0	0	0	0.0949	597
AUG	5862	5862	35.4	35.4	349	201	0	0	0	0	0	0.0938	550
SEP	4734	4734	28.7	28.7	252	308	0	0	0	0	0	0.1184	560
OCT	3848	3848	21.7	21.7	180	109	0	0	0	0	0	0.0751	289
NOV	2971	2971	14.1	14.1	138	68	0	0	0	0	0	0.0694	206
DEC	3251	3251	14.1	14.1	151	68	0	0	0	0	0	0.0675	219
	========	========	========		=======	=======	=======	=======	=======	=======	=======	=======	=======
TOTAL	49629	49629	39.9		2602	1765	0	0	0	0		0.0880	4368

ES-F Block-Charges and Ratchets for <utility rate name>

For each UTILITY-RATE this report summarizes the costs associated with each BLOCK-CHARGE, and the monthly RATCHET values. The summary varies somewhat for energy and demand BLOCK-CHARGEs.

BLOCK-CHARGES

lists the U-name of each BLOCK-CHARGE.

JAN, FEB, etc.

is the billing period ending at the BILLING-DAY of the parent UTILITY-RATE.

METERED ENERGY

is the metered energy as passed to the BLOCK-CHARGE from the parent UTILITY-RATE for each billing period, and as modified by any BLOCK-SCH for actual activity. This value will be less than the value shown for the parent UTILITY-RATE in report ES-E if the BLOCK-CHARGE was not active the whole billing period.

BILLING ENERGY

is the energy used for billing calculations. This value may be larger than the metered energy if a minimum energy qualifier is used. In addition, when costs are to be prorated between two blocks sharing the same billing period (i.e., when the season changes), this value is the total energy for the billing period.

PRORATE FACTOR

is shown only if a block is not used for an entire billing period. It is the multiplier used to split the costs between two BLOCK-CHARGEs sharing the same billing period. For seasonal changes, it is the ratio of the total hours this BLOCK-CHARGE was active to the total hours in the billing period. For seasonal changes involving seasonal or time of use charges, it is the ratio of the total hours this BLOCK-CHARGE was active to the sum of these hours plus the active hours of the other BLOCK-CHARGE.

METERED DEMAND

is the metered demand as passed to the BLOCK-CHARGE from the parent UTILITY-RATE for each billing period, and as modified by any BLOCK-SCH for actual activity.

BILLING DEMAND

is the demand used for billing calculations. This value includes any minimum demands and also ratchets. For time of use blocks sharing a TOU-SEASON-LINK, the demand will be the maximum demand of either block when both share the same billing period.

ENERGY CHGS

are the charges for the billing period. These charges are based on the billing energy, multiplied by any prorate factor shown.

TOTAL ENERGY

is the total billing energy accounted for in all BLOCK-CHARGEs. If this value does not match the quantity shown in report ES-E for the parent UTILITY-RATE, a warning will be printed indicating whether the BLOCK-CHARGEs are undercounting or double counting energy.

TOTAL CHARGES

are the total charges for energy and demand BLOCK-CHARGEs.

RATCHETS

is the U-name of each RATCHET.

TYPE

is the type of peak load calculation defined; the value is either PEAK or AVERAGE.

JAN, FEB, etc.

is the billing period ending on the BILLING-DAY. For each billing period, the value of the ratchet is listed. The user should review these values carefully to ensure that the ratchet is functioning as intended.

```
SIMPLE STRUCTURE RUN 3A, CHICAGO      INCREASED ROOF INSULATION            DOE-2.2b-027  Fri Jan  9 13:55:16 1998BDL RUN  1

REPORT- ES-F Block-Charges and Ratchets for ELEC-RATE                      WEATHER FILE- Chicago IL TMY2
-----------------------------------------------------------------------------------------------------------------------
  UTILITY-RATE: ELEC-RATE
     RESOURCE: ELECTRICITY
  ENERGY-UNITS: KWH
  DEMAND-UNITS: KW
 DEMAND-WINDOW:  15

BLOCK-CHARGES            JAN     FEB     MAR     APR     MAY     JUN     JUL     AUG     SEP     OCT     NOV     DEC    YEAR
------------------------ ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- ------- ------
-
WINTER-OFF-PK    USE: TIME-OF-USE
       METERED ENERGY:   297     248     241     200      96       0       0       0     126     205     234     263
       BILLING ENERGY:   297     248     241     200      96       0       0       0     126     205     234     263    1909
       METERED DEMAND:   9.7     9.5     7.1     3.0     1.4     0.0     0.0     0.0    17.2     2.7     4.5     9.2
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):    12      10      10       8       4       0       0       0       5       8       9      11      76

WINTER-SHLDR     USE: TIME-OF-USE
       METERED ENERGY:  1804    1554    1717    1820     999       0       0       0    1165    1978    1593    1723
       BILLING ENERGY:  1804    1554    1717    1820     999       0       0       0    1165    1978    1593    1723   14352
       METERED DEMAND:  14.3    14.1    15.4    20.2    24.9     0.0     0.0     0.0    25.4    21.1    14.1    14.1
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):    81      70      77      82      45       0       0       0      52      89      72      78     646

WINTER-ON-PK     USE: TIME-OF-USE
       METERED ENERGY:  1326    1145    1273    1417     869       0       0       0    1068    1665    1145    1266
       BILLING ENERGY:  1326    1145    1273    1417     869       0       0       0    1068    1665    1145    1266   11174
       METERED DEMAND:  13.6    13.6    16.6    19.2    25.5     0.0     0.0     0.0    27.2    21.7    13.6    13.6
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):    66      57      64      71      43       0       0       0      53      83      57      63     559

SUMMER-OFF-PK    USE: TIME-OF-USE
       METERED ENERGY:     0       0       0       0     119     326     445     385     148       0       0       0
       BILLING ENERGY:     0       0       0       0     119     326     445     385     148       0       0       0    1423
       METERED DEMAND:   0.0     0.0     0.0     0.0    18.2    25.5    27.8    26.9    13.8     0.0     0.0     0.0
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):     0       0       0       0       5      15      20      17       7       0       0       0      64

SUMMER-SHLDR     USE: TIME-OF-USE
       METERED ENERGY:     0       0       0       0    1069    2186    2569    2430    1001       0       0       0
       BILLING ENERGY:     0       0       0       0    1069    2186    2569    2430    1001       0       0       0    9255
       METERED DEMAND:   0.0     0.0     0.0     0.0    29.1    34.5    39.9    35.4    27.7     0.0     0.0     0.0
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):     0       0       0       0      59     120     141     134      55       0       0       0     509

SUMMER-ON-PK     USE: TIME-OF-USE
       METERED ENERGY:     0       0       0       0    1288    2681    3273    3047    1225       0       0       0
       BILLING ENERGY:     0       0       0       0    1288    2681    3273    3047    1225       0       0       0   11514
       METERED DEMAND:   0.0     0.0     0.0     0.0    27.8    30.0    37.1    33.4    28.7     0.0     0.0     0.0
       BILLING DEMAND:   0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
       ENERGY CHGS($):     0       0       0       0      84     174     213     198      80       0       0       0     748

WINTER-DEMAND    USE: TIME-OF-USE
       METERED ENERGY:  1326    1145    1273    1417     869       0       0       0    1068    1665    1145    1266
       BILLING ENERGY:     0       0       0       0       0       0       0       0       0       0       0       0   11183
       METERED DEMAND:  13.6    13.6    16.6    19.2    25.5     0.0     0.0     0.0    27.2    21.7    13.6    13.6
       BILLING DEMAND:  13.6    13.6    16.6    19.2    25.5     0.0     0.0     0.0    27.2    21.7    13.6    13.6
       DEMAND CHGS($):    68      68      83      96     127       0       0       0     136     109      68      68     823

SUMMER-DEMAND    USE: TIME-OF-USE
       METERED ENERGY:     0       0       0       0    1288    2681    3273    3047    1225       0       0       0
       BILLING ENERGY:     0       0       0       0       0       0       0       0       0       0       0       0   11519
       METERED DEMAND:   0.0     0.0     0.0     0.0    27.8    30.0    37.1    33.4    28.7     0.0     0.0     0.0
       BILLING DEMAND:   0.0     0.0     0.0     0.0    27.8    30.0    37.1    33.4    28.7     0.0     0.0     0.0
       DEMAND CHGS($):     0       0       0       0     167     180     222     201     172       0       0       0     942
                       ======= ======= ======= ======= ======= ======= ======= ======= ======= ======= ======= ======= =======
         TOTAL ENERGY:  3427    2947    3231    3436    4441    5193    6287    5862    4733    3848    2971    3251   49629
      TOTAL CHARGES ($): 227     205     233     257     535     489     597     550     560     289     206     219    4368
```

ES-G Summary of Pollutant Production

This report gives monthly values of atmospheric pollutant production associated with the combustion of various types of fuel, both on-site and off-site at the utility power plant that supplies electricity to the building. Six types of pollutants are listed: carbon dioxide, sulphur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons and particulate matter. (The following report, ES-H, gives pollutant production by time-of-use period.) See "Pollutant Production Calculation" in the *Topics Manual.*

```
SIMPLE STRUCTURE RUN 3A, CHICAGO       INCREASED ROOF INSULATION             DOE-2.2b-027  Fri Jan  9 13:55:16 1998BDL RUN  1

REPORT- ES-G Summary of Pollutant Production                                         WEATHER FILE- Chicago IL TMY2
-----------------------------------------------------------------------------------------------------------------------------


           CARBON     SULPHER    NITROGEN     CARBON      HYDRO-  PARTICULATE
          DIOXIDE     DIOXIDE      OXIDES    MONOXIDE    CARBONS       MATTER
 MONTH      (LB)        (LB)        (LB)        (LB)        (LB)        (LB)
 -----   --------    --------    --------    --------    --------    --------

  JAN      8378.1    78.62238    17.64021     1.97866     0.10554     1.78545

  FEB      6199.2    67.59749    13.97099     1.40433     0.08568     1.50900

  MAR      5618.3    74.11236    13.91426     1.19124     0.08800     1.62381

  APR      3899.3    78.81496    12.32568     0.65315     0.08313     1.67291

  MAY      4346.2   101.85219    15.10340     0.63920     0.10394     2.14390

  JUN      5082.1   119.09686    17.66057     0.74743     0.12153     2.50688

  JUL      6153.1   144.19458    21.38225     0.90494     0.14714     3.03516

  AUG      5737.2   134.44791    19.93694     0.84377     0.13720     2.83001

  SEP      4632.5   108.56061    16.09818     0.68131     0.11078     2.28510

  OCT      3836.9    88.25845    13.17182     0.57480     0.09042     1.85960

  NOV      4750.3    68.15607    12.30003     0.97235     0.07883     1.48248

  DEC      7006.5    74.58499    15.61343     1.59872     0.09538     1.66931
         ========    ========    ========    ========    ========    ========

 TOTAL   65638.3  1138.26819   189.11319    12.18972     1.24755    24.40296
```

ES-H Pollutant Production by Block-Charge

This report shows monthly atmospheric pollutant production according to time of use in the month. As in Report ES-G, "Summary of Pollutant Production," six pollutants are listed: carbon dioxide, sulphur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons and particulate matter. These pollutants are produced on-site and at the utility power plant that supplies electricity to the building.

The time of use is determined by blocks, which in this examples are named WINTER-OFF-PK, WINTER-SHLDR, WINTER-ON-PK, SUMMER-OFF-PK, etc. These blocks have been defined with BLOCK-CHARGE commands and are associated with an electric UTILITY-RATE, in this case one named ELEC-RATE. See "Pollutant Production Calculation" in the *Topics Manual*.

Note that the monthly values at the end of this report under "TOTAL" should correspond to the monthly values in Report ES-G.

SIMPLE STRUCTURE RUN 3A, CHICAGO   INCREASED ROOF INSULATION   DOE-2.2b-027 Fri Jan 9 13:55:16 1998BDL RUN 1

REPORT- ES-H Pollutant Production by Block-Charge   WEATHER FILE- Chicago IL TMY2

 UTILITY-RATE: ELEC-RATE

POLLUTANT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
BLOCK: WINTER-OFF-PK				USE: TIME-OF-USE									
CO2 (LB):	1797.8	1224.4	871.0	313.6	94.2	0.0	0.0	0.0	123.1	219.7	695.9	1151.9	6491.6
SO2 (LB):	6.829	5.688	5.535	4.581	2.207	0.000	0.000	0.000	2.885	4.695	5.359	6.036	43.815
NOx (LB):	2.806	2.012	1.577	0.820	0.327	0.000	0.000	0.000	0.428	0.719	1.351	1.960	12.001
CO (LB):	0.488	0.326	0.222	0.064	0.014	0.000	0.000	0.000	0.018	0.035	0.172	0.302	1.642
HC (LB):	0.015	0.011	0.009	0.005	0.002	0.000	0.000	0.000	0.003	0.005	0.008	0.011	0.068
PM (LB):	0.183	0.145	0.133	0.099	0.046	0.000	0.000	0.000	0.061	0.099	0.125	0.150	1.042
BLOCK: WINTER-SHLDR				USE: TIME-OF-USE									
CO2 (LB):	4068.1	2945.6	2805.0	2116.9	978.0	0.0	0.0	0.0	1140.4	1974.9	2389.9	3433.8	21852.4
SO2 (LB):	41.379	35.644	39.375	41.740	22.919	0.000	0.000	0.000	26.724	45.375	36.533	39.516	329.202
NOx (LB):	8.878	6.982	7.178	6.589	3.399	0.000	0.000	0.000	3.963	6.775	6.407	7.941	58.110
CO (LB):	0.940	0.645	0.580	0.361	0.144	0.000	0.000	0.000	0.168	0.296	0.475	0.765	4.374
HC (LB):	0.054	0.044	0.046	0.044	0.023	0.000	0.000	0.000	0.027	0.046	0.041	0.049	0.375
PM (LB):	0.931	0.787	0.858	0.887	0.482	0.000	0.000	0.000	0.563	0.956	0.791	0.877	7.132
BLOCK: WINTER-ON-PK				USE: TIME-OF-USE									
CO2 (LB):	2512.2	2029.1	1942.3	1468.8	850.7	0.0	0.0	0.0	1045.7	1642.3	1664.4	2420.9	15576.4
SO2 (LB):	30.414	26.266	29.203	32.494	19.935	0.000	0.000	0.000	24.505	38.188	26.264	29.032	256.302
NOx (LB):	5.956	4.977	5.159	4.916	2.956	0.000	0.000	0.000	3.634	5.678	4.542	5.713	43.531
CO (LB):	0.550	0.433	0.389	0.228	0.125	0.000	0.000	0.000	0.154	0.243	0.326	0.532	2.980
HC (LB):	0.037	0.031	0.033	0.034	0.020	0.000	0.000	0.000	0.025	0.039	0.030	0.036	0.285
PM (LB):	0.672	0.576	0.633	0.686	0.420	0.000	0.000	0.000	0.516	0.804	0.567	0.642	5.515
BLOCK: SUMMER-OFF-PK				USE: TIME-OF-USE									
CO2 (LB):	0.0	0.0	0.0	0.0	116.6	318.9	435.4	377.1	144.8	0.0	0.0	0.0	1392.8
SO2 (LB):	0.000	0.000	0.000	0.000	2.731	7.472	10.203	8.837	3.394	0.000	0.000	0.000	32.639
NOx (LB):	0.000	0.000	0.000	0.000	0.405	1.108	1.513	1.310	0.503	0.000	0.000	0.000	4.840
CO (LB):	0.000	0.000	0.000	0.000	0.017	0.047	0.064	0.055	0.021	0.000	0.000	0.000	0.205
HC (LB):	0.000	0.000	0.000	0.000	0.003	0.008	0.010	0.009	0.003	0.000	0.000	0.000	0.033
PM (LB):	0.000	0.000	0.000	0.000	0.057	0.157	0.215	0.186	0.071	0.000	0.000	0.000	0.687
BLOCK: SUMMER-SHLDR				USE: TIME-OF-USE									
CO2 (LB):	0.0	0.0	0.0	0.0	1046.1	2139.0	2514.2	2378.3	979.9	0.0	0.0	0.0	9057.5
SO2 (LB):	0.000	0.000	0.000	0.000	24.516	50.128	58.920	55.733	22.963	0.000	0.000	0.000	212.258
NOx (LB):	0.000	0.000	0.000	0.000	3.635	7.433	8.737	8.265	3.405	0.000	0.000	0.000	31.475
CO (LB):	0.000	0.000	0.000	0.000	0.154	0.315	0.370	0.350	0.144	0.000	0.000	0.000	1.332
HC (LB):	0.000	0.000	0.000	0.000	0.025	0.051	0.060	0.057	0.023	0.000	0.000	0.000	0.217
PM (LB):	0.000	0.000	0.000	0.000	0.516	1.055	1.240	1.173	0.483	0.000	0.000	0.000	4.468
BLOCK: SUMMER-ON-PK				USE: TIME-OF-USE									
CO2 (LB):	0.0	0.0	0.0	0.0	1260.7	2624.2	3203.4	2981.8	1198.6	0.0	0.0	0.0	11268.8
SO2 (LB):	0.000	0.000	0.000	0.000	29.543	61.497	75.071	69.877	28.089	0.000	0.000	0.000	264.078
NOx (LB):	0.000	0.000	0.000	0.000	4.381	9.119	11.132	10.362	4.165	0.000	0.000	0.000	39.159
CO (LB):	0.000	0.000	0.000	0.000	0.185	0.386	0.471	0.439	0.176	0.000	0.000	0.000	1.657
HC (LB):	0.000	0.000	0.000	0.000	0.030	0.063	0.077	0.071	0.029	0.000	0.000	0.000	0.269
PM (LB):	0.000	0.000	0.000	0.000	0.622	1.294	1.580	1.471	0.591	0.000	0.000	0.000	5.559
BLOCK: WINTER-DEMAND				USE: TIME-OF-USE									
CO2 (LB):	2512.2	2029.1	1942.3	1468.8	850.7	0.0	0.0	0.0	1045.7	1642.3	1664.4	2420.9	15576.4
SO2 (LB):	30.414	26.266	29.203	32.494	19.935	0.000	0.000	0.000	24.505	38.188	26.264	29.032	256.302
NOx (LB):	5.956	4.977	5.159	4.916	2.956	0.000	0.000	0.000	3.634	5.678	4.542	5.713	43.531
CO (LB):	0.550	0.433	0.389	0.228	0.125	0.000	0.000	0.000	0.154	0.243	0.326	0.532	2.980
HC (LB):	0.037	0.031	0.033	0.034	0.020	0.000	0.000	0.000	0.025	0.039	0.030	0.036	0.285
PM (LB):	0.672	0.576	0.633	0.686	0.420	0.000	0.000	0.000	0.516	0.804	0.567	0.642	5.515
BLOCK: SUMMER-DEMAND				USE: TIME-OF-USE									
CO2 (LB):	0.0	0.0	0.0	0.0	1260.7	2624.2	3203.4	2981.8	1198.6	0.0	0.0	0.0	11268.8
SO2 (LB):	0.000	0.000	0.000	0.000	29.543	61.497	75.071	69.877	28.089	0.000	0.000	0.000	264.078
NOx (LB):	0.000	0.000	0.000	0.000	4.381	9.119	11.132	10.362	4.165	0.000	0.000	0.000	39.159
CO (LB):	0.000	0.000	0.000	0.000	0.185	0.386	0.471	0.439	0.176	0.000	0.000	0.000	1.657
HC (LB):	0.000	0.000	0.000	0.000	0.030	0.063	0.077	0.071	0.029	0.000	0.000	0.000	0.269
PM (LB):	0.000	0.000	0.000	0.000	0.622	1.294	1.580	1.471	0.591	0.000	0.000	0.000	5.559
TOTAL													
CO2 (LB):	8378.1	6199.2	5618.3	3899.3	4346.2	5082.1	6153.1	5737.2	4632.5	3836.9	4750.3	7006.5	65638.3
SO2 (LB):	78.622	67.597	74.112	78.815	101.852	119.097	144.195	134.448	108.561	88.258	68.156	74.585	1138.268
NOx (LB):	17.640	13.971	13.914	12.326	15.103	17.661	21.382	19.937	16.098	13.172	12.300	15.613	189.113
CO (LB):	1.979	1.404	1.191	0.653	0.639	0.747	0.905	0.844	0.681	0.575	0.972	1.599	12.190
HC (LB):	0.106	0.086	0.088	0.083	0.104	0.122	0.147	0.137	0.111	0.090	0.079	0.095	1.248
PM (LB):	1.785	1.509	1.624	1.673	2.144	2.507	3.035	2.830	2.285	1.860	1.482	1.669	24.403

HOURLY-REPORTS

Introduction

Hourly reports are user designed. You choose the variables to be displayed from lists in the following tables. For instructions on setting up hourly reports see the HOURLY-REPORT and REPORT-BLOCK commands in the *Command/Keyword Dictionary*.

Hourly reports can be printed from the LOADS and HVAC sub-programs. You may mix REPORT-BLOCKS from the two subprograms in the same HOURLY-REPORT. However, because these two sub-programs execute sequentially (rather than in the same time step), only the variables in the report-blocks applicable to a given subprogram will print in the report following that subprogram's execution. In other words, if you mix variables from the two subprograms in the same report, the program will output the report twice; once for the LOADS variables, and again for the HVAC variables. The example shown here is from LOADS. The U-name of the HOURLY-REPORT command associated with the report is shown at the beginning of the third line. The first column of the report, headed by MMDDHH, gives the month, day and hour (in local standard time; this means that daylight savings is not taken into account in this report even if DAYLIGHT-SAVINGS = YES). Succeeding columns give the following:

> variable type (GLOBAL, BUILDING-LOADS, U-name of space, etc. as found listed in the sections below);
> variable name (DRY BULB TEMP, etc.);
> units (F, BTU/HR, etc.);
> variable-list number, in parentheses, chosen from the sections below; and
> the values of the variable for hours 1 to 24.

Statistical summaries are printed at the bottom of the page. DAILY SUMMARY displays the minimum (MN), maximum (MX), sum (SM), and average (AV) values over the day for each variable. A MONTHLY SUMMARY and YEARLY SUMMARY are printed if this is the last scheduled day of the month and run period, respectively. It is important to note that the MONTHLY SUMMARY includes only those days that satisfy three conditions:

1. in the month indicated,
2. in the RUN-PERIOD, and
3. in the REPORT-SCHEDULE.

Similarly, YEARLY SUMMARY includes only the days that are

1. in the RUN-PERIOD, and
2. in the REPORT-SCHEDULE.

You may suppress printing of hourly data and print only the DAILY, MONTHLY or YEARLY Summary by using REPORT-FREQUENCY, which is a keyword in the LOADS-REPORT, SYSTEMS-REPORT, PLANT-REPORT and ECONOMICS-REPORT commands.

Hourly values may be written to files in different formats for display by spreadsheet programs and other post-processor software. See "Saving Files of Hourly Output for Postprocessing" in this manual.

```
Simple Structure Run 3, Chicago        Divide into zones; add plenum       DOE-2.2b-027  Fri Jan  9
Design-day sizing of VAV system        Show All Reports
HOURLY REPORT- LDS-REP-1                                                     WEATHER FILE- TRY  CHICAGO
----------------------------------------------------------------------------------------------------
MMDDHH  GLOBAL     GLOBAL    GLOBAL    GLOBAL     BUILDING
                                                 -LOADS
        DRY BULB   WET BULB  WIND      GLOBAL     SENSIBLE
        TEMP       TEMP      SPEED     SOLAR      CLG LOAD
        F          F         KNOTS     BTU/HR-    BTU/HR
                                       SQFT
        ----( 4)   ----( 3)  ----(17)  ----(15)   ----(19)
 8 5 1     80.2       70.0       6.5       0.0       58102.
 8 5 2     78.4       69.5       6.5       0.0       56903.
 8 5 3     76.9       69.1       6.5       0.0       55801.
 8 5 4     75.7       68.7       6.5       0.0       54807.
 8 5 5     74.8       68.5       6.5       0.0       53939.
 8 5 6     74.2       68.3       6.5      14.7       58179.
 8 5 7     74.0       68.2       6.5      73.1       66613.
 8 5 8     74.8       68.5       6.5     134.4       70543.
 8 5 9     76.9       69.1       6.5     189.2       71352.
 8 510     80.2       70.0       6.5     233.6       71341.
 8 511     84.0       71.1       6.5     264.8       72382.
 8 512     87.8       72.2       6.5     280.6       74127.
 8 513     91.1       73.0       6.5     280.0       76189.
 8 514     93.2       73.6       6.5     263.0       79329.
 8 515     94.0       73.8       6.5     230.8       82668.
 8 516     93.8       73.7       6.5     185.5       84785.
 8 517     93.2       73.6       6.5     130.1       84450.
 8 518     92.3       73.4       6.5      68.6       80472.
 8 519     91.1       73.0       6.5      11.3       72162.
 8 520     89.6       72.6       6.5       0.0       66833.
 8 521     87.8       72.2       6.5       0.0       64239.
 8 522     86.0       71.6       6.5       0.0       62343.
 8 523     84.0       71.1       6.5       0.0       60785.
 8 524     82.0       70.6       6.5       0.0       59391.
DAILY SUMMARY (AUG  5)
     MN    74.0       68.2       6.5       0.0       53939.
     MX    94.0       73.8       6.5     280.6       84785.
     SM  2016.0     1705.4     156.0    2359.9     1637735.
     AV    84.0       71.1       6.5      98.3       68239.
MONTHLY SUMMARY (AUG)
     MN    74.0       68.2       6.5       0.0       53939.
     MX    94.0       73.8       6.5     280.6       84785.
     SM  2016.0     1705.4     156.0    2359.9     1637735.
     AV    84.0       71.1       6.5      98.3       68239.
YEARLY SUMMARY
     MN    74.0       68.2       6.5       0.0       53939.
     MX    94.0       73.8       6.5     280.6       84785.
     SM  2016.0     1705.4     156.0    2359.9     1637735.
     AV    84.0       71.1       6.5      98.3       68239.
```

HOURLY REPORT PLOT

The following example is an HOURLY-REPORT in graphic form. The month, day, and hours appear in the left-hand column. The next entry to the right is the first possible value. A period (.) indicates that there is no value at or below this value; an asterisk (*) indicates that two or more values occupy this position. The numerical values appearing on the plot are correlated to the symbol numbers in the table above the plot. Component name, in the table, is the VARIABLE-TYPE of which the variable is a part. If a value appears at the last possible position on the right it means either that the value is at this point or that the value is higher than this point.

The original input that created the following sample plot is as follows:

```
        PLOTER1 = REPORT-BLOCK
            VARIABLE-TYPE      = GLOBAL
            VARIABLE-LIST      = (15) .. $GLOBAL HORIZONTAL SOLAR$


        PLOTER2 = REPORT-BLOCK
            VARIABLE-TYPE      = SOUTHZONE
            VARIABLE-LIST      = (49) .. $DAYL ILLUM, REF PT 1$
```

```
    PLOTD = HOURLY-REPORT
        REPORT-SCHEDULE    = PLTSCH
        REPORT-BLOCK       = (PLOTER1,PLOTER2)
        OPTION             = PLOT
        AXIS-ASSIGN        = (1,2)
        AXIS-TITLES        = (*EXTERIOR SOLAR, *INTERIOR DAYLITE*)
        AXIS-MAX           = (500, 100)
        AXIS-MIN           = (0,0)
        DIVIDE             = (1,1,) ..
```

```
DAYLIGHTING EXAMPLE                    FLOOR OF OFFICE BUILDING IN CHICAGO
30-FT DEEP PERIM OFFS DAYLIT TO 15 FT  AUTO SHADE MANAGEMENT FOR SUN CONTROL
PLOTD          = HOURLY-REPORT                                                                  PAGE  1
-------------------------------------------------------------------------------------------------------


        SYMBOL     COMPONENT NAME    (NO.)  DESCRIPTION    AXIS      UNIT

          1        GLOBAL            (15)   GLOBAL  SOLAR    1     BTU/HR- SQFT
          2        SOUTHZONE         (49)   DAYL ILLREF PT 1 2     FOOTCANDLES


                                    INTERIOR DAYLITE
  0.00000E+00       0.20000E+02      0.40000E+02       0.60000E+02       0.80000E+02
      I........ .........I......... .........I......... .........I......... .........I......
                                    EXTERIOR SOLAR
  0.00000E+00       0.10000E+03      0.20000E+03       0.30000E+03       0.40000E+03
      I........ .........I......... .........I......... .........I......... .........I......
  1 2  7 *
  1 2  8 12
  1 2  9 . 1     2
  1 2 10 .     1           2
  1 2 11 .       1             2
  1 2 12 .        1            2
  1 2 13 .        1            2
  1 2 14 .       1           2
  1 2 15 .     1         2
  1 2 16 . 1     2
  1 2 17 *
  1 2 18 *
  1 2 19 *
      I........ .........I......... .........I......... .........I......... .........I......
```

The following tables describe each of the hourly report variables that you can have printed from LOADS and HVAC (SYSTEMS and PLANT). Hourly reports are not available for ECONOMICS.

The units shown here are English units; for metric output runs, the corresponding metric units that will be printed can be determined from the DOE-2 Units Table (see "Metric Input and Output")

GLOBAL

Global variables are applicable to both the LOADS and HVAC subprograms. However, the HVAC subprogram does not use many of these variables (particularly the solar data), and unused fields will be blank.. To force the LOADS global variables to print, either include the global block with other LOADS blocks, or create an hourly-report with only a global block. In other words, do not include the global block with HVAC blocks.

Variable-List Number	Variable in FORTRAN Code	Description
1	CLRNES	Atmospheric clearness number
2	TGNDR	Ground temperature (Rankine)
3	WBT	Outside wetbulb temperature (F)
4	DBT	Outside drybulb temperature (F)
5	PATM	Atmospheric pressure (in. Hg)
6	CLDAMT	Cloud amount, 0 to 10 (0 = clear, 10 = overcast)
7	ISNOW	Snow flag (1 = snowfall); not used in simulation
8	IRAIN	Rain flag (1 = rainfall); not used in simulation
9	IWNDDR	Wind direction (0-15) (0=north, 4=east, 8=south, 12=west)
10	HUMRAT	Humidity ratio (lb H_2O/lb air)
11	DENSTY	Outside air density (lb/ft³)
12	ENTHAL	Specific enthalpy of outside air (Btu/lb)
13		Unused
14	DIRSOL	Direct normal solar radiation from the weather file; zero when no solar on weather file (Btu/hr-ft²)
15	SOLRAD	Total horizontal solar radiation from the weather file; if non-solar weather file, = calculated total horizontal solar radiation (direct plus diffuse) (Btu/hr-ft²)
16	ICLDTY	Cloud type (0=cirrus, 1=stratus, 2=halfway between cirrus and stratus)
17	WNDSPD	Wind speed at weather station (knots). See also variable No.58, Variable-Type = U-name of SPACE, for windspeed at the building.
18	DPT	Dew-point temp (F)
19	WNDDRR	Wind direction in radians (clockwise from North)
20	CLDCOV	Cloud cover multiplier
21	RDNCC	Direct normal solar radiation. If non-solar weather tape, = clear day direct normal solar radiation times CLDCOV. If solar tape, = measured direct normal solar radiation (DIRSOL) (Btu/hr-ft2)
22	BSCC	Diffuse horizontal solar radiation from the sky. If non-solar weather tape, = clear day diffuse horizontal solar radiation times CLDCOV. If solar tape, = measured diffuse horizontal solar (total horizontal minus direct horizontal) (Btu/hr-ft²)
23	-	Unused

Variable-List Number	Variable in FORTRAN Code	Description
24	DBTR	Outside drybulb temperature (Rankine)
25	ISUNUP	Sun up flag (= 1 if sun is up; = 0 if down)
26	GUNDOG	Hour angle of sunrise for the day (radians)
27	HORANG	Current hour angle (radians)
28	TDECLN	Tangent of solar declination angle
29	EQTIME	Value of the solar equation of time (hr)
30	SOLCON	Fitted "solar constant" (Btu/hrft^2). See *Engineers Manual (2.1A), p.III.24.*
31	ATMEXT	Atmospheric extinction coefficient
32	SKYDFF	Sky diffusivity factor
33	RAYCOS(1)	Solar direction cosine (x) in building coordinate system
34	RAYCOS(2)	Solar direction cosine (y) in building coordinate system
35	RAYCOS(3)	Solar direction cosine (z) in building coordinate system
36	RDN	Direct normal solar radiation intensity on a clear day [calculated] Btu/hr-ft^2)
37	BSUN	Diffuse solar intensity on a horizontal surface on a clear day [calculated] Btu/hr-ft^2)
38	IYR	Year
39	IMO	Month
40	IDAY	Day
41	IHR	Hour (local time; with Daylight Saving Time if appropriate)
42	IDOY	Day of year (1-365)
43	IDOW	Day of week (1-7) (1 = Sunday, 2 = Monday, ...)
44	ISCHR	Schedule hour (DST corrected IHR + IDSTF)
45	ISCDAY	Schedule day (Day of week, 1 = Sunday, 2 = Monday ... 8 = holiday)
46	IDSTF	Daylight saving time flag (1 if daylight saving in effect, 0 if not)
47	PTWV	Pressure caused by wind velocity (inches of water)
48	ATMTUR(IMO)	Atmospheric turbidity factor according to Angstrom
49	ATMMOI(IMO)	Atmospheric moisture (inches of precipitable water)
50	PHSUND	Solar altitude (degrees above horizon)
51	THSNHR	Solar azimuth (degrees) measured clockwise from North
52	ETACLD	Cloudiness factor; ranges from 0 for overcast sky to 1.0 for clear sky
53	CHISKF	Exterior horizontal illuminance from clear part of sky (footcandles)
54	OHISKF	Exterior horizontal illuminance from overcast part of sky (footcandles)
55	HISUNF	Exterior horizontal illuminance from direct sun (footcandles).

Variable-List Number	Variable in FORTRAN Code	Description
56	ALFAD	Ratio of exterior horizontal illuminance calculated from insolation and luminous efficacy to exterior horizontal illuminance calculated from theoretical CIE sky luminance distributions.
57	CDIRLW	Luminance efficacy of direct solar radiation (lumens/watt)
58	CDIFLW	Luminance efficacy of diffuse solar radiation from clear part of sky (lumens/watt)
59	ODIFLW	Luminance efficacy of diffuse solar radiation from overcast part of the sky (lumens/watt)

BUILDING-LOADS

For each hour, entries are summed for all spaces with a heating load that hour and appear in BLDDTH (1-18), VARIABLE-LIST numbers 1-18; similarly, entries are summed for all zones with a cooling load and appear in BLDDTC (1-18), VARIABLE-LIST numbers 19-36. For example, if a building has three spaces, S1, S2, and S3, and for a given hour, S1 and S2 each have a net heating load, and S3 has a net cooling load, then: (1) the sensible heating load for S1 and S2 appears in VARIABLE-LIST number 1, the latent heating load appears in VARIABLE-LIST number 2, etc.; (2) the sensible cooling load for S3 appears in VARIABLE-LIST number 19, the latent cooling load for S3 appears in VARIABLE-LIST number 20, etc. All loads are in Btu/hr, including electric. "Sensible load" is heat extraction from space air required to maintain constant air temperature; "sensible loads" are obtained from corresponding instantaneous heat gains by application of weighting factors that account for heat storage and release by building mass. "Walls" below are exterior surfaces with tilt ≥ 45°; "roofs" are exterior surfaces with tilt < 45°. (All gains and loads reported here are calculated at *constant space air temperatures.* Corrections for variable space temperature are made in the SYSTEMS calculation.)

Variable-List Number	Variable in FORTRAN Code	Description
1	BLDDTH(1)	Building heating load (sensible)
2	BLDDTH(2)	Building heating load (latent)
3	BLDDTH(3)	Building heating load from wall conduction
4	BLDDTH(4)	Building heating load from roof conduction
5	BLDDTH(5)	Building heating load from window conduction
6	BLDDTH(6)	Building heating load from solar radiation through exterior windows
7	BLDDTH(7)	Building sensible heating load from infiltration
8	BLDDTH(8)	Building heating load from interior wall conduction
9	BLDDTH(9)	Building heating load from conduction through underground walls and floors
10	BLDDTH(10)	Building lighting heating load
11	BLDDTH(11)	Building heating load from doors
12	BLDDTH(12)	Building equipment (electrical) heating load (sensible)
13	BLDDTH(13)	Building source heating load (sensible)
14	BLDDTH(14)	Building people heating load (sensible)
15	BLDDTH(15)	Building people heating load (latent)
16	BLDDTH(16)	Building equipment (electrical) heating load (latent)
17	BLDDTH(17)	Building source heating load (latent)
18	BLDDTH(18)	Building infiltration heating load (latent)
19	BLDDTC(1)	Building cooling load (sensible)
20	BLDDTC(2)	Building cooling load (latent)
21	BLDDTC(3)	Building cooling load from wall conduction
22	BLDDTC(4)	Building cooling load from roof conduction
23	BLDDTC(5)	Building cooling load from window conduction
24	BLDDTC(6)	Building cooling load from solar radiation through exterior windows

Variable-List Number	Variable in FORTRAN Code	Description
25	BLDDTC(7)	Building cooling sensible infiltration load
26	BLDDTC(8)	Building cooling load from conduction through interior walls
27	BLDDTC(9)	Building cooling load from conduction through underground walls and floors
28	BLDDTC(10)	Building lighting cooling load
29	BLDDTC(11)	Building cooling load from door conduction
30	BLDDTC(12)	Building equipment (electrical) cooling load (sensible)
31	BLDDTC(13)	Building source cooling load (sensible)
32	BLDDTC(14)	Building people cooling load (sensible)
33	BLDDTC(15)	Building people cooling load (latent)
34	BLDDTC(16)	Building equipment (electrical) cooling load (latent)
35	BLDDTC(17)	Building source cooling load (latent)
36	BLDDTC(18)	Building infiltration cooling load (latent)
37	QBELEC	Building electric total
38	QBGAS	Building gas total
39	QBHW	Building hot water total
40	QBEQEL	Building equipment electric total
41	QBLTEL	Building lighting electric total

SPACE

All space gains and loads are in Btu/hr, including electric. "Sensible gain" means the instantaneous heat gain before application of weighting factors. "Sensible load" is the heat extraction from space air required to maintain constant air temperature; "loads" are obtained from corresponding gains by application of weighting factors that account for heat storage and release by building mass. "Walls" below are exterior surfaces with tilt greater than or equal to 45°; "roofs" are exterior surfaces with tilt less than 45°. (All sensible gains and loads reported here are calculated at constant space air temperatures. Corrections for variable space temperature are made in the SYSTEMS calculation.) All quantities are before multiplication by space multiplier or floor multiplier.

Variable-List Number	Variable in FORTRAN Code	Description
1	QWALQ	Quick wall conduction gain
2	QCELQ	Quick roof conduction gain
3	QWINC	Window conduction gain (UAΔT conduction plus absorbed solar radiation that is conducted into the space)
4	QWALD	Delayed wall conduction gain
5	QCELD	Delayed roof conduction gain
6	QINTW	Interior wall conduction gain
7	QUGF	Underground floor conduction gain
8	QUGW	Underground wall conduction gain
9	QDOOR	Door conduction gain
10	QEQPS	Electrical equipment sensible gain
11	QEQPS2	Source sensible gain
12	QPPS	People sensible gain
13	QTSKL	Task light gain
14	QSOL	Glass transmitted solar gain (from exterior windows only)
15	QPLENUM	Light heat gain to return air
16	QWALD	Quick wall conduction load
17	QCELQ	Quick roof conduction load
18	QWINC	Window conduction load (UAΔT conduction plus absorbed solar radiation that is conducted into the space)
19	QWALD	Delayed wall conduction load
20	QCELD	Delayed roof conduction load
21	QINTW	Interior wall conduction load
22	QUGF	Underground floor conduction load
23	QUGW	Underground wall conduction load
24	QDOOR	Door conduction load
25	QEQPS	Equipment sensible load
26	QEQPS2	Source sensible load

Variable-List Number	Variable in FORTRAN Code	Description
27	QPPS	People sensible load
28	QPPL	People latent gain
29	QEQPL	Equipment latent gain
30	QEQPL2	Source latent gain
31	QINFL	Infiltration latent gain
32	QTSKL	Task lighting load
33	QSOL	Glass transmitted solar load (from exterior windows only)
34	ZLTOTH	Light heat gain to other space
35	QLITE	Light gain
36	QLITEW	Light load
37	QINFS	Infiltration sensible gain
38	QELECT	Electric load for space
39	CFMINF	Infiltration flow rate (cfm)
40	QSUMW	Sum of all weighted loads except infiltration and latent
41	ZCOND	Space conductance (Btu/hr-F)
42	QZS	Space sensible load
43	QZL	Space latent load
44	QZTOT	Space total load
45	QZLTEL	Space electric from lights
46	QZEQEL	Space electric from equipment
47	QZGAS	Space gas
48	QZHW	Space hot water
49	RDAYIL(1)	Daylight illuminance at LIGHT-REF-POINT1 (footcandles)
50	RDAYIL(2)	Daylight illuminance at LIGHT-REF-POINT2 (footcandles)
51	BACLUM(1)	Background luminance (footlamberts) for glare calculation at LIGHT-REF-POINT1.
52	BACLUM(2)	same as BACLUM(1) but for REF-POINT2.
53	GLRNDX(1)	Daylight glare index at LIGHT-REF-POINT1 calculated after window management (if any) has been employed as a response to MAX-GLARE, MAX-SOLAR-SCH, and/or CONDUCT-TMIN-SCH.
54	GLRNDX(2)	Daylight glare index at LIGHT-REF-POINT2 calculated after window management (if any) has been employed as a response to MAX-GLARE, MAX-SOLAR-SCH, and/or CONDUCT-TMIN-SCH.
55	FPHRP(1)	Multiplier, due to daylighting, on electric lighting power for the lighting zone at LIGHT-REF-POINT1 (varies from 1.0 if no lighting energy reduction to 0.0 if lighting energy reduced to zero).
56	FPHRP(2)	Multiplier, due to daylighting, on electric lighting power for the lighting zone at LIGHT-REF-POINT2 (varies from 1.0 if no lighting energy reduction to 0.0 if

Variable-List Number	Variable in FORTRAN Code	Description
		lighting energy reduced to zero).
57	<POWER-RED-FAC>	Net multiplier, due to daylighting, on electric lighting power for the entire space (= FPHRP(1) * ZONE-FRACTION1 + FPHRP(2) * ZONE-FRACTION2 + [1- (ZONE-FRACTION1) - (ZONE-FRACTION2)]).
58	WNDSPZ	Free-stream windspeed at the location of the space (knots).
		This is the weather station windspeed (Variable #17, VARIABLE-TYPE = GLOBAL) corrected for terrain, shielding, and space height effects.

EXTERIOR-WALL

Variable-List Number	Variable in FORTRAN Code	Description
1	SOLI	Total solar radiation on wall (direct and diffuse) after shading Btu/hr-ft²)
2	XGOLGE	Fraction of the wall that is shaded from direct solar radiation
3	FILMU	Outside air film U-value, radiative plus convective (Btu/hr-ft²-F)
4	PCO	Pressure difference across wall caused by wind velocity and stack effect (inches. of water)
5	Q	Heat transfer from the wall to the zone, unweighted (Btu/hr)
6	T	Outside surface temperature (Rankine)
7	CFM	Crack method air flow for wall (cfm)
8	C2	Used in response factor determination of Q and T for delayed walls
9	C3	Used in response factor determination of Q and T for delayed walls
10	SUMXDT	Used in response factor determination of Q and T for delayed walls
11	SUMYDT	Used in response factor determination of Q and T for delayed walls
12	DT	Used in response factor determination of Q and T for delayed walls
13	XSXCMP	Used in response factor determination of Q and T for delayed walls
14	XSQCMP	Used in response factor determination of Q and T for delayed walls
15	ETA	Cosine of the angle between the direction of the sun and the surface outward normal
16	BG	Solar radiation reflected from ground (Btu/hr-ft²) [total horizontal solar radiation x ground reflectance]. This is *not* equal to the ground diffuse solar radiation incident on the wall.
17	<DIREWSH>	Intensity of direct solar radiation on the surface *before* shading (Btu/hr-ft²)
18	<DIFEWSH>	Intensity of diffuse solar radiation on the surface from the sky and ground, *after* shading (Btu/hr-ft²) incident on the wall.
19		Total solar intensity

WINDOW

Except as noted, the following variables are applicable to both exterior windows (WINDOW in EXTERIOR-WALL) and interior windows (WINDOW in INTERIOR-WALL between a sunspace and a non-sunspace). The effect of a window MULTIPLIER, if specified, is not taken into account.

Variable -List Number	Variable in FORTRAN Code	Description
1	UAVE	Area-weighted average of glass plus frame U-value (glass U-value is multiplied by CONDUCT-SCHEDULE if defined). Includes inside and outside film coefficients (Btu/hr-ft²-F).
2	TDIR	Direct radiation transmission coefficient of all panes of glass in the window. If SHADING-COEF is specified, equals direct transmission coefficient of 1/8" clear reference glass.
3	ADIRO	Direct radiation absorption coefficient (outer pane). If SHADING-COEF is specified, equals direct absorption coefficient of 1/8" clear reference glass.
4	TDIF	Net diffuse radiation transmission coefficient of all panes of glass int he window. If SHADING-COEF is specified, equals diffuse transmission coefficient of 1/8" clear reference glass.
5	ADIFO	Diffuse radiation absorption coefficient (outer pane). If SHADING-COEF is specified, equals diffuse absorption coefficient of 1/8" clear reference glass.
6	ADIRI	Direct radiation absorption coefficient (inner pane). Zero if SHADING-COEF is specified or single pane.
7	ADIFI	Diffuse radiation absorption coefficient (inner pane). Zero if SHADING-COEF is specified or single pane.
8	FI	Inward-flowing fraction of heat from solar radiation absorbed by the inner pane. Zero if SHADING-COEF is specified or single pane.
9	FO	Inward-flowing fraction of heat from solar radiation absorbed by the inner pane..
10	AGOLGE	Fraction of window area that is shaded from direct solar radiation. [Exterior WINDOW only]
11	QDIR	Direct solar radiation incident on window (after shading by setback, overhang, etc.) divided by the total window area (Btu/hr-ft²).
12	QDIF	Diffuse solar radiation incident on window (after shading by setback, overhang, etc.) divided by the total window area (Btu/hr-ft²).
13	QTRANS	Direct and diffuse solar energy transmitted through glass (after shading by setback, overhang, etc.) divided by glass area (Btu/hr-ft²), before multiplication by glass shading coefficient, if applicable, and by SHADING-SCHEDULE value. [Exterior WINDOW only]
14	QABS	Direct and diffuse solar energy absorbed by glass (after shading by set-back, overhang, etc.) and conducted into the space, divided by glass area (Btu/hr-ft²), before multiplication by glass shading coefficient, if applic-able, and by SHADING-SCHEDULE value. [Exterior WINDOW only]
15	QSOLG+QABSG	Transmitted plus reconducted solar heat gain through window (glass plus frame) (after shading by setback, overhang, etc.)(Btu/hr). For exterior WINDOW: [(QTRANS+QABS)* (glass area) * (shading coefficient of glass)* (SHADING-

Variable-List Number	Variable in FORTRAN Code	Description
		SCHEDULE value if defined and shade is in place)] + [direct and diffuse solar energy absorbed by frame and conducted into the space]. shading coefficient is 1.0 if GLASS-TYPE-CODE is used.
16	GSHACO	Shading coefficient of glass. Used only if SHADING-COEF is specified. 1.0 if GLASS-TYPE-CODE is <= 11.
17	QCON+QC/ETEMONFR	Conduction heat gain through window (glass plus frame) (Btu/hr): = UAVE * (glass area + frame area) (outside DBT - zone temp) - (exterior IR radiation correction) [exterior WINDOW only; for interior WINDOWs see Variable No. 58, VARIABLE-TYPE = ZONE, in SYSTEMS.
18	SWFAC	Switching factor. 0.0 = unswitched; 1.0 = fully switched. [Exterior WINDOW only]
19	SHMULT	Value by which solar heat gain of glazing is multiplied when glass is covered by a shading device. Determined by SHADING-SCHEDULE
20	SOLGMX	Transmitted direct solar gain threshold for activation of glass shading device (Btu/ft²). Determined by MAX-SOLAR-SCH.
21	none	Visible transmittance of glazing (excluding shading device) for direct solar radiation. [Exterior WINDOW only]
22	TAU1	Value by which visible transmittance of glazing is multiplied when glass is covered by a shading device. Determined by VIS-TRANS-SCH. [Exterior WINDOW only]
23	<SHADING-FLAG>	Disposition of window shading device: 0 = no shade assigned to window; 1 = shade assigned but open this hour; 2 = shade assigned and closed this hour due to solar gain, outside dry bulb temperature, or glare test, or for daylit spaces because WIN-SHADE-TYPE = FIXED-INTERIOR or FIXED-EXTERIOR; 3 = shade assignedand closed this hour but no solar gain, outside dry bulb temperature, or glare test requested (preset schedule control)
24	<ILLUMW>$_1$	Contribution of window to daylight illuminance at LIGHT-REF-POINT1 with no shading device on glass (footcandles). [Exterior WINDOW only]
25	<ILLUMW>$_2$	Contribution of window to daylight illuminance at LIGHT-REF-POINT2 with no shading device on window (footcandles). [Exterior WINDOW only]
26	<ILLUMW>$_3$	Contribution of window to daylight illuminance at LIGHT-REF-POINT1 with glass covered by shading device on window (footcandles). [Exterior WINDOW only]
27	<ILLUMW>$_4$	Contribution of window to daylight illuminance at LIGHT-REF-POINT2 with glass covered by shading device (footcandles). [Exterior WINDOW only]

Variable -List Number	Variable in FORTRAN Code	Description
28	BLDCOV	Fraction of window covered by blind (-999 if no blind).
29	ANGSLATADJ	Slat angle for window with blind (-999 if no blind).

DOOR

Variable-List Number	Variable in FORTRAN Code	Description
1	FILMU	Outside air film U-value, radiative plus convective (Btu/hr-ft²-F)
2	DRGOLG	Fraction of door shaded from direct solar radiation
3	SOLID	Solar radiation incident on door (Btu/hr-f²)
4	TSOLD	Outside surface temperature (R)
5	QD	Heat flow through door (Btu/hr-ft²-F)
6	CFMD	Crack method infiltration air flow (cfm)

ZONE

Variable-List Number	Variable in FORTRAN Code	Description
1	<QS>	Sensible load at constant zone temperature (from LOADS) (Btu/hr)
2	<QL>	Latent load at constant zone temperature, excluding infiltration (from LOADS) (Btu/hr)
3	<ZKW>	Zone electrical load (from LOADS) (kW)
4	<QP>	Light heat to return air (from LOADS) (Btu/hr)
5	<CFMINF>	Outdoor air infiltration rate (from LOADS) (cfm)
6	<TNOW>	Current hour zone temperature (F).
7	<TSET>	Current hour zone thermostat setting; a diagnostic variable not meaningful when <TNOW> is outside the throttling range of either HEAT-TEMP-SCH or COOL-TEMP-SCH (F)
8	<QNOW>	Current hour heat extraction rate; a diagnostic variable not meaningful when <TNOW> is outside the throttling range of either HEAT-TEMP-SCH or COOL-TEMP-SCH (F). Excludes heat extraction due to interzone convection across interior wall between sunspace and non-sunspace. For sunspaces, excludes heat extraction due to venting.
9	<CONDUCHR>	Sum of exterior wall + interior wall thermal conductances from LOADS (Btu/hr-F)
10	-	Unused
11	EXCFM	Exhaust air flow rate (cfm)
12	FH	Hot air flow rate (cfm)
13	FC	Cold air flow rate (cfm)
14	CFMZ	Zone supply air flow rate (cfm)
15	QHBZ	Baseboard heat output to zone (Btu/hr)
16	QOVER	Amount of extra heat extraction needed to hold setpoint if load not met (Btu/hr)
17	THZ	Thermostat setpoint for heating (F)
18	TCZ	Thermostat setpoint for cooling (F)
19	ERMAX	Maximum heat extraction rate (meaningful only within the current thermostat band) (Btu/hr)
20	ERMIN	Minimum heat extraction rate (meaningful only within the current thermostat band) (Btu/hr)
21	TRY	Trial zone temperature (if no zone coil activity) (F)
22	FTD	F in temperature variation calculation (TEMDEV subroutine) (Btu/hr)
23	CORINT	A part of the correction in SYSTEMS for the contribution to the zone load due to conduction from adjacent zones (partially calculated in LOADS)

Variable-List Number	Variable in FORTRAN Code	Description
		(Btu/hr)
24	G0	Air temperature weighting factors (Btu/hr-F)
25	G1	Air temperature weighting factors (Btu/hr-F)
26	G2	Air temperature weighting factors (Btu/hr-F)
27	G3	Air temperature weighting factors (Btu/hr-F)
28	SIGMAG	G0 + G1 + G2 + G3 (Btu/hr-F)
29	TL	Induced air temperature for IU, SZCI (F)
30	ZQHR	Portion of reheat load that would bring the supply temperature to the zone temperature (Btu/hr)
31	TAVE	The average zone air temperature during this hour (F). This is the value used for the energy calculation.
32	ZQH	Zone coil heating (Btu/hr)
33	ZQC	Zone coil cooling (Btu/hr)

Note: Variables 34 through 48 apply only to the systems indicated

		FC	HP	UHT	UVT	PTAC	
34	FCHPS (1)	TC	TS	-	TS	TS	Cold deck temp (F)
35	FCHPS (2)	QH	ZQH	ZQH	ZQH	ZQH	Zone heating (Btu/hr)
36	FCHPS (3)	QC	ZQC	-	-	ZQC	Zone cooling (Btu/hr)
37	FCHPS (4)	SFKW+ RFKW	ZFANKW	ZFANKW	ZFANKW	ZFANKW	Zone fan energy (Btu/hr)
38	FCHPS (5)	TM	TM	-	TM	TM	Mixed air temp (F)
39	FCHPS (6)	WR	TC	-	-	TC	WR = return humidity ratio TC = coil leaving temp
40	FCHPS (7)	WM	WM	-	-	WM	Mixed air humidity ratio (lb H_2O/lb dry air)
41	FCHPS (8)	WCOIL	WCOIL	-	-	WCOIL	Humidity ratio of air leaving cooling coil (lb H_2O/lb dry air)
42	FCHPS (9)	PO	PO	-	PO	PO	Ratio of outside air to total supply air
43	FCHPS(10)	QCLAT	QCLATZ	-	-	QCLATZ	Latent load (Btu/hr)
44	FCHPS(11)	PLRC	PLRC	-	-	PLRC	Cap. part load ratio (clg)
45	FCHPS(12)	-	PLRH	-	-	PLRH	Cap. part load ratio (ht)
46	FCHPS(13)	-	EIR	-	-	EIR	Electric input ratio

47	FCHPS(14)	WBTZ	WBTZ	-	-	WBTZ	Zone wetbulb temp (F)
48	FCHPS(15)	-	-	-	-	EIRM3	Supp heat load for zone heat pumps this hour (Btu/hr)
49	ACFM						Weighted plenum flow rate (cuft/min)
50	ZKW						Total zone elec (kW)
51	TCMINZ						Minimum zone supply air temperature (F)
52	THMAXZ						Maximum zone supply air temperature (F)
53	ERMAXM	All air systems					Extraction rate, top of deadband (Btu/hr)
54	ERMINM	All air systems					Extraction rate, bottom of deadband (Btu/hr)
55	THR						(THROTTLING-RANGE) 2 (F)

In the following descriptions, "sunspace" is a SPACE with SUNSPACE = YES; and "room" is a SPACE with SUNSPACE = NO (the default) that is adjacent to a sunspace.

Variable-List Number	Variable in FORTRAN Code	Description
56	<SGIW0>	For room only: total heat gain (unweighted) due to solar radiation coming from adjacent sunspaces through interior windows (Btu/hr).
57	<SLIW0>	For room only: total solar load (weighted) through interior windows from all adjacent sunspaces (Btu/hr).
58	QGWIN	For room or sunspace: heat gain by conduction (unweighted) through interior windows (Btu/hr), calculated with the air temperature of the zone in question fixed at the LOADS calculation temperature and actual previous-hour temperatures for adjacent zones.
59	QSNABT	For room or sunspace: solar radiation absorbed on the sunspace side (opaque part) of interior walls (Btu/hr).
60	QGOPWL	For room or sunspace: heat gain by conduction (unweighted) through opaque part of interior walls (Btu/hr), calculated with the air temperature of the zone in question fixed at the LOADS calculation temperature and actual previous-hour temperatures for adjacent zones.
61	QGVEC	For room or sunspace: heat extraction from convection across interior wall. For room, includes contribution from fan heat if AIR-FLOW-TYPE = FORCED-RECIRC (Btu/hr).
62	CFMCVT	For room or sunspace: average airflow due to convection across interior wall (cfm)
63	<CFMVNT>	For sunspace only: average airflow due to venting (cfm).
64	<QGVNT>	For sunspace only: heat extraction due to venting (Btu/hr)
65	GPMZ	Flow through unit condenser (GPM)

Variable-List Number	Variable in FORTRAN Code	Description
66	GPMHZ	Flow during unit heating (GPM)
67	GPMCZ	Flow during unit cooling (GPM)
68	QHLUPZ	Heat taken from loop (Btu/hr)
69	QCLUPZ	Heat added to loop (Btu/hr)
70	QCVZ	Cooling due to natural ventilation (Btu/Hr)
71	VNTCFM	Natural ventilation flow (cuft/min)
72	See description	VNTCFM*60/<VOLUME> - the natural ventilation air changes
73	TVZ	Natural ventilation setpoint temperature (Deg F)
74		unused
75	CAPAIR	Heat transport capacity on air side of water-side economizer
76	CAPWTR	Heat transport capacity on water side of water-side economizer
77	QCWSEM	Max possible water-side economizer exchange
78	QCWSE	Actual water-side economizer exchange
79	WSEDTA	Air temperature drop through water-side economizer
80	WSEDTW	Water temperature rise through water-side economizer
81	WSEXEF	Heat-exchanger efficiency of water-side economizer
82	WSENTU	unused
83	WSEUA	unused
84	WSEQMX	unused
85	WSEPLR	Ratio of actual load to maximum capacity for water-side economizer
86	WSEDT	Difference between entering air and water temperatures for WS econo
87	<ir;Qconv>	Ice rink - Ice load due to convection (Btu/hr)
88	<ir;Qlat>	Ice rink - Ice load due to latent heat gain (Btu/hr)
89	<ir;QceilRad>	Ice rink - Ice load from ceiling radiation (Btu/hr)
90	<ir;Qlights>	Ice rink - Ice load due to lights, weighted (Btu/hr)
91	<ir;Qsolar>	Ice rink - Ice load due to solar transmittance, weighted (Btu/hr)
92	ir;Qsubfloor>	Ice rink - Ice load due to subfloor heating (Btu/hr)
93	<ir;Qresurf>	Ice rink - Ice load due to resurfacing (Btu/hr)
94	<ir;Qskaters>	Ice rink - Ice load due to skaters, weighted (Btu/hr)
95	<ir;Qrink>	Ice rink - Gross ice load, unweighted (Btu/hr)
96	<ir;Qbrine>	Ice rink - Net brine load, weighted (Btu/hr)
97	<ir;Tceil>	Ice rink - Ceiling surface temperature (Deg F by subtracting 460.)
98	<ir;Trink>	Ice rink - Rink temperature (Deg F)
99	<ir;Wrink>	Ice rink - Humidity ratio at ice temperature (lb/lb)
100	<DCVOAcfmZ>	Hourly zone OA CFM requirement for DCV calculation (cuft/min)
101	<DCVOAcfmFrac>	Hourly zone OA/total flow for DCV calculation (cfm/cfm)

VARIABLES BY SYSTEM-TYPE FOR ZONE

V-L No.	1	2	3	4	5	6	7	8
SYSTEM-TYPE	SENS LOAD-IN	LATENT LOAD-IN	ELEC LOAD-IN	PLENUM LOAD-IN	INFL CFM	ZONE TEMP	THERMOSTAT SETPT	EXTRAC-TION RATE
SUM	A	A	A	A	A	A	A	A
SZRH	A	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	A	A	A
UHT	A	A	A	A	A	A	A	A
UVT	A	A	A	A	A	A	A	A
FPH	A	A	A	A	A	A	A	A
TPFC	A	A	A	A	A	A	A	A
FPFC	A	A	A	A	A	A	A	A
TPIU	A	A	A	A	A	A	A	A
FPIU	A	A	A	A	A	A	A	A
VAVS	A	A	A	A	A	A	A	A
PIU	A	A	A	A	A	A	A	A
RHFS	A	A	A	A	A	A	A	A
HP	A	A	A	A	A	A	A	A
HVSYS	A	A	A	A	A	A	A	A
CBVAV	A	A	A	A	A	A	A	A
RESYS	A	A	A	A	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	A	A	A	A	A	A	A	A
PVVT	A	A	A	A	A	A	A	A
RESVVT								

V-L No.	9	10	11	12	13	14	15	16
SYSTEM-TYPE	TOTAL UA FOR HOUR	UNUSED	EXH CFM	HOT DECK CFM	COLD DECK CFM	SUPPLY CFM	BBRD HEAT RATE	LOAD NOT MET
SUM	A	N	N	N	N	N	A	A
SZRH	A	N	A	N	N	A	A	A
MZS	A	N	A	A	A	A	A	A
DDS	A	N	A	A	A	A	A	A
SZCI	A	N	A	N	N	A	A	A
UHT	A	N	N	A	N	A	A	A
UVT	A	N	N	A	N	A	A	A
FPH	A	N	N	N	N	N	A	A
TPFC	A	N	A	N	N	A	A	A
FPFC	A	N	A	N	N	A	A	A
TPIU	A	N	A	N	N	A	A	A
FPIU	A	N	A	N	N	A	A	A
VAVS	A	N	A	N	N	A	A	A
PIU	A	N	A	N	N	A	A	A
RHFS	A	N	A	N	N	A	A	A
HP	A	N	A	A	A	A	A	A
HVSYS	A	N	A	N	N	A	A	A
CBVAV	A	N	A	N	N	A	A	A
RESYS	A	N	N	N	N	N	A	A
PSZ	A	N	A	N	N	A	A	A
PMZS	A	N	A	A	A	A	A	A
PVAVS	A	N	A	N	N	A	A	A
PTAC	A	N	N	A	A	A	A	A
PVVT	A	N	A	N	N	A	A	A
RESVVT								

Legend:
  A = Appropriate   D = Used for program code debugging only
  N = Not appropriate   S = System (or configuration) dependent
  X = Unused

V-L No.	17	18	19	20	21	22	23	24
SYSTEM-TYPE	HEAT SET POINT	COOL SET POINT	MAX COOLING	MAX HEATING	FLOAT TEMP	F IN TEMDEV	INT TRAN TO ZONE	TEMDEV VAR G0
SUM	A	A	A	A	A	D	A	D
SZRH	A	A	A	A	A	D	A	D
MZS	A	A	A	A	A	D	D	D
DDS	A	A	A	A	A	D	A	D
SZCI	A	A	A	A	A	D	A	D
UHT	A	A	A	A	A	D	A	D
UVT	A	A	A	A	A	D	A	D
FPH	A	A	A	A	A	D	A	D
TPFC	A	A	A	A	A	D	A	D
FPFC	A	A	A	A	A	D	A	D
TPIU	A	A	A	A	A	D	A	D
FPIU	A	A	A	A	A	D	A	D
VAVS	A	A	A	A	A	D	A	D
PIU	A	A	A	A	A	D	A	D
RHFS	A	A	A	A	A	D	A	D
HP	A	A	A	A	A	D	A	D
HVSYS	A	A	A	A	A	D	A	D
CBVAV	A	A	A	A	A	D	A	D
RESYS	A	A	A	A	A	D	A	D
PSZ	A	A	A	A	A	D	A	D
PMZS	A	A	A	A	A	D	A	D
PVAVS	A	A	A	A	A	D	A	D
PTAC	A	A	A	A	A	D	A	D
PVVT	A	A	A	A	A	D	A	D
RESVVT						D		D

V-L No.	25	26	27	28	29	30	31	32
SYSTEM-TYPE	TEMDEV VAR G1	TEMDEV VAR G2	TEMDEV VAR G3	TEMDEV SIG-MAG	IND UNIT AIR TEMP	HEAT TO ZONE T	COOL TO ZONE T	HEATING BY COILS
SUM	D	D	D	D	N	N	N	N
SZRH	D	D	D	D	N	A	N	A
MZS	D	D	D	D	N	N	N	N
DDS	D	D	D	D	N	N	N	N
SZCI	D	D	D	D	N	A	N	A
UHT	D	D	D	D	N	N	N	A
UVT	D	D	D	D	N	N	N	A
FPH	D	D	D	D	N	N	N	A
TPFC	D	D	D	D	N	N	N	A
FPFC	D	D	D	D	N	N	N	A
TPIU	D	D	D	D	A	N	N	A
VAVS	D	D	D	D	N	A	N	A
PIU	D	D	D	D	N	A	N	A
RHFS	D	D	D	D	N	A	N	A
HP	D	D	D	D	N	N	N	A
HVSYS	D	D	D	D	N	A	N	A
CBVAV	D	D	D	D	N	A	N	A
RESYS	D	D	D	D	N	N	N	N
PSZ	D	D	D	D	N	A	N	A
PMZS	D	D	D	D	N	N	N	N
PVAVS	D	D	D	D	N	A	N	A
PTAC	D	D	D	D	N	N	N	A
PVVT	D	D	D	D	N	A	N	A
RESVVT	D	D	D	D				

Legend:
 A = Appropriate   D = Used for program code debugging only
 N = Not appropriate   S = System (or configuration) dependent
 X = Unused

V-L No.	33	34	35	36	37	38	39	40
SYSTEM-TYPE	COOLING BY COILS	UNIT SUP TEMP	UNIT HEATING	UNIT COOLING	UNIT FAN KW	UNIT MIX TEMP	UNIT WR OR TC	UNIT MIX HUM
SUM	N	N	N	N	N	N	N	N
SZRH	N	N	N	N	N	N	N	N
MZS	N	N	N	N	N	N	N	N
DDS	N	N	N	N	N	N	N	N
SZCI	N	N	N	N	N	N	N	N
UHT	A	A	A	A	A	A	S	A
UVT	A	A	A	A	A	A	S	A
FPH	N	N	N	N	N	N	N	N
TPFC	A	A	A	A	A	A	A	A
FPFC	A	A	A	A	A	A	A	A
TPIU	N	N	N	N	N	N	N	N
FPIU	N	N	N	N	N	N	N	N
VAVS	N	N	N	N	N	N	N	N
PIU	N	N	N	N	N	N	N	N
RHFS	N	N	N	N	N	N	N	N
HP	A	A	A	A	A	A	A	A
HVSYS	A	N	N	N	N	N	N	N
CBVAV	N	N	N	N	N	N	N	N
RESYS	N	N	N	N	N	N	N	N
PSZ	N	N	N	N	N	N	N	N
PMZS	N	N	N	N	N	N	N	N
PVAVS	N	N	N	N	N	N	N	N
PTAC	A	A	A	A	A	A	S	A
PVVT	A	N	N	N	N	N	N	N
RESVVT								

V-L No.	41	42	43	44	45	46	47	48
SYSTEM-TYPE	UNIT COIL HUM	UNIT OA-RATIO	UNIT LAT COOL	UNIT COOL PLR	UNIT HEAT PLR	UNIT EIR	UNIT WETBULB	UNIT DEFROST
SUM	N	N	N	N	N	N	N	N
SZRH	N	N	N	N	N	N	N	N
MZS	N	N	N	N	N	N	N	N
DDS	N	N	N	N	N	N	N	N
SZCI	N	N	N	N	N	N	N	N
UHT	A	A	A	A	A	A	A	N
UVT	A	A	A	A	A	A	A	N
FPH	N	N	N	N	N	N	N	N
TPFC	A	A	A	A	A	A	A	N
FPFC	A	A	A	A	A	A	A	N
TPIU	N	N	N	N	N	N	N	N
FPIU	N	N	N	N	N	N	N	N
VAVS	N	N	N	N	N	N	N	N
PIU	N	N	N	N	N	N	N	N
RHFS	N	N	N	N	N	N	N	N
HP	A	A	A	A	A	A	A	N
HVSYS	N	N	N	N	N	N	N	A
CBVAV	N	N	N	N	N	N	N	N
RESYS	N	N	N	N	N	N	N	N
PSZ	N	N	N	N	N	N	N	N
PMZS	N	N	N	N	N	N	N	N
PVAVS	N	N	N	N	N	N	N	N
PTAC	A	A	A	A	A	A	A	A
PVVT	N	N	N	N	N	N	N	N
RESVVT								

Legend:
 A = Appropriate   D = Used for program code debugging only
 N = Not appropriate   S = System (or configuration) dependent
 X = Unused

V-L No.	49	50	51	52	53	54	55	56
SYSTEM-TYPE	WEIGHTED CFM	TOTAL ELECTRIC	MIN COOL T	MAX HEAT T	DEADBAND MAX EXTR	DEADBAND MIN EXTR	THROTTLE OVER TWO	COM WIN SOL GAIN (Btu/hr)
SUM	N	A	N	N	N	N	N	A
SZRH	A	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	A	A	A
UHT	N	A	A	A	A	A	A	A
UVT	N	A	A	A	A	A	A	A
FPH	N	A	N	N	N	N	N	A
TPFC	N	A	A	A	A	A	A	A
FPFC	N	A	A	A	A	A	A	A
TPIU	A	A	A	A	A	A	A	A
FPIU	A	A	A	A	A	A	A	A
VAVS	A	A	A	A	A	A	A	A
PIU	A	A	A	A	A	A	A	A
RHFS	A	A	A	A	A	A	A	A
HP	N	A	A	A	A	A	A	A
HVSYS	A	A	A	A	A	A	A	A
CBVAV	A	A	A	A	A	A	A	A
RESYS	N	A	A	A	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	N	A	A	A	A	A	A	A
PVVT	A	A	A	A	A	A	A	A
RESVVT								

V-L No.	57	58	59	60	61	62	63	64
SYSTEM-TYPE	COM WIN SOL LOAD BTU/HR	COM WIN CONDUC BTU/HR	COM WIN ABSD SOL BTU/HR	COM WALL CONDUC BTU/HR	CONVEC HT GAIN BTU/HR	CONVEC AIR FLOW CFM	SUNSPACE FAN POWR KW	SUNSPACE VENT FLOW CFM
SUM	A	A	A	A	A	A	A	A
SZRH	A	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	A	A	A
UHT	A	A	A	A	A	A	A	A
UVT	A	A	A	A	A	A	A	A
FPH	A	A	A	A	A	A	A	A
TPFC	A	A	A	A	A	A	A	A
FPFC	A	A	A	A	A	A	A	A
TPIU	A	A	A	A	A	A	A	A
FPIU	A	A	A	A	A	A	A	A
VAVS	A	A	A	A	A	A	A	A
PIU	A	A	A	A	A	A	A	A
RHFS	A	A	A	A	A	A	A	A
HP	A	A	A	A	A	A	A	A
HVSYS	A	A	A	A	A	A	A	A
CBVAV	A	A	A	A	A	A	A	A
RESYS	A	A	A	A	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	A	A	A	A	A	A	A	A
PVVT	A	A	A	A	A	A	A	A
RESVVT								

Legend:
  A = Appropriate   D = Used for program code debugging only
  N = Not appropriate   S = System (or configuration) dependent
  X = Unused

SYSTEM

Variable-List Number	Variable in FORTRAN Code	Description
1	TH	Temperature of air leaving the heating coil - hot deck temperature (F)
2	TC	Temperature of air leaving cooling coil - cold deck temp (F)
3	TM	Temperature of air entering coil (F)
4	TR	Return air temp downstream of the return fan and plenums (F)
5	QH	Total central heating coil energy input (Btu/hr)
6	QC	Total central cooling coil energy input (Btu/hr)
7	QHZ	Total zone heating energy input (Btu/hr)
8	QCZ	For SYSTEM:TYPE = RESYS this is the cooling by natural ventilation
9	QHB	Total baseboard heating energy input (Btu/hr)
10	QHP	Total preheat coil energy input (Btu/hr)
11	QHUM	Humidification energy input (for RESYS and RESVVT: electrical resistance heat load) (Btu/hr)
12	QDHUM	Sensible dehumidification reheat input (for RESYS and RESVVT: defrost load) (Btu/hr)
13	TCMIN	minimum temperature air handler could supply (F)
14	THMAX	maximum temperature air handler could supply (F)
15	QLSUM	Total system latent heat load from LOADS (Btu/hr)
16	QPSUM	Total system light heat to return (Btu/hr)
17	CFM	Total system supply air flow rate (cfm)
18	CFMH	Total system hot supply air flow rate (DDS, MZS, PMZS) (cfm)
19	CFMC	Total system cold supply air flow rate (DDS, MZS, PMZS) (cfm)
20	RCFM	Total system return air flow rate (cfm)
21	ECFM	Total system exhaust air flow rate (cfm)
22	CINF	Outside air infiltration rate (cfm)
23	FON	Fan on/off flag(1 = on, 0 = off, -1 cannot cycle on for NIGHT-CYCLE-CTRL)
24	HON	Heating on/off flag (1 = on, 0 = off)
25	CON	Cooling on/off flag (1 = on, 0 = off)
26	BON	Baseboard heater on-off flag (ratio from RESET-SCHEDULE)
27	CONS(1)	In the equation Q = CONS(1) * CFM * ΔT, CONS(1) = 0.24 + 0.44 * HUMRAT) * 60.0/V(*DBT, HUMRAT, PATM) = 1.08 at standard conditions
28	CONS(2)	In the equation Q = CONS(2) * CFM * DW, CONS(2) = 1061.0 * 60.0/V(*DBT, HUMRAT, PATM) = 4790 at standard conditions
29	CONS(3)	Convert fan pressure to kW: CONS(3) = 0.3996/CONS(1), 0.363 at STP

Variable-List Number	Variable in FORTRAN Code	Description
30	PH	For dual duct systems: ratio of hot duct flow to total flow
31	PC	For dual duct systems: ratio of cold duct cfm to total cfm
32	SKW	Hourly total electrical consumption (kW)
33	FANKW	Total of supply fan, return fan, and exhaust fan electrical consumption
34	DTREC	Makeup air temperature obtainable from recovery system (F)
35	WR	Return air humidity ratio (lb H_2O/lb dry air)
36	WM	Mixed air humidity ratio (lb H_2O/lb dry air)
37	WCOIL	Humidity ratio of air leaving cooling coil (lb h_2O/lb dry air)
38	WW	Water (moisture) added/removed from air for (de)humidification (lb/lb)
39	PO	Ratio of outside air flow to total supply air flow
40	D	Density of air x 60 min/hr (lb/ft³ x min/hr)
41	FTEMP	Temperature of circulating fluid for HP system (F)
42	TCR	Effect of controller on cooling coil setpoint (F)
43	QHR	Adjusted capacity of air source heat pump this hour for (Btu/hr)
44	RFanPumpKW	Refrigeration system fan plus pump energy (kWh)
45	SGAS	Total gas heating (Btu/hr)
46	SKWQH	Electrical input to heating (kW)
47	SKWQC	Electrical input to cooling (kW)
48	QCLAT	Latent part of total cooling (Btu/hr)
49	SFKW	Supply fan electrical (kW)
50	RFKW	Return fan electrical (kW)
51	FONNGT	System can be night cycled: -1 for heating, 0 for no cycle, 1 for cooling
52	WSURF	Humidity retio at saturation at coil surface temperature
53	RWalkinQ	Refrigeration system walkin load (Btu/hr)
54	TSURF	Coil surface temperature at supply setpoint (F)
55	TRh	Return temperature - dual duct hot side (return fan may be for cold only)
56	CBF	Coil bypass factor: (COIL-BF) * CBF1 * CBF2
57	CBF1	Temperature correction to COIL-BF
58	CBF2	Flow correction to COIL-BF
59	EON	Exhaust fan schedule: 0=off, 1=on
60	PLRCFM	(Current hour cfm)/(design cfm)
61	PLRC	Capacity part load ratio for cooling (also see PLRCC below)
62	PLRH	Capacity part load ratio for heating
63	QCM1	Temperature correction to COOLING-CAPACITY
64	QCM2	Temperature correction to COOL-SH-CAP
65	QHM1	Temperature correction to HEATING-CAPACITY

Variable-List Number	Variable in FORTRAN Code	Description
66	EIRM1	Temperature correction to COOLING-EIR
67	EIRM2	Part load correction to COOLING-EIR
68	EIR	(COOLING-EIR) * EIRM1 * EIRM2 (Btu/Btu)
69	OFKW	Outside fan power (kW)
70	QCT	Total cooling capacity (Btu/hr)
71	QCS	Sensible cooling capacity (Btu/hr)
72	WRMAX	Maximum humidity setpoint (lb H20/lb)
73	WRMIN	Minimum humidity setpoint (dry air)
74	CFMRAT	Maximum ratio of zone flow (for supply fans smaller than sum of zones)
75	QdistG	Heat gains to DUCT&PIPE-ZONE from pipes and ducting
76	QdistL	Heat losses from DUCT&PIPE-ZONE from pipes and ducting
77	RON	Heat recovery on/off (0/1) flag
78	QHT	The total heating capacity (Btu/hr) for central AHU
79	TPOMIN	Mixed air temperature at minimum OA damper position for central AHU
80	POMIN	The minimum OA damper position (fraction) for central AHU
81	QHSUP	The total supplemental heat load for RESYS, RESVVT, PSZ and PTAC (Btu/hr)
82	QRSENS	Sensible heat gain to zone from refrigerated casework (PSZ only) (Btu/hr)
83	QRLAT	Latent heat gain to zone from refrigerated casework (PSZ only) (Btu/hr)
84	QRREC	Energy recovered from condenser and used for space heating in heat recovery mode (PSZ only) (Btu/hr)
85	QRREJ	Energy rejected from condenser (PSZ only) (Btu/hr)
86	RCOMKW	Electrical energy consumed by compressors (PSZ only) (kW)
87	RDEFKW	Electrical energy consumed by defrosters (PSZ only) (kW)
88	RAUXKW	Electrical energy consumed by lights, fans, and anti-sweat heaters in refrigerated casework (PSZ only) (kW)
89	ECFMP	Plenum exhaust flow rate (cfm)
90	SCGAS	Gas used for cooling (Btu/hr)
91	QREG	Regeneration energy (Btu/hr)
92	WBR	Return air wetbulb temperature (F)
93	WB8	Debug variable for PTGSD
94	T8	Debug variable for PTGSD
95	W8	Debug variable for PTGSD
96	WB9	Debug variable for PTGSD
97	T9	Debug variable for PTGSD
98	W9	Debug variable for PTGSD

Variable-List Number	Variable in FORTRAN Code	Description
99	EFF	Direct evaporative cooler effectiveness
100	DTON	Fraction of hour evaporative cooler or desiccant system is on
101-111	DMODE(1-7)	Debug variables for PTGSD
108	ERMAX4	Debug variable for PTGSD
109	ERMAX5	Debug variable for PTGSD
110	ERMAX6	Debug variable for PTGSD
1111	OPMODE	Debug variable for PTGSD
112	DBOA	drybulb temperature of air leaving desiccant or evaporative supplemental cooling unit (F)
113	WOA	humidity ratio of air leaving desiccant or evaporative supplemental unit (lb H_2O/lb air)
114	DGAS	gas used to desiccate the air for integrated (supplemental) units (Btu/hr)
115	DKW	auxiliary electricity the integrated/supplemental desiccant unit used (kWh)
116	TCOND	temperature of water sent to condenser (DUBLSORB) (F)
117	QCDTOT	total cooling done by desiccant unit (Btu/hr)
118	QCDS	sensible cooling done by desiccant unit (Btu/hr)
119	QCDL	latent cooling done by desiccant unit (Btu/hr)
120	POA	ratio of air flowing through supplemental desiccant or evaporative unit to total supply air
121	EVKW	auxiliary electricity used by the supplemental evaporative cooler (kW)
122	QCEVT	total cooling done by the evaporative cooling unit (Btu/hr)
123	QCEVS	sensible cooling by the evaporative cooling unit (Btu/hr)
124	QCEVL	latent cooling by the evaporative cooling unit (Btu/hr)
125	HPDefE	heat pump defrost energy (Btu)
126	DTS	Supply air stream temperature rise across the supply fan (Deg F)
127	DTR	Supply air stream temperature rise across the return fan (Deg F)
128	TDuctEnv	Temperature of environment (zone after loss adjustment) of duct location
129-133 and 139-150 for SYSTEM-TYPE=HP and CONDENSER-TYPE=WATER-COOLED only		
129	GPMS	Condenser water flow (GPM)
130	GPMHS	Condenser flow for heating (GPM)
131	GPMCS	Condenser flow for cooling (GPM)
132	QHLUPS	Heat taken from loop (Btu/hr)
133	QCLUPS	Heat added to loop (Btu/hr)
134	IVENTF	Natural Ventilation – venting is being used 0=no
135	INT(VENTF)	Natural Ventilation – venting scheduled available 0=no 1=yes
136	IVENTG	Natural Ventilation – venting allowed (scheduled or OA enthalpy < zone)

Variable-List Number	Variable in FORTRAN Code	Description
137	QCV	Natural Ventilation – total cooling for ventilation (Btu/hr)
138	XRAN	Natural Ventilation – random number used for venting probability (0 to 1)
139	CAPAIR	Heat transport capacity of air side of water-side economizer (Btu/hr-F)
140	CAPWTR	Heat transport capacity of water sied of water-side of economizer (Btu/hr-F)
141	QCWSEM	Max possible water-side economizer exchange (Btu/hr)
142	QCWSE	Actual water-side economizer exchange (Btu/hr)
143	WSEDTA	Temperature change of air (F)
144	WSEDTW	Temperature change of water (F)
145	WSEXEF	Water-side economizer heat-exchanger effectiveness
146	WSENTU	Unused
147	WSEUA	Unused
148	WSEQMX	Unused
149	WSEPLR	Fraction of water-side economizer max flow used
150	WSEDT	Air/water temperature difference
151-153	WSE13/14/15	Unused WSE variables
154	PLRCC	Compressor PLR (accounting for MIN-UNLOAD/HGB-RATIOs)

Variables 155-213 are for HEAT-SOURCE = GAS-HEAT-PUMP or COMPRESSOR-TYPE = VARIABLE SPEED

		Cooling Mode:
155	QCRUN	Run time of compressor (hours)
156	QCLOAD	Output of unit (Btu/hr)
157	QCGAS	Gas or electricity consumed by unit for cooling (Btu/hr)
158	QCAUX	Fans/Pumps/Aux energy (Btu/hr)
159	QCGSLD	Unmet cooling load (Btu/hr)
160	QCGSUP	Unused
161	QCWAS	Waste heat generated (Btu/hr)
162	QCWASU	Waste heat used (Btu/hr)
163	QCGSAV1	Unused
164	QCFAN	Indoor fan energy (Btu/hr)
		Heating Mode:
165	QHRUN	Run time of compressor (hours)
166	QHLOAD	Output of Unit (Btu/hr)
167	QHGAS	Gas or electricity consumed by unit for heating (Btu/hr)
168	QHAUX	Fans/Pumps/Aux energy (Btu/hr)
169	QHGSLD	Load on supp heat (Btu/hr)

Variable-List Number	Variable in FORTRAN Code	Description
170	QHGSUP	Energy input to supp (Btu/hr)
171	QHWAS	Waste heat generated (Btu/hr)
172	QHWASU	Waste heat used (Btu/hr)
173	QHGDFR	Defrost imposed heat (Btu/hr)
174	QHFAN	Indoor fan energy (Btu/hr)
175	COIL-BF-FPLR	Value of COIL-BF-FPLR used this hour
176-177	-	Unused
178	COOL-EIR-FRPMT	Value of COOL-EIR-FRPMT used this hour
179	COOL-RPM-FPLR	Value of COOL-RPM-FPLR used this hour
180	COOL-WH-FT	Value of COOL-WH-FT used this hour
181	COOL-WH-FRPMT	Value of COOL-WH-FRPMT used this hour
182	COOL-CFM-FPLR	Value of COOL-CFM-FPLR used this hour
183	OUTSIDE-FAN-CFLT	Value of OUTSIDE-FAN-CFLT used this hour
184	HEAT-EIR-FRPMT	Value of HEAT-EIR-FRPMT used this hour
185	HEAT-RPM-FPLR	Value of HEAT-RPM-FPLR used this hour
186	HEAT-WH-FT	Value of HEAT-WH-FT used this hour
187	HEAT-WH-FRPMT	Value of HEAT-WH-FRPMT used this hour
188	HEAT-CFM-FPLR	Value of HEAT-CFM-FPLR used this hour
189	OUTSIDE-FAN-HFLT	Value of OUTSIDE-FAN-HFLT used this hour
190	HEAT-LOS-FPLR	Value of HEAT-LOS-FPLR used this hour
191	COOL-LOS-FPLR	Value of COOL-LOS-FPLR used this hour
192	DEFROST-FRAC-FT	Ratio of defrost/heating time
193	DEFROST-CAP-FT	Heating fraction for defrost
194	DEFROST-PWR-FT	EIR in defrost mode
195	COOL-CAP-FRPMT	Value of COOL-CAP-FRPMT curve used this hour
196	HEAT-CAP-FRPMT	Value of HEAT-CAP-FRPMT curve used this hour
197-202	-	Unused
202	PCH	Fraction of dual duct cold air that "wipes" the heating coil first
203	ISZCZ	Single zone system control zone flag 0=not control zone 1=is C-Z
204	GCAP(1)	Capacity at maximum RPM (Btu/hr)
205	GCAP(2)	Capacity at minimum RPM (Btu/hr)
206	GEDB	Entering mixed air temperature (F)
207	QHDFRG	Gas or electricity used in defrost mode (Btu/hr)
208	GRPM	Speed of compressor (RPM)
209	PLRSUP	PLR of supplemental heating unit
210	CFMCYC	Fraction fan are on for INDOOR-FAN-MODE=INTERMITTANT

Variable-List Number	Variable in FORTRAN Code	Description
211	CLPLR	Cycling loss PLR (fraction)
212	CFMVVT	Flow fraction for PVVT (fraction)
213	QHZHP	Total zone heating load for gas heat pump (Btu/hr)
214	PCCEDB	Condenser entering temperature (evaporative precooler exit temperature) (F)
215	FONh	Hot deck fan on/off
216	SFKWh	Hot deck fan power consumption. Note that item #33 is *total* kw for all fans
217	DTSh	Hot deck air temperature rise
218	CFMRATh	Ratio of hot fan max flow/hourly zonal demand
219	FONNGTh	Hot deck fan on for night cycle
220	RCFMmix	Return flow to mixed air plenum
221	RfanCFM	Air moved by return/relief fan
222	EXFIL	Exfiltration from building pressurization, excluding zonal exhaust
223	DTDUCT	Duct temperature rise/fall due to losses (F)
224	DTDUCTh	Hot duct temperature rise/fall due to losses (for two-duct systems) (F)
225	TCDFSR	Duct air temperature (F)
226	THDFSR	Hot duct air temp (for two duct systems) (F)
227	QRNOW	Display case load at LOADS temperature
228	CRNOW	Display case conductance
229	QR(1)	Lowest temperature display case load
230	QR(2)	Intermediate temperature display case load
231	QR(3)	Highest temperature display case load
232	RQSSCH(1)	Lowest temperature conductance schedule value
233	RQSSCH(3)	Intermediate temperature conductance schedule value
234	RQSSCH(3)	Highest temperature conductance schedule value
235	AUXSCH(1)	Lowest temperature auxiliary schedule value
236	AUXSCH(2)	Intermediate temperature auxiliary schedule value
237	AUXSCH(3)	Highest temperature auxiliary schedule value
238	QSENS(1)	Lowest temperature sensible load
239	QSENS(2)	Intermediate temperature sensible load
240	QSENS(3)	Highest temperature sensible load
241	QLAT(1)	Lowest temperature latent load
242	QLAT(2)	Intermediate temperature latent load
243	QLAT(3)	Highest temperature latent load
244	QDEF(1)	Lowest temperature defrost energy

Variable-List Number	Variable in FORTRAN Code	Description
245	QDEF(2)	Intermediate temperature defrost energy
246	QDEF(3)	Highest temperature defrost energy
247	SWEATKW(1)	Lowest temperature anti-sweat energy
248	SWEATKW(2)	Intermediate temperature anti-sweat energy
249	SWEATKW(3)	Highest temperature anti-sweat energy
250	COMPKW1(1)	Lowest temperature compressor energy, no htrec
251	COMPKW1(2)	Intermediate temperature compressor energy, no htrec
252	COMPKW1(3	Highest temperature compressor energy, no htrec
253	COMPKW2(1)	Lowest temperature compressor energy, htrec
254	COMPKW2(2)	Intermediate temperature compressor energy, htrec
255	COMPKW2(3)	Highest temperature compressor energy, htrec
256	QREC1(1)	Lowest temperature recoverable heat, no htrec
257	QREC1(2)	Intermediate temperature recoverable heat, no htrec
258	QREC1(3)	Lowest temperature recoverable heat, no htrec
259	QREC2(1)	Lowest temperature recoverable heat, htrec
260	QREC2(2)	Intermediate temperature recoverable heat, htrec
261	QREC2(3)	Highest temperature recoverable heat, htrec
262	QREJ1(1)	Lowest temperature condenser heat, no htrec
263	QREJ1(2)	Intermediate temperature condenser heat, no htrec
264	QREJ1(3)	Highest temperature condenser heat, no htrec
265	QREJ2(1)	Lowest temperature condenser heat, htrec
266	QREJ2(2)	Intermediate temperature condenser heat, htrec
267	QREJ2(3)	Highest temperature condenser heat, htrec
268	TcondR or <TSIGc>	Condenser temperature OR WARMEST/COLDEST cooling signal T
269	PLR(1)	Lowest temperature part load ratio
270	PLR(2)	Intermediate temperature part load ratio
271	PLR(3)	Highest temperature part load ratio
272	TREJ1	Total condenser heat, no htrec
273	TREJ2	Total condenser heat, htrec
274	TREC1	Total recoverable heat, no htrec
275	TREC2	Total recoverable heat, htrec
276	EIR1(1)	Lowest temperature electric input ratio, part load correction
277	EIR1(2)	Intermediate temperature electric input ratio, part load correction
278	EIR1(3)	Highest temperature electric input ratio, part load correction
279	EIR1r(1)	Lowest temp electric input ratio, part load correction, htrec mode

Variable-List Number	Variable in FORTRAN Code	Description
280	EIR1r(2)	Intermediate temp electric input ratio, part load corr, htrec mode
281	EIR1r(3)	Highest temp electric input ratio, part load correction, htrec mode
282	EIR2(1)	Lowest temperature electric input ratio, temperature correction
283	EIR2(2)	Intermediate temp electric input ratio, temperature correction
284	EIR2(3)	Highest temperature electric input ratio, temperature correction
285	GPMcw	Condenser water flow, water-cooled
286	FRAC1	Fraction of hour in non-htrec mode
287	FRAC2	Fraction of hour in htrec mode
288	CONDcap	Condenser capacity
289	CONDplr	Condenser fan part load ratio
290	TcondFloat or <TSIGh>	Condenser temperature when floating above setpoint OR WARMEST/COLDEST heating signal T
291	EIR3	Condenser fan power part load correction factor
292	<rv;CFMoa>	ERV Outdoor airflow
293	<rv;CFMexh>	ERV Exhaust airflow
294	<rv;effSensible>	ERV Sensible effectiveness
295	<rv;effLatent>	ERV Latent effectiveness
296	<rv;Qsensible>	ERV Sensible heat transfer (heating of OA is negative)
297	<rv;Qlatent>	ERV Latent heat transfer (moisture gain of OA is negative)
298	<rv;QHexcess>	ERV Excess heat transfer (heating of OA is negative)
299	<rv;QCexcess>	ERV Excess coolth transfer (cooling of OA is positive)
300	<rv;TervReqd>	ERV required leaving temperature to maintain mixed-air setpoint
301	<rv;TervSetpt>	ERV Temperature setpoint for air supply to mixed air plenum
302	<rv;ToaHXi>	ERV Outdoor air temperature entering HX, after preheat
303	<rv;ToaHXo>	ERV Outdoor air temperature leaving HX (to mixed air plenum)
304	<rv;TexhHXi>	ERV Exhaust air temperature entering HX, after preheat
305	<rv;TexhHXo>	ERV Exhaust air temperature leaving HX (to outdoors)
306	<rv;WoaHXi>	ERV Outdoor air humidity ratio entering HX
307	<rv;WoaHXo>	ERV Outdoor air humidity ratio leaving HX (to mixed air plenum)
308	<rv;WexhHXi>	ERV Exhaust air humidity ratio entering HX
309	<rv;WexhHXo>	ERV Exhaust air humidity ratio leaving HX (to outdoors)
310	<rv;PLRhx>	ERV Capacity modulation of HX
311	<rv;OAbypass> or <rv;ExhBypass>	ERV Fraction of air bypassed around HX; OA or exhaust
312	<rv;OAecono>	ERV Fraction of OA thru economizer to maintain setpoint

Variable-List Number	Variable in FORTRAN Code	Description
313	<rv;kWoa> + <rv;kWexh>	ERV Power of integral fans
314	<rv;kWhx>	ERV Power of HX (heat wheel motor)
315	<rv;kWpreheat>	ERV Power of preheat coil
316	<rv;Qpreheat>	ERV HW load of preheat coil
317	<rv;ExhWetFlag>	ERV flag indicating that exhaust air is at dewpoint within hx
318	<rv;OAWetFlag>	ERV flag indicating that outside air is at dewpoint within hx
319	<DCVOAcfmS>	Hourly summed ZONE OA CFM for DCV calculation (cuft/min)
320	<DCVOAcfmFracCrit>	Hourly max ZONE OA/total flow for DCV calculation (cfm/cfm)

VARIABLES BY SYSTEM-TYPE FOR SYSTEM

V-L No.	1	2	3	4	5	6	7	8
SYSTEM-TYPE	HEATING COIL AIR TEMP	COOLING COIL AIR TEMP	MIXED AIR TEMP	RETURN AIR TEMP	TOTAL HEATING COIL BTU	TOTAL COOLING COIL BTU	TOTAL ZONE HEATING BTU	TOTAL ZONE COOLING BTU
SUM	N	N	N	N	A	A	N	N
SZRH	N	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	N	N
DDS	A	A	A	A	A	A	N	N
SZCI	N	A	A	A	A	A	A	A
UHT	N	N	N	N	A	A	A	N
UVT	N	N	N	N	A	A	A	N
FPH	N	N	N	N	A	N	A	N
TPFC	N	N	N	N	A	A	A	A
FPFC	N	N	N	N	A	A	A	A
TPIU	N	A	A	A	A	A	A	A
FPIU	N	A	A	A	A	A	A	A
VAVS	N	A	A	A	A	A	A	A
PIU	N	A	A	A	A	A	A	A
RHFS	N	A	A	A	A	A	A	A
HP	N	N	N	N	A	A	A	A
HVSYS	A	N	A	A	A	N	A	N
CBVAV	N	A	A	A	A	A	A	A
RESYS	A	A	A	A	A	A	A	A
PSZ	N	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	N	N
PVAVS	N	A	A	A	A	A	A	A
PTAC	A	N	N	N	A	A	A	A
PTGSD	N	D	A	A	A	A	N	N
PVVT	N	A	A	A	A	A	A	A
RESVVT								

V-L No.	9	10	11	12	13	14	15	16
SYSTEM-TYPE	TOTAL BBRD ENERGY	TOTAL PREHEAT ENERGY	HUMID-CN HEATING	DEHUMID REHEAT	MIN SUP T	MAX SUP T	SUM ZONE LAT HEAT	SUM ZONE PLN HEAT
SUM	N	N	N	N	N	N	A	A
SZRH	A	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	A	A	A
UHT	A	N	N	N	N	N	N	N
UVT	A	N	N	N	N	N	N	N
FPH	A	N	N	N	N	N	N	N
TPFC	A	N	A	A	N	N	N	N
FPFC	A	N	A	A	N	N	N	N
TPIU	A	A	A	A	A	A	A	A
FPIU	A	A	A	A	A	A	A	A
VAVS	A	A	A	A	A	A	A	A
PIU	A	A	A	A	A	A	A	A
RHFS	A	A	A	A	A	A	A	A
HP	A	N	N	N	N	N	N	N
HVSYS	A	A	A	N	A	A	A	A
CBVAV	A	A	A	A	A	A	A	A
RESYS	A	A	S	S	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	A	N	N	N	N	N	N	N
PTGSD	A	N	N	N	A	A	A	A
PVVT	A	A	A	A	A	A	A	A
RESVVT								

Legend:
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  X = Unused

V-L No.	17	18	19	20	21	22	23	24
SYSTEM-TYPE	TOTAL SYSTEM CFM	TOTAL HOT CFM	TOTAL COLD CFM	RETURN CFM	EXHAUST CFM	INF CFM	FANS ON/OFF	HEAT ON/OFF
SUM	N	N	N	N	N	A	A	A
SZRH	A	N	N	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	N	N	A	A	A	A	A
UHT	N	N	N	N	N	N	A	A
UVT	N	N	N	N	N	N	A	A
FPH	N	N	N	N	N	N	N	A
TPFC	N	N	N	N	N	N	A	A
FPFC	N	N	N	N	N	N	A	A
TPIU	A	N	N	A	A	A	A	A
FPIU	A	N	N	A	A	A	A	A
VAVS	A	N	N	A	A	A	A	A
PIU	A	N	N	A	A	A	A	A
RHFS	A	N	N	A	A	A	A	A
HP	N	N	N	N	N	N	A	A
HVSYS	A	N	N	A	A	A	A	A
CBVAV	A	N	N	A	A	A	A	A
RESYS	A	N	N	N	N	A	A	A
PSZ	A	N	N	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	N	N	A	A	A	A	A
PTAC	N	N	N	N	N	N	A	A
PTGSD	A	N	N	A	A	A	A	A
PVVT	A	N	N	A	A	A	A	A
RESVVT								

V-L No.	25	26	27	28	29	30	31	32
SYSTEM-TYPE	COOL ON/OFF	BBRDSCH RATIO	CONSTANT (1.08)	CONSTANT (0.689)	CONSTANT (0.363)	HOT AIR FRAC	COLD AIR FRAC	TOTAL ELECTRIC KW
SUM	A	N	N	N	N	N	N	A
SZRH	A	A	A	A	A	N	N	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	N	N	A
UHT	A	A	A	A	A	N	N	A
UVT	A	A	A	A	A	N	N	A
FPH	N	A	N	N	N	N	N	A
TPFC	A	A	A	A	A	N	N	A
FPFC	A	A	A	A	A	N	N	A
TPIU	A	A	A	A	A	N	N	A
FPIU	A	A	A	A	A	N	N	A
VAVS	A	A	A	A	A	N	N	A
PIU	A	A	A	A	A	N	N	A
RHFS	A	A	A	A	A	N	N	A
HP	A	A	A	A	A	N	N	A
HVSYS	A	A	A	A	A	N	N	A
CBVAV	A	A	A	A	A	N	N	A
RESYS	A	A	A	A	A	N	N	A
PSZ	A	A	A	A	A	N	N	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	N	N	A
PTAC	A	A	A	A	A	N	N	A
PTGSD	N	A	A	A	A	N	N	A
PVVT	A	A	A	A	A	N	N	A
RESVVT								

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V-L No.	33	34	35	36	37	38	39	40
SYSTEM-TYPE	TOTAL FAN ELEC	DELTA-T RECOV	RET HUMID	MAX HUMID	HUMID LEAVING COIL	MOIST CHG	OUTSIDE/TOTAL CFM	DENSITY (AIR*60)
SUM	N	N	N	N	N	N	N	N
SZRH	A	A	A	A	A	A	A	A
MZS	A	A	A	A	A	A	A	A
DDS	A	A	A	A	A	A	A	A
SZCI	A	A	A	A	A	A	A	A
UHT	A	N	N	N	N	N	N	N
UVT	A	N	N	N	N	N	N	N
FPH	A	N	N	N	N	N	N	N
TPFC	A	N	N	N	N	N	N	N
FPFC	A	N	N	N	N	N	N	N
TPIU	A	A	A	A	A	A	A	A
FPIU	A	A	A	A	A	A	A	A
VAVS	A	A	A	A	A	A	A	A
PIU	A	A	A	A	A	A	A	A
RHFS	A	A	A	A	A	A	A	A
HP	A	N	N	N	N	N	N	N
HVSYS	A	A	A	A	A	A	A	A
CBVAV	A	A	A	A	A	A	A	A
RESYS	A	N	N	A	A	A	N	N
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	A	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	A	N	N	N	N	N	N	N
PTGSD	A	N	A	A	A	A	A	A
PVVT	A	A	A	A	A	A	A	N
RESVVT								

V-L No.	41	42	43	44	45	46	47	48
SYSTEM-TYPE	FLUID TEMP	COOL-CTR EFFECT	QHR	QCR	HEATING GAS	HEATING ELEC	COOLING ELEC	LATENT COOLING
SUM	N	N	N	N	A	A	N	N
SZRH	N	A	A	N	A	A	A	A
MZS	N	A	N	N	A	A	A	A
DDS	N	A	N	N	A	A	A	A
SZCI	N	A	A	N	A	A	A	A
UHT	N	N	N	N	A	A	N	N
UVT	N	N	N	N	A	A	N	N
FPH	N	N	N	N	N	A	N	N
TPFC	N	N	N	N	A	A	N	A
FPFC	N	N	N	N	A	A	N	A
TPIU	N	A	N	N	A	A	N	A
FPIU	N	A	N	N	A	A	N	A
VAVS	N	A	A	N	A	A	N	A
PIU	N	A	A	N	A	A	N	A
RHFS	N	A	A	N	A	A	N	A
HP	A	N	N	N	N	A	A	A
HVSYS	N	N	N	N	A	A	N	N
CBVAV	N	A	A	N	A	A	N	A
RESYS	N	N	N	N	A	A	A	A
PSZ	N	A	A	N	A	A	A	A
PMZS	N	A	A	N	A	A	A	A
PVAVS	N	A	A	N	A	A	A	A
PTAC	N	N	N	N	A	A	A	A
PTGSD	N	A	N	N	A	N	N	A
PVVT	N	A	A	A	A	A	A	A
RESVVT								

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X = Unused

V-L No.	49	50	51	52	53	54	55	56
SYSTEM-TYPE	SUPPLY ELEC	RETURN ELEC	CYCLE ON/H OFF C	SURFACE HUMIDITY	Walkin Q	SURFACE TEMP	DD heating coil entering temp	BYPASS FACTOR
SUM	N	N	N	N	N	A	N	N
SZRH	A	A	A	N	A	A	N	A
MZS	A	A	N	N	N	A	A	A
DDS	A	A	N	N	N	A	A	A
SZCI	A	A	A	N	A	A	N	A
UHT	N	N	N	N	N	A	N	N
UVT	N	N	N	N	N	A	N	N
FPH	N	N	N	N	N	A	N	N
TPFC	N	N	N	N	N	A	N	A
FPFC	N	N	N	N	N	A	N	A
TPIU	A	A	N	N	N	A	N	A
FPIU	A	A	N	N	N	A	N	A
VAVS	A	A	A	N	A	A	N	A
PIU	A	A	A	N	N	A	N	A
RHFS	A	A	A	N	A	A	N	A
HP	A	N	N	N	N	A	N	A
HVSYS	A	A	N	N	N	A	N	N
CBVAV	A	A	A	N	N	A	N	A
RESYS	A	N	N	N	N	A	N	A
PSZ	A	A	A	N	A	A	N	A
PMZS	A	A	A	N	N	A	A	A
PVAVS	A	A	A	N	A	A	N	A
PTAC	N	N	N	N	N	A	N	A
PTGSD	A	A	N	N	N	N	N	A
PVVT	A	A	A	A	A	A	N	A
RESVVT					N			

V-L No.	57	58	59	60	61	62	63	64
SYSTEM-TYPE	CBF F (WB,DB)	CBF F CFM	EXHAUST FANS ON/OFF	PLR CFM	PLR COOLING	PLR HEATING	COOL-CAP F (WB, DB)	COOL-SH F (WB,DB)
SUM	N	N	N	N	N	N	N	N
SZRH	A	A	A	A	A	N	A	A
MZS	A	A	A	A	A	N	A	A
DDS	A	A	A	A	A	N	A	A
SZCI	A	A	A	A	A	N	A	A
UHT	N	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N	N
TPIU	A	A	A	A	A	N	A	A
FPIU	A	A	A	A	A	N	A	A
VAVS	A	A	A	A	A	N	A	A
PIU	A	A	A	A	A	N	A	A
RHFS	A	A	A	A	A	N	A	A
HP	N	N	N	N	N	N	N	N
HVSYS	N	N	A	N	N	N	N	N
CBVAV	A	A	A	A	A	N	A	A
RESYS	A	A	N	A	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	A	A	A	A	A	N	A	A
PVAVS	A	A	A	A	A	A	A	A
PTAC	N	N	N	N	N	N	N	N
PTGSD	N	N	N	A	N	N	N	N
PVVT	A	A	A	A	A	A	A	A
RESVVT			N					

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  X = Unused

V-L No.	65	66	67	68	69	70	71	72
SYSTEM-TYPE	HEAT-CAP F (TEMP)	EIR F (WB,DB)	EIR F (PLR)	EIR	OUTSIDE FAN KW	COOLING CAPACITY	SENSIBLE CAPACITY	MAX HUMID SETPOINT
SUM	N	N	N	N	N	N	N	N
SZRH	N	N	N	N	N	A	A	A
MZS	N	N	N	N	N	A	A	A
DDS	N	N	N	N	N	A	A	A
SZCI	N	N	N	N	N	A	A	A
UHT	N	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N	N
TPIU	N	N	N	N	N	A	A	A
FPIU	N	N	N	N	N	A	A	A
VAVS	N	N	N	N	N	A	A	A
PIU	N	N	N	N	N	A	A	A
RHFS	N	N	N	N	N	A	A	A
HP	N	N	N	N	N	N	N	N
HVSYS	N	N	N	N	N	A	A	A
CBVAV	N	N	N	N	N	A	A	A
RESYS	A	A	A	A	A	A	A	A
PSZ	A	A	A	A	A	A	A	A
PMZS	N	A	A	A	A	A	A	A
PVAVS	N	A	A	A	A	A	A	A
PTAC	N	N	N	N	N	A	A	A
PTGSD	N	N	N	N	N	A	A	A
PVVT	A	A	A	A	A	A	A	A
RESVVT								

V-L No.	73	74	75	76	77	78	79	80
SYSTEM-TYPE	MIN HUMID SETPOINT	VAV MAX CFM RATE	PIPE DUCT LOSS	PIPE DUCT LOSS	ERV SCHEDULE	HEATING CAPACITY	TEMP AT MIN OA	MIN OA EST
SUM	N	N	N	N	X	N	N	N
SZRH	A	A	S	S	A	A	A	A
MZS	A	A	S	S	A	A	A	A
DDS	A	A	S	S	A	A	A	A
SZCI	A	N	S	S	A	A	A	A
UHT	N	N	S	S	X	N	N	N
UVT	N	N	S	S	X	N	N	N
FPH	N	N	S	S	X	N	N	N
TPFC	N	N	S	S	A	N	N	N
FPFC	N	N	S	S	A	N	N	N
TPIU	A	N	S	S	A	A	A	A
FPIU	A	N	S	S	A	A	A	A
VAVS	A	A	S	S	A	A	A	A
PIU	A	A	S	S	A	A	A	A
RHFS	A	A	S	S	A	A	A	A
HP	N	N	S	S	X	N	N	N
HVSYS	A	N	S	S	A	A	A	A
CBVAV	A	N	S	S	A	A	A	A
RESYS	A	N	S	S	X	N	N	N
PSZ	A	A	S	S	A	A	A	A
PMZS	A	A	S	S	A	A	A	A
PVAVS	A	A	S	S	A	A	A	A
PTAC	A	N	S	S	X	N	N	N
PTGSD	N	N	S	S	X	N	N	A
PVVT	A	A	S	S	A	A	A	A
RESVVT								

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V-L No.	81	82	83	84	85	86	87	88
SYSTEM-TYPE	HP SUPP HEAT	REFG ZONE SENS HT	REFG ZONE LAT HT	REFG SYS REC HT	REFG SYS REJ HT	REFG SYS COMP KW	REFG SYS DEF KW	REFG SYS AUX KW
SUM	N	N	N	N	N	N	N	N
SZRH	N	A	A	A	A	A	A	A
MZS	N	N	N	N	N	N	N	N
DDS	N	N	N	N	N	N	N	N
SZCI	N	A	A	A	A	A	A	A
UHT	N	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N	N
TPIU	N	N	N	N	N	N	N	N
FPIU	N	N	N	N	N	N	N	N
VAVS	N	A	A	A	A	A	A	A
PIU	N	N	N	N	N	N	N	N
RHFS	N	A	A	A	A	A	A	A
HP	N	N	N	N	N	N	N	N
HVSYS	N	N	N	N	N	N	N	N
CBVAV	N	N	N	N	N	N	N	N
RESYS	A	N	N	N	N	N	N	N
PSZ	A	A	A	A	A	A	A	A
PMZS	N	N	N	N	N	N	N	N
PVAVS	A	A	A	A	A	A	A	A
PTAC	A	N	N	N	N	N	N	N
PTGSD	N	N	N	N	N	N	N	N
PVVT	A	A	A	A	A	A	A	A
RESVVT		N	N	N	N	N	N	N

V-L No.	89	90	91	92	93	94	95	96
SYSTEM-TYPE	PLEN EXH FLOW RATE	COOL GAS	REGEN POWER	RETURN WB TEMP	WB8	T8	W8	WB9
SUM	N	N	N	N	N	N	N	N
SZRH	A	N	N	N	N	N	N	N
MZS	A	N	N	N	N	N	N	N
DDS	A	N	N	N	N	N	N	N
SZCI	A	N	N	N	N	N	N	N
UHT	N	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N	N
TPIU	A	N	N	N	N	N	N	N
FPIU	A	N	N	N	N	N	N	N
VAVS	A	N	N	N	N	N	N	N
PIU	A	N	N	N	N	N	N	N
RHFS	A	N	N	N	N	N	N	N
HP	N	N	N	N	N	N	N	N
HVSYS	A	N	N	N	N	N	N	N
CBVAV	A	N	N	N	N	N	N	N
RESYS	N	N	N	N	N	N	N	N
PSZ	A	N	N	N	N	N	N	N
PMZS	A	N	N	N	N	N	N	N
PVAVS	A	N	N	N	N	N	N	N
PTAC	N	N	N	N	N	N	N	N
PTGSD	A	N	A	A	A	A	A	A
PVVT	A	N	N	N	N	N	N	N
RESVVT								

Legend:
  A = Appropriate   D = Used for program code debugging only
  N = Not appropriate   S = System (or configuration) dependent
  X = Unused

V-L No.	97	98	99	100	101	102	103	104
SYSTEM-TYPE	T9	W9	EFF	DTON	MODE 1	MODE 2	MODE 3	MODE 4
SUM	N	N	N	N	N	N	N	N
SZRH	N	N	N	N	N	N	N	N
MZS	N	N	N	N	N	N	N	N
DDS	N	N	N	N	N	N	N	N
SZCI	N	N	N	N	N	N	N	N
UHT	N	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N	N
TPIU	N	N	N	N	N	N	N	N
FPIU	N	N	N	N	N	N	N	N
VAVS	N	N	N	N	N	N	N	N
PIU	N	N	N	N	N	N	N	N
RHFS	N	N	N	N	N	N	N	N
HP	N	N	N	N	N	N	N	N
HVSYS	N	N	N	N	N	N	N	N
CBVAV	N	N	N	N	N	N	N	N
RESYS	N	N	N	N	N	N	N	N
PSZ	N	N	N	N	N	N	N	N
PMZS	N	N	N	N	N	N	N	N
PVAVS	N	N	N	N	N	N	N	N
PTAC	N	N	N	N	N	N	N	N
PTGSD	A	A	A	A	A	A	A	A
PVVT	N	N	N	N	N	N	N	N
RESVVT								

V-L No.	105	106	107	108	109	110	111
SYSTEM-TYPE	MODE 5	MODE 6	MODE 7	ERMAX 4	ERMAX 4	ERMAX 4	MODE 4
SUM	N	N	N	N	N	N	N
SZRH	N	N	N	N	N	N	N
MZS	N	N	N	N	N	N	N
DDS	N	N	N	N	N	N	N
SZCI	N	N	N	N	N	N	N
UHT	N	N	N	N	N	N	N
UVT	N	N	N	N	N	N	N
FPH	N	N	N	N	N	N	N
TPFC	N	N	N	N	N	N	N
FPFC	N	N	N	N	N	N	N
TPIU	N	N	N	N	N	N	N
FPIU	N	N	N	N	N	N	N
VAVS	N	N	N	N	N	N	N
PIU	N	N	N	N	N	N	N
RHFS	N	N	N	N	N	N	N
HP	N	N	N	N	N	N	N
HVSYS	N	N	N	N	N	N	N
CBVAV	N	N	N	N	N	N	N
RESYS	N	N	N	N	N	N	N
PSZ	N	N	N	N	N	N	N
PMZS	N	N	N	N	N	N	N
PVAVS	N	N	N	N	N	N	N
PTAC	N	N	N	N	N	N	N
PTGSD	A	A	A	A	A	A	A
PVVT	N	N	N	N	N	N	N
RESVVT							

Legend:
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X = Unused

BUILDING-HVAC

Variable-List Number	Variable in FORTRAN Code	Description
1	<QCPL>	Total cooling load (Btu/hr)
2	<QHPL>	Total heating load (Btu/hr)
3	<PKW>	Total electrical load (kW)
4	<PGAS>	Total gas load (Btu/hr)
5	<PKWQH>	Portion of <PKW> used for heating (kW)
6	<PKWQC>	Portion of <PKW> used for cooling (kW)
7	<PFANKW>	Portion of <PKW> used for fans (kW)
8		unused
9	<PCGAS>	Gas used for cooling (packaged equipment)
10	-	unused

VARIABLES BY SYSTEM-TYPE FOR BUILDING-HVAC

V-L No.	1	2	3	4	5	6	7	8
SYSTEM-TYPE	COOLING LOAD	HEATING LOAD	ELEC KW LOAD	HEATING GAS	HEATING ELEC KW	COOLING ELEC KW	FANS ELEC KW	HEATING OIL
SUM	A	A	A	A	A	N	N	X
SZRH	A	A	A	A	A	N	A	X
MZS	A	A	A	A	A	N	A	X
DDS	A	A	A	A	A	N	A	X
SZCI	A	A	A	A	A	N	A	X
UHT	A	A	A	A	A	N	A	X
UVT	A	A	A	A	A	N	A	X
FPH	A	A	A	A	A	N	A	X
TPFC	A	A	A	A	A	N	A	X
FPFC	A	A	A	A	A	N	A	X
TPIU	A	A	A	A	A	N	A	X
FPIU	A	A	A	A	A	N	A	X
VAVS	A	A	A	A	A	N	A	X
PIU	A	A	A	A	A	N	A	X
RHFS	A	A	A	A	A	N	A	X
HP	A	A	A	A	A	A	A	X
HVSYS	A	A	A	A	A	N	A	X
CBVAV	A	A	A	A	A	N	A	X
RESYS	A	A	A	A	A	A	A	X
PSZ	A	A	A	A	A	A	A	X
PMZS	A	A	A	A	A	A	A	X
PVAVS	A	A	A	A	A	A	A	X
PTAC	A	A	A	A	A	A	A	X
PVVT	A	A	A	A	A	A	A	X
PTGSD								
RESVVT								

V-L No.	9	10
SYSTEM-TYPE	COOLING GAS	UNUSED
SUM		X
SZRH		X
MZS		X
DDS		X
SZCI		X
UHT		X
UVT		X
FPH		X
TPFC		X
FPFC		X
TPIU		X
FPIU		X
VAVS		X
PIU		X
RHFS		X
HP		X
HVSYS		X
CBVAV		X
RESYS		X
PSZ		X
PMZS		X
PVAVS		X
PTAC		X
PVVT		X
PTGSD		
RESVVT		

Legend:
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 X = Unused

<u>CIRCULATION-LOOP</u>

Variable-List Number	Variable in FORTRAN Code	Description
1	RunLoop	0 = Loop Off, 1 = Loop Active
2	ModeCtrl	0 = Floating, 1 = Heating, 2 = Cooling
3	GPMs	Flow rate on supply side (gpm)
4	GPMr	Flow rate on return side (gpm)
5	QloopNet	Net loop load, including pump heat and thermal losses
6	QcoilH	Heating loads of loop end-uses (coils, etc.)
7	QcoilC	Cooling loads of loop end-uses (coils, etc.)
8	Q2nd	Load on primary loop from secondary loops
9	Q1st	Load on primary loop from primary equipment (absorption chillers, etc.)
10	QCp	Load on loop due to loop temperature swing
11	QlossS	Thermal loss, supply side
12	QlossR	Thermal loss, return side
13	Tenv	Temperature of loop's environment
14	Tset	Supply temperature setpoint
15	Tsupply	Supply temperature
16	TcoilEnt	Temperature entering coils (supply minus thermal dT)
17	TcoilExit	Temperature exiting coils, entering return
18	Treturn	Temperature at return outlet (entering chillers, etc.)
19	dTsc	Loop temperature rise, supply side
20	dTrc	Loop temperature rise, return side
21	TavgS	Average loop temperature, supply side
22	TavgR	Average loop temperature, return side
23	TavgPast	Last hours's average loop temperature, supply and return
24	Tfloat	Temperature loop will achieve if no active heating/cooling
25	HDpump	Head pressure across pump
26	Qpump	Heat gain from pump
27	dTpump	Fluid temperature rise from pump
28	GPM21	Flow from a secondary loop onto primary (2ndary loops only)
29	HEAD21f	Friction from a secondary loop onto primary (excludes static heads)
30	Qover	Primary equipment overload
31	QpumpEq	Heat gain due to primary equipment pumps
32	GMPpumpEq	Flow of primary equipment pumps (valid only if powering loop)
33	dTpumpEq	Temperature rise of primary equipment pumps

Variable-List Number	Variable in FORTRAN Code	Description
34	PipeHead	Head due to loop friction (excluding coils, chillers, etc.)
35	DesEqGPM	Design flow through all active primary equipment units
36	PLRpipe	Flow ratio of loop (fraction of nominal flow)
37	TotalLoopCap	Total capacity of all active primary equipment units
38	CapRatio	Capacity limit (<1 if loop overloaded previous hour)
39	GPM2	Flow from all attached secondary loops
40	Friction	Net head loss of loop and attachments, excluding static
41	Qhtrec	Total heat recovered to loop
42	Thtrec	Return temperature after heat recovery
43	dTover	Temperature rise due to loop overload (WLHP loops only)
44	TcoilEst	Estimated temperature entering coils (CW and WLHP loops only)
45	Qprocess	Process load on this loop
46	Tinlet	Make-up water inlet temperature (DHW loops only)
47	QoverNew	Loop overload not carried over from previous hour
48		unused
49		unused
50		unused

PUMP

Variable-List Number	Variable in FORTRAN Code	Description
1	PMPgpm	Pump flow
2	PMPkw	Pump power
3	PMPnum	Number of pumps running
4	RPMr	Speed ratio (fraction of nominal)
5	PMPfrac	Fraction of hour running
6	PMPset	Head required at setpoint
7	PMPhead	Actual head developed
8	PMPfric	Head on pump due to friction of all components (coils, piping, etc.)
9	PMPstatic	Static head on pump due to static head of components
10	HEADr	Head ratio (fraction of nominal)
11	PMPGPMr	Flow ratio (fraction of nominal)
12	GPMmax	Maximum flow per pump at actual head
13	HPRPM	RPMr ** <pm:POWER-EXP>
14	XGPMR	PMPGPMr / RPMr
15	PMPHPR	Output of curve <pm:HP-fGPM> with XGPMr as input
16	PMPQ	Pump heat added to fluid
17	PMDdT	Temperature rise across pump
18	PMPVFDloss	Loss in variable-frequency drive

CHILLER

Variable-List Number	Variable in FORTRAN Code	Description
1	EQload	Equipment load
2	EQrun	Operating point of machine (greater than load if HGB or cycling)
3	EQhgb	Load due to hot-gas bypass
4	OperCap	Available capacity at current conditions
5	Frac	Fraction of hour this equipment ran
6	PLR	Part load ratio (fraction of Available)
7	EQsupplyT	Supply temperature
8	ECT	Entering condenser temperature
9	EIRPLR	Electric input ratio as f(PLR)
10	EIRFT	Electric input ratio as f(EQsupplyT, ECT)
11	EQeir	Net electric input ratio
12	EQelec	Electric demand
13	EQfanKW	Electric demand of air-cooled condenser
14	EQaux	Electric demand of auxiliaries
15	HIRPLR	Heat input ratio as f(PLR)
16	HIRFT	Heat input ratio as f(EQsupplyT, ECT)
17	EQHIR	Net heat input ratio
18	EQfuel	Fuel/thermal demand
19	EQcond	Rejected heat
20	EQrecvr	Recoverable heat
21	HWflow	Flow to/from hot water loop
22	HWhead	Head on hot water loop
23	CHWflow	Flow to/from chilled water loop
24	CHWhead	Head on chilled water loop
25	CWflow	Flow to/from condenser water loop
26	CWhead	Head on condenser water loop
27	HTRECflow	Flow to/from heat-recovery loop
28	HTREChead	Head on heat-recovery loop
29	ForcePump	Flag indicating equipment pump must run, even if no load
30	EQstart	Start-up load
31	EQloadH	Equipment load (heating side of gas-fired chiller heater only)
32	EqstartH	Start-up load (heating side of gas-fired chiller heater only)
33	PLRh	Part load ratio (heating side of gas-fired chiller heater only)

34	FracH	Fraction of hour operating (heating side of gas-fired chiller heater only)
35	EQfuelH	Fuel consumption (heating side of gas-fired chiller heater only)
36	EQelecH	Electric consumption (heating side of gas-fired chiller heater only)

BOILER

Variable-List Number	Variable in FORTRAN Code	Description
1	EQload	Equipment load
2	EQrun	Operating point of machine (greater than load if HGB or cycling)
3		unused
4	OperCap	Available capacity at current conditions
5	Frac	Fraction of hour this equipment ran
6	PLR	Part load ratio (fraction of Available)
7	EQsupplyT	Supply temperature
8	ECT	Environment temperature
9	EIRPLR	Electric input ratio as f(PLR)
10		unused
11	EQeir	Net electric input ratio
12	EQelec	Electric demand
13		unused
14	EQaux	Electric demand of auxiliaries
15	HIRPLR	Heat input ratio as f(PLR)
16	HIRFT	Heat input ratio as f(ECT)
17	EQHIR	Net heat input ratio
18	EQfuel	Fuel demand
19		unused
20		unused
21		unused
22		unused
23		unused
24		unused
25		unused
26		unused
27		unused
28		unused
29	ForcePump	Flag indicating equipment pump must run, even if no load
30	EQstart	Start-up load
31		unused
32		unused
33		unused

34	unused
35	unused
36	unused

ELEC-GENERATOR

Variable-List Number	Variable in FORTRAN Code	Description
1	EQload	Equipment load
2		unused
3		unused
4	OperCap	Available capacity at current conditions
5	Frac	Fraction of hour this equipment ran
6	PLR	Part load ratio (fraction of Available)
7		unused
8		unused
9	EIRPLR	EIR correction as function of PLR (PV-ARRAY only)
10		unused
11	EQEIR	Electric input ratio (EIR) (PV-ARRAY only)
12	EQelec	Direct-current input from PV-MODULE (PV-ARRAY only)
13		unused
14	EQaux	Electric demand of auxiliaries
15	HIRPLR	Heat input ratio as f(PLR)
16	HIRFT	Heat input ratio as f(drybulb)
17	EQHIR	Net heat input ratio
18	EQfuel	Fuel demand
19		unused
20	EQrecvr	Recoverable heat
21		unused
22		unused
23		unused
24		unused
25	CWflow	Flow to/from condenser water loop
26	CWhead	Head on condenser water loop
27		unused
28		unused
29		unused
30	EQstart	Start-up load
31		unused
32		unused
33		unused

34	unused
35	unused
36	unused

PV-MODULE

Variable-List Number	Variable in FORTRAN Code	Description
1	n/a	DC power output
2	Vmp	Voltage at maximum power point
3	Imp	Current at maximum power point
4	SOLRAD	Total horizontal solar radiation
5	Edirect	Direct radiation on module surface
6	Ediffuse	Diffuse radiation on module surface
7	Eground	Ground reflected radiation on module surface
8	AOI	Angle of incidence, 0° = normal to surface
9	fAOI	Angle of incidence optical correction factor
10	AirMass	Relative air mass, 1 = sun directly overhead at sea level
11	fAirMass	Air mass spectral correction factor
12	Epoa	Plane-of-array irradiation
13	Eeffective	Ratio of plane-of-array irradiation to reference irradiation, suns
14	Tcell	Internal cell temperature
15		unused
16		unused
17		unused
18		unused
19		unused
20		unused
21		unused
22		unused
23		unused
24		unused
25		unused
26		unused
27		unused
28		unused
29		unused
30		unused

DW-HEATER

Variable-List Number	Variable in FORTRAN Code	Description
1	EQload	Equipment load
2	EQrun	Operating point of machine (greater than load if HGB or cycling)
3		unused
4	OperCap	Available capacity at current conditions
5	Frac	Fraction of hour this equipment ran
6	PLR	Part load ratio (fraction of Available)
7	EQsupplyT	Supply temperature
8	ECT	Environment temperature
9	EIRPLR	Electric input ratio as f(PLR)
10	EIRFT	Electric input ratio as f(EQsupplyT, ECT)
11	EQeir	Net electric input ratio
12	EQelec	Electric demand
13		unused
14	EQaux	Electric demand of auxiliaries
15	HIRPLR	Heat input ratio as f(PLR)
16	HIRFT	Heat input ratio as f(ECT)
17	EQHIR	Net heat input ratio
18	EQfuel	Fuel demand
19		unused
20		unused
21		unused
22		unused
23		unused
24		unused
25		unused
26		unused
27		unused
28		unused
29	ForcePump	Flag indicating equipment pump must run, even if no load
30		unused
31		unused
32		unused
33		unused

34	unused
35	unused
36	unused

HEAT-REJECTION

Variable-List Number	Variable in FORTRAN Code	Description
1	TWRload	Equipment load
2	TCAP	Available capacity
3	TWRrej	Net heat rejected, including tower pump
4	CWgpm	Circulation loop flow to this tower
5	TWRgpm	Flow internal to tower
6	TWRsupply	Leaving tower temperature
7	TWRset	Leaving tower temperature setpoint
8	Ttower	Leaving tower temperature (same as TWRsupply)
9	RANGE	Temperature drop through tower
10	APP	Leaving tower temperature minus wetbulb temperature
11		unused
12	GPMra	Flow capacity ratio (fraction of nominal) (design variable only)
13	GPMcap	Flow capacity at current conditions
14	GPMcell	Assigned flow per cell
15	NumCells	Number of cells operating
16	MinCells	Minimum number of cells that can handle flow
17	MaxCells	Maximum number of cells that can handle flow
18	Ttop	Temperature at top of throttling range
19	GPMtop	Flow capacity at top of throttling range
20	Tbot	Temperature at bottom of throttling range
21	GPMbot	Flow capacity at bottom of throttling range
22	CFMra	Required airflow (fraction of nominal)
23	FankWr	Fan power ratio (fraction of nominal)
24	FankW	Fan power, all cells
25	TWRaux	Auxiliary power
26	QpanLoss	Pan heat loss
27	QcoilLoss	Coil heat loss (fluid cooler only)
28	SpraykW	Spray pump power (fluid cooler only)
29	Twet1	Wetbulb temperature, limited to allowable range
30	Tstart	Condenser water temperature at beginning of hour

THERMAL-STORAGE

Variable-List Number	Variable in FORTRAN Code	Description
1	Qcharge	Charging demand
2	Qdischarge	Discharging load
3	Qloss	Thermal loss
4	Qfreeze	Heating load to prevent tank freeze-up
5	Qtank	Heat/Coolth in tank relative to reference temperature
6	CapMax	Available discharge capacity
7	AuxkW	Auxiliary electric demand
8	TtankEnv	Environmental temperature
9	Ttank	Temperature in tank
10	NumChrgHours	Number of hours required to charge tank
11	NumHoursToSt	Number of hours until tank will start charging
12	ChrgHours	Number of hours tank has been charging
13	DChrgHours	Number of hours tank has been discharging
14	StoredKWh	Boiler/Chiller electrical consumption stored in tank
15	StoredFuel	Boiler/Chiller fuel consumption stored in tank

ELEC-METER

Variable-List Number	Variable in FORTRAN Code	Description
1	<em;LIGHT>	End-use, lights
2	<em;TASK>	End-use, task lights
3	<em;EQUIP>	End-use, equipment
4	<em;HEAT>	End-use, space heating equipment
5	<em;COOL>	End-use, space cooling equipment
6	<em;HTREJ>	End-use, heat-rejection equipment, except pumps
7	<em;AUX>	End-use, auxiliary loads
8	<em;VENT>	End-use, vent fans
9	<em;REFG>	End-use, refrigeration equipment
10	<em;SUPP>	End-use, supplemental heat pump heating
11	<em;DHW>	End-use, domestic water heating
12	<em;EXTERIOR>	End-use, exterior loads
13	<em;CogenSurplus>	End-use, generator surplus
14		unused
15		unused
16		unused
17		unused
18		unused
19	<em;TES_ADJUST>	End-use, thermal storage adjustment factor
20	<em;TOTAL>	Total usage
21	<em;TRANSFORMER>	Transformer loss
22	<em.TDVsrc>	Multiplier to convert site energy to source "TDV energy"

FUEL-METER

Variable-List Number	Variable in FORTRAN Code	Description
1	<fm;LIGHT>	End-use, lights
2	<fm;TASK>	End-use, task lights
3	<fm;EQUIP>	End-use, equipment
4	<fm;HEAT>	End-use, space heating equipment
5	<fm;COOL>	End-use, space cooling equipment
6	<fm;HTREJ>	End-use, heat-rejection equipment, except pumps
7	<fm;AUX>	End-use, auxiliary loads
8	<fm;VENT>	End-use, vent fans
9	<fm;REFG>	End-use, refrigeration equipment
10	<fm;SUPP>	End-use, supplemental heat pump heating
11	<fm;DHW>	End-use, domestic water heating
12	<fm;EXTERIOR>	End-use, exterior loads
13	<fm;CogenSurplus>	End-use, generator surplus
14		unused
15		unused
16		unused
17		unused
18		unused
19	<fm;TES_ADJUST>	End-use, thermal storage adjustment factor
20	<fm;TOTAL>	Total usage
21		unused
22	<fm.TDVsrc>	Multiplier to convert site energy to source "TDV energy"

STEAM-METER

Variable-List Number	Variable in FORTRAN Code	Description
1	<sm;LIGHT>	End-use, lights
2	<sm;TASK>	End-use, task lights
3	<sm;EQUIP>	End-use, equipment
4	<sm;HEAT>	End-use, space heating equipment
5	<sm;COOL>	End-use, space cooling equipment
6	<sm;HTREJ>	End-use, heat-rejection equipment, except pumps
7	<sm;AUX>	End-use, auxiliary loads
8	<sm;VENT>	End-use, vent fans
9	<sm;REFG>	End-use, refrigeration equipment
10	<sm;SUPP>	End-use, supplemental heat pump heating
11	<sm;DHW>	End-use, domestic water heating
12	<sm;EXTERIOR>	End-use, exterior loads
13	<sm;CogenSurplus>	End-use, generator surplus
14		unused
15		unused
16		unused
17		unused
18		unused
19	<sm;TES_ADJUST>	End-use, thermal storage adjustment factor
20	<sm;TOTAL>	Total usage
21		unused

CHW-METER

Variable-List Number	Variable in FORTRAN Code	Description
1	<cm;LIGHT>	End-use, lights
2	<cm;TASK>	End-use, task lights
3	<cm;EQUIP>	End-use, equipment
4	<cm;HEAT>	End-use, space heating equipment
5	<cm;COOL>	End-use, space cooling equipment
6	<cm;HTREJ>	End-use, heat-rejection equipment, except pumps
7	<cm;AUX>	End-use, auxiliary loads
8	<cm;VENT>	End-use, vent fans
9	<cm;REFG>	End-use, refrigeration equipment
10	<cm;SUPP>	End-use, supplemental heat pump heating
11	<cm;DHW>	End-use, domestic water heating
12	<cm;EXTERIOR>	End-use, exterior loads
13		unused
14		unused
15		unused
16		unused
17		unused
18		unused
19	<cm;TES_ADJUST>	End-use, thermal storage adjustment factor
20	<cm;TOTAL>	Total usage
21		unused

GROUND-LOOP-HX

Variable-List Number	Variable in FORTRAN Code	Description
1	Qload	Thermal load
2	GPM	Fluid flow
3	OperCap	Available capacity at current conditions
4	OutletT	Outlet temperature
5	FarGroundT	Far field ground temperature
6	GroundDeltaT	Ground temperature rise at well bore
7	QdeltaT	Ground temperature rise due to current load
8	LoopDeltaT	Fluid temperature rise
9	Qrate	Rate of heat addition/removal (including cycling)
10	Runtime	Fraction of hour running