

5 LOADS INPUT

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5 LOADS INPUT

5.1 Introduction

The Loads Input segment of ASEAM3.0 is an interactive module that asks for all the data needed to characterize the architectural, thermal, occupancy, internal gain, and scheduling parameters of the building. Read through this chapter once quickly to get an idea of the ASEAM3.0 loads input data requirements. Blank copies of the input screens are included in Appendix B. You may want to photocopy these and use them to write down your input data before entering the program.

You can determine many of the input variables, such as wall and window types and areas, directly from blueprints. Some variables, such as U-factors, may require simple calculations. Other variables (e.g., infiltration rates) will require assumptions and judgments on your part.

ASEAM3.0 can calculate building and system loads for up to 15 zones. A zone is an area of the building (more precisely, a volume) that is modeled as one thermal unit. Zoning is discussed in greater detail in Chapter 4, section 4.3.

5.2 Entering Loads Input Data

5.2.1 Creating a New Loads Input File

To create a new loads input file, you must first access the loads input program of ASEAM3.0 from the "Exit" menu of any program or from the Main Menu. The procedure for doing this is discussed in detail in Chapter 3. Once within this program, you should choose the "Enter New Data" command from the main loads input bar menu (shown in 5.3.1).

The input screens will then appear sequentially in the order shown below. Some input screens are "conditional," that is, they will appear only if previously entered data dictate. For example, the exterior window shading screen will be accessed only if you enter a window shading model number on the input screen for windows.

Note: If you begin entering data for a building but do not complete the input process in one sitting, you should *always* save the input file, even if incomplete. Later, when you are ready to complete the data entry, use the "Get" command to retrieve this file and edit the unfinished portions. "Enter New Data" is used only when you first enter data for the building.

5.2.2 Editing an Existing Loads Input File

To modify an existing loads input file stored in the data subdirectory, you first need to access the loads input program and then retrieve the existing data with the "Get Loads File" command. The procedure for doing this is discussed in detail in Chapter 3. The steps are briefly summarized below:

1. Access the loads input program from the "Exit" menu of any program or from the Main Menu.

2. Choose "Get Loads Data" from the Loads Input Menu.
3. Choose the file you want to edit from the list. (This will copy the loads input data from the subdirectory into memory.)
4. Choose "Edit Loads Data."

When editing an existing file, you have a choice of which data to edit. You may edit all data or only a particular subset.

5.3 Loads Input Screen Map and Editing Sequence

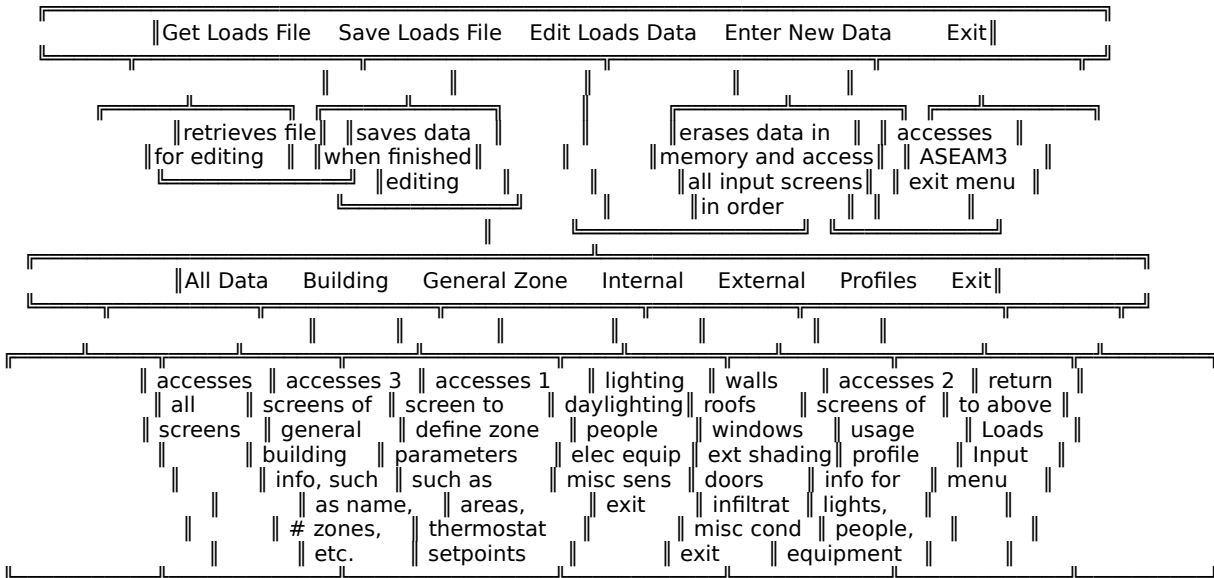
After you choose "Edit Loads Data," you will be asked which input screens you want to edit. The Loads Input Screen Map in section 5.3.1 shows the arrangement of the loads input screens. There are seven different menu options. Two categories, Internal and External, are further divided into subcategories.

- All Data: accesses all screens sequentially
- Building: accesses three input screens for general building data
- General Zone: accesses one input screen for general zone data
- Internal: accesses one of five internal type load input screens
- External: accesses one of seven external type load input screens
- Profiles: accesses two screens for zone diversity factors
- Exit: returns to the previous menu

Highlight (using the left and right cursor control keys) the category you want to edit, and then press CR to select the desired option. If you highlight "Internal" or "External," a pull-down menu will appear beneath the heading, as shown below. Once in the pull-down menu, choose the subcategory by using the up and down cursor control keys to move the reverse video box. (If you do not want to edit anything in this category, mark "Exit" at the bottom of the list, and the cursor will be returned to the main category list.) Thus, you can choose to edit any one section at a time, or all of them in succession with the "All Data" selection.

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5.3.1 Loads Input Screen Map



5.3.2 General Categories

Besides the first ("All Data") and last ("Exit") options, there are five main categories of loads input data. You may edit the sections one at a time, or you may edit everything at once with the "All Data" choice. The main categories are:

1. Building: building name, location, occupancy schedule (3 screens)
2. General Zone: zone size, thermostat setpoints, zone type
3. Internal
 - Lighting: light type and wattage; on this screen, you specify whether you want a daylighting analysis.
 - Daylighting: geometry, reflectances, lighting levels, controls
 - People: number of people and their heat generation
 - Equipment: wattage of electrical equipment
 - Misc Sens: amount (BTUH) of miscellaneous heat gain or loss
4. External
 - Walls: wall orientation, area, U-factor, construction
 - Roof: roof area, U-factor, construction
 - Windows: window orientation, area, U-factor, construction
 - External shading: external window shading geometries
 - Doors: door area, U-factor, crack length
 - Infiltration: air change rates
 - Misc Cond: area, U-factor, reference temperatures for unconditioned spaces
5. Profiles: diversity factors for internal gains (2 screens)

5.3.3 Selecting Zones for Editing

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After you specify one of these categories (except for the "Building" category), you will see a screen asking you to select the zones you want to edit. Each zone's label, or name, which you defined previously on the zone input screen, will be listed. An arrow points to the first zone on the list. Using the up and down cursor control keys, move the arrow until it points to the zone you want to edit, press CR, and that zone will be shown in reverse video. (CR works like a toggle switch here; if you press CR when the arrow is pointing at a marked zone, it will unmark it.) After you have marked all the zones you want to edit, press the "Escape" (ESC) key, and the screen(s) for each selected zone and category will be brought up.

If there is more than one screen for a category, the screens will appear sequentially. If there is more than one zone to edit, the screen(s) for each zone will appear one zone at a time. After you have edited all the indicated screens, you will be returned to the Loads Input Menu, where you can choose to edit additional sections or to save your file and exit this portion of the program.

5.3.4 Copying Zone Data

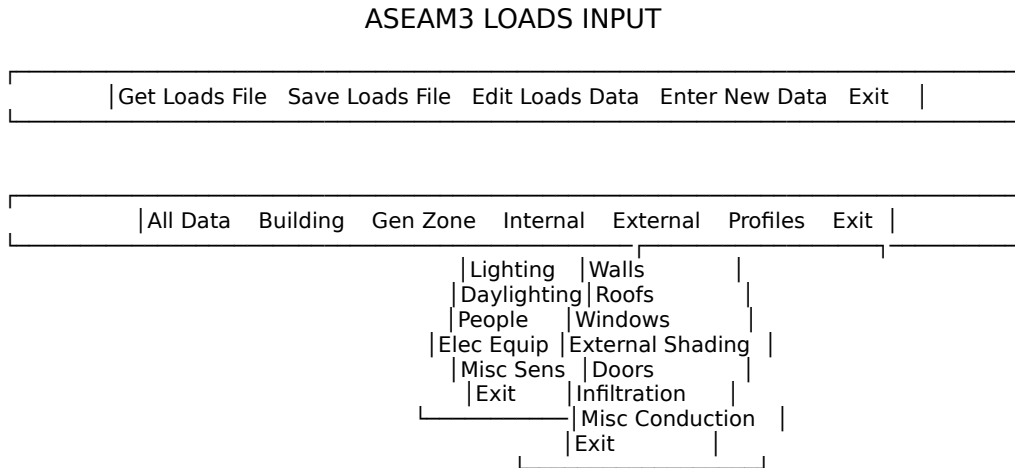
For any screen that appears for all zones, you can copy data from another zone to the current zone being edited by pressing Alt-`x' simultaneously, where `x' is the zone number you want copied. The input data will then be copied from zone `x' to the zone whose screen you are currently editing. (If `x' is a zone that has not been defined, a screen full of blanks will be copied onto this screen.)

5.3.5 Saving Your Data

It is always wise to save your work from time to time especially if you are in an area that experiences frequent power outages. Use the F10 function key after every second or third zone to return to the Main Menu and then save your work. After saving the file, access the "Edit Loads Data" from the main loads input menu bar, and select "All Data" from the editing menu bar. You should then "select" only the unfinished zones for editing.

ASEAM3.0 User's Manual Chapter 5 - Loads Input
5.4 Loads Input Screens

If you select "Edit Loads Data" from the main loads input menu, the following screen will appear:



Note: This menu is fully expanded. The pull-down menus will show on your screen if you select either Internal or External.

The following discussion focuses on the input screens and the questions that appear on each screen. Each screen is shown below, outlined by a box, as it will appear to you. Function key menus, which generally appear at the bottom of each screen, are omitted here.

The name printed above each screen is the name of the file (extension .LIS, for Load Input Screen) that contains the screen format and input parameters (i.e., help messages, error-checking limits, default values, etc.) for the screen. You can ignore this information unless you need to change these values. See Appendix C for instructions on how to change input screen parameters.

5.4.1 General Project/Building Screens

The first three input screens contain general information about the building. The location is used to refer to the latitude tables for solar heat gain factors. The number of zones that you specify here is used throughout the program. If you want to add or delete zones, you must first change the number of zones specified on this screen.

ASEAM3.0 User's Manual Chapter 5 - Loads Input
5.4.1.1 Project/Building Data

LIPROJDT

PROJECT/BUILDING DATA	
Building Names & ID'S:	
Building File Name	_____
Building Name	_____
Project Number	_____
Building Location:	
Building Address	_____
_____	_____
_____	_____
Building Type:	
Building Type	_____
Building Areas and Zones:	
Building Gross Floor Area	_____ ft ²
Building Net Conditioned Area	_____ ft ²
Number of Zones	_____

Building file name
 For your reference only.

Building name
 For your reference only.

Project number
 For your reference only.

Building address
 For your reference only.

Building type
 For your reference only.

Building gross floor area
 Enter square feet.

Building net conditioned area
 Enter square feet. Enter only the total area that is conditioned.

Number of zones
 Enter number 1-15. The number of zones you have defined for the building. See section 4.3 on zoning a building. The maximum number of zones ASEAM3.0 can model is 15.

ASEAM3.0 User's Manual Chapter 5 - Loads Input
5.4.1.2 Project/Building Data (Screen 2)

LIPRJ2DT

```

|-----|
| PROJECT DATA SCREEN 2 |
|-----|
| Building Location: |
| North Latitude (Use '-' for South Lat) |      |      |
| West Longitude (Use '-' for East Long) |      |      |
|-----|
| Operating Schedules: |
| Typical weekday occupancy starting hour |      |      |
| Typical weekday operating hours per day |      |      |
| (Use only 8, 10, 12, 14, 16) |      |      |
|-----|
| Summer thermostat schedule beginning month number |      |      |
| Summer thermostat schedule ending month number |      |      |
|-----|
| Time Zone Number |
| 5=Eastern 6=Central 7=Mountain 8=Pacific |
|-----|
| Daylight Savings Time Used (Y/N) |      |      |
|-----|

```

North latitude

Enter decimal degrees. For example, 35 deg 30 minute north latitude is entered as 35.5. Use positive values for north latitudes and negative values for south latitudes.

West longitude

Enter decimal degrees. Use positive values for west longitude and negative values for east longitudes.

Typical weekday occupancy starting hour

Enter number 0-24. The number indicates the hour at which building occupancy begins on a typical weekday. Internal loads (people, lights, and equipment) are assumed to start at this hour.

Typical weekday operating hours per day

Enter 8, 10, 12, 14, or 16 to indicate the number of hours from the starting hour that the building is occupied on a typical weekday. The number determines which cooling load factors tables are used.

Summer thermostat schedule, beginning month number

Enter number 1-12. The number indicates the month that the summer thermostat schedule takes effect (e.g, 5 means that it starts May 1).

Summer thermostat schedule, ending month number

Enter number 1-12. The number indicates the month that the summer thermostat schedule ends (e.g., 9 means that it ends September 30).

Time zone number

Enter number 5-8. Pick the number for your time zone from the list. See Appendix A, section A.2.2, if your time zone is not listed here.

ASEAM3.0 User's Manual Chapter 5 - Loads Input

Daylight savings time

Enter 'Y' if daylight savings time is observed; otherwise enter 'N'.

5.4.1.3 Occupancy Schedules

LIOCCSDT

| OCCUPANCY SCHEDULES |

|-----|

| Enter the typical OCCUPIED schedule - Use military time (5:30 pm = 1730) |

| Values should be in 'hundreds' of hours - 8 am = 800 |

| If UNOCCUPIED for entire day - use 0 to 0 |

| If OCCUPIED for entire day - use 0 to 2400 |

| Day of Week |

| Weekdays from ___ to ___ |

| Saturdays ... from ___ to ___ |

| Sundays from ___ to ___ |

Typical occupied hours

Enter number 0 to 2400. These hours are used to determine the occupied and unoccupied time blocks for bin calculations. Unlike the hours of occupancy on the previous screen, you are not limited to even numbers of hours between 8 and 16. The hourly loads (from the loads calculations) are averaged over both the occupied and unoccupied time periods defined by these values. The HVAC system and plant calculations are performed with these averaged loads. Therefore, you may want to consider these inputs as defining the system and plant operating schedules.

Use military time (e.g., 1430 is 2:30 p.m.). Note that if the building is unoccupied for the entire day, you should use from 0 to 0. INSURE THAT VALUES ARE ENTERED IN 'HUNDREDS'.

Caution: You are advised *not* to use 0 to 2400 entries even if the building is occupied for the entire day. This would average the hourly loads for an entire 24-hour period, thereby eliminating the normal daytime peaks and nighttime valleys in the load profile. A better method is to enter a typical schedule here (e.g., 0600 to 1800) and specify, in systems input, that your systems operate continuously during the unoccupied cycle. With this specification, the loads on your systems and plant will follow the normal peaks and valleys of a typical load profile. Use high unoccupied diversity factors for people, lights, etc., to simulate occupancy during these times.

5.4.2 General Zones Screen

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Data for the general zone input screen must be completed for each zone. The number of zones is taken from the first project/building data screen. If you wish to add (or delete) a zone, you must change the number of zones on the first project/building data screen.

5.4.2.1 Zone Screen (one per zone)

On the zone input screen, you specify the zone label (or name), size, and thermostat setpoints.

```

LIZONEDT
-----
| ASEAM3 LOADS INPUT: ZONE 1 - |
|                               |
|                               | LOAD FILE: |
|-----|-----|
| Zone label                    |
|                               |
| Zone function                  |
| Zone area                     | _____ ft2 |
| Zone volume                   | _____ ft3 |
| (or) Floor to ceiling height | _____ ft  |
|                               |
| Thermostat Set Point Temperatures |
| Summer occupied temperature     | _____ °F |
| Winter occupied temperature     | _____ °F |
| Winter unoccupied temperature   | _____ °F |
|                               |
|-----|-----|
  
```

Zone label

For your reference only. This label, or user-defined name, will be displayed on the screen when you select zones to edit, assign zones to systems in systems input, and on some output reports.

Zone function

For your reference only.

Zone volume

Enter cubic feet. You must supply either zone volume or floor-to-ceiling height, below. If you enter zone volume here, this value is used; if you do not, the volume is calculated from the zone area and floor-to-ceiling height entry, below.

Floor-to-ceiling height

Enter in feet. Not required if zone volume is specified above. Otherwise, the zone volume will be calculated as zone area times this value.

Summer occupied thermostat setpoint

Enter degrees Fahrenheit (F) to indicate the thermostat setting during the summer schedule.

Winter occupied thermostat setpoint

Enter degrees F to indicate the thermostat setting during the winter schedule and occupied times.

ASEAM3.0 User's Manual Chapter 5 - Loads Input

Winter unoccupied thermostat setpoint

Enter degrees F to indicate the thermostat setting during the winter schedule and unoccupied times. Since the unoccupied cycle thermal loads are calculated based on this assumed space temperature, use realistic values that reflect the average space temperature during the unoccupied cycle. That is, if the space temperature rarely drops below 60 degrees F at night (regardless of the thermostat) set point, you should use `60'.

5.4.3 Internal Screens

The internal screens contain input data for typical internal loads: lighting, daylighting, daylighting controls, people, infiltration, and miscellaneous sensible loads.

5.4.3.1 Lighting Screen (one per zone)

Specify the lighting input data for each zone on this screen. You can enter up to four lighting functions, that is, four different sets of lighting input. More than one lighting function may be used if you have several different types of space in one zone (e.g., office spaces, storage space, toilets, corridors, etc.). Lighting data for each space can be entered separately, using a different function column for each space.

If you are using ASEAM3.0 for daylighting analysis, you also should have a separate lighting function for each control area. (See the "Daylighting Screens" section for more information.) If you are using daylighting, there is a one-to-one correspondence between lighting function data on this screen and daylighting data entered on subsequent daylighting input screens. That is, the data from function 1 on this screen "goes with" the data for function 1 on the daylighting screens.

Lighting information is used to calculate internal heat gains and electric energy consumption produced by the lights.

On these and all other multicolumn input screens, you must enter something on the first line (function name) of each column. Entering `NA' (not applicable) indicates that you do not want to simulate this component, and you will not be able to move the cursor down to enter data in this column. Pressing the default (F8) key will insert `NA' on this line. Any other entry will be taken as the function name, and you will be required to enter data for the component.

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LILITEDT

```

|-----|
| ASEAM3 LOADS INPUT: ZONE 1 - |
| LIGHTING | LOAD FILE: |
|-----|
| Ltg Func 1 Ltg Func 2 Ltg Func 3 Ltg Func 4 |
| Function name (or 'NA') |
| Average function area (ft²) |
| Installed watts/ft² |
| (times) Percent of function area |
| (or) Total installed watts |
| Daylighting (Y/N) |
| Controlite filename (if appl) |
| Lighting system type (Opt) |
| Percent light heat to space (%) |
| 'A' classification |
| 'B' classification |
| A classification - .45, .55, .65, .75 (See ASHRAE F26.19 T15) |
| B classification - A, B, C, D (See ASHRAE F26.19 T16) |
|-----|

```

Function name

For your reference only. Enter `NA' (or F8 - the default value) if this function does not apply.

Average function area (ft²)

Enter square feet. Used with subsequent entries to calculate installed watts but is not used if you enter total installed watts, below.

Installed watts/ft²

Watts per square foot of lighting installed. Used with the previous question to calculate installed watts but is not used if you enter total installed watts, below.

Percent of function area

Percent of the function area, defined above, by this lighting function. Normally, if you enter actual square feet for each function area above, this value should be 100%. If the total installed wattage is not entered below, the installed lighting wattage is calculated by multiplying the function area times the installed watts per square foot times the percent of function area. You may also use the zone area as the function area (in all functions) and then enter the percent of the zone area that is corridors, office space, etc.

Total installed watts

Enter watts. Not required if installed watts per square foot, function area, and percent of function area, above, are *all* specified. If you enter a value for total installed watts, it is used instead of the calculated value.

Daylighting

Answer `Y' if Controlite or IES method daylighting analysis is required. This calls up two screens on daylighting and controls. If the Controlite analysis is to be used, the Controlite output file must be ready for ASEAM3.0 to read. If no daylighting analysis is to be done, answer `N'.

ASEAM3.0 User's Manual Chapter 5 - Loads Input

Controlite file name

Enter the file name for the Controlite output file (file name extension '.OUT'). This file *must* be in the data subdirectory.

Lighting system type (optional)

For your reference only. You can use this to indicate the type of lighting (e.g., "Rec-Fluor," "Incandescent," etc.).

Percent light heat to space

Enter percent. Remainder assumed to go to plenum (return air). Note that for system types without typical return air plenums (e.g., window air conditioners), the system load is the sum of the plenum load and the space load.

'A' classification

Enter .45, .55, .65, .75. See 1985 ASHRAE Handbook of Fundamentals, Table 15, page 26.19 (reprinted on following page).

'B' classification

Enter A, B, C, D. See 1985 ASHRAE Handbook of Fundamentals, Table 16, page 26.19 (reprinted on following page).

ASEAM3.0 User's Manual Chapter 5 - Loads Input
Design Values of 'a' Coefficient
Features of Room Furnishings, Light Fixtures,
and Ventilation Rates

'a' Classification	Furnishings	Air Supply and Return	Type of Light Fixture
0.45	Heavyweight, simple furnishing, no carpet	Low rate; supply and return below ceiling	Recessed, not vented
0.55	Ordinary furniture, no carpet	Medium to high ventilation rate; supply and return below ceiling or through ceiling grill and space	Recessed, not vented
0.65	Ordinary furniture, with or without carpet	Medium to high ventilation rate or fan coil or induction type air-conditioning terminal unit; supply through ceiling or wall diffuser; return around light fixtures and through ceiling space	Vented
0.75	Any type of furniture	Ducted returns through light fixtures	Vented or free hanging in air stream with ducted returns

'b' Classification Values
Calculated for Different Envelope Construction
and Room Air Circulation Rates

Room Envelope Construction	Mass of Floor Area lb/ft ²	Room Air Circulation and Type of Supply and Return			
		Low	Medium	High	Very High
2 in. Wood Floor	10	B	A	A	A
3 in. Concrete Floor	40	B	B	B	A
6 in. Concrete Floor	75	C	C	C	B
8 in. Concrete Floor	120	D	D	C	C
12 in. Concrete Floor	160	D	D	D	D

ASEAM3.0 User's Manual Chapter 5 - Loads Input

5.4.3.2 Daylighting Screen (one per zone)

The daylighting screen is accessed only if you indicated on the previous lighting screen that a daylighting analysis is to be performed.

On this screen you describe the characteristics of a typical room that are used to calculate the daylighting contribution to the overall lighting requirement. Daylighting saves energy only if lights that are not required can be turned down or off, so you also input the method of lighting control.

The numbers of the daylighting functions correspond to the numbers for the lighting functions on the previous screen and the numbers for the control functions on the next screen. That is, lighting function number 1 refers to the same function area and lighting system as daylighting function number 1 and daylighting control function number 1.

The daylighting algorithms used in ASEAM3.0 are those for a simplified IES method. Only side lighting from one exterior window orientation (vertical only) is considered. External shading data for windows are ignored in ASEAM3.0 daylighting calculations. Each typical room modeled may have only one window orientation. Controlite performs a much more complex analysis and can, for example, handle skylights and multiple window orientations.

Note: "Typical" room data is to be entered on the daylighting screens. The calculations simulate daylighting for a typical space - *not* for the entire zone. The "percent of lights controlled" input question is used to apportion the "typical" room calculations over the entire zone. The limits for the dimensions for the typical space are:

	Minimum Dimension	Maximum Dimension
Room depth from window	8 ft	50 ft
Room length	8 ft	50 ft
Ceiling height	8 ft	16 ft

ASEAM3.0 User's Manual Chapter 5 - Loads Input

ASEAM3 LOADS INPUT: ZONE 1 -				
DAYLIGHTING	LOAD FILE:			
	Ltg Func 1	Ltg Func 2	Ltg Func 3	Ltg Func 4
Function name (or 'NA')				
Window orientation (N,NW,etc)				
Ground reflectance (%)				
Typical room window area (ft2)				
Glass visible transmittance (%)				
Room depth from window (ft)				
Room length (ft)				
Ceiling height (ft)				
Wall reflectance (%)				
Present footcandles in space				
Design footcandles for space				
Sensor location				
(1=Max 2=Mid 3=Min)				
Percent of lights controlled				
Control type ('D'im or 'S'tep)				

Function name

For your reference only. The function name for the corresponding lighting function is repeated here, but you may change it if desired.

Window orientation

Enter N, NW, etc. Specify orientation with one or two letters. ASEAM3.0 can only model daylighting from one window orientation.

Ground reflectance

Enter percent. The reflectance of a surface is defined as the ratio of the amount of light (lumens) leaving a surface to the amount of light falling onto that surface. Green grass has a reflectance of about 20%. For other values, refer to the 1985 ASHRAE Handbook of Fundamentals, Table 12, page 27.9 (reprinted at the end of this section).

Typical room window area

Enter square feet. This is the total window area for a "typical" space in this zone, and *not* the total window area for the entire zone.

Glass visible transmittance

Enter percent. The visible transmittance is defined as the ratio of the amount of light that passes through the glass to the amount of light incident on it. Typical values may be found in the 1985 ASHRAE Handbook of Fundamentals, Table 30, page 27.32 (reprinted at the end of this section).

Room depth from window

Enter feet, measured perpendicular from window.

Room length

Enter feet, measured parallel to window.

Ceiling height

Enter feet.

ASEAM3.0 User's Manual Chapter 5 - Loads Input

Note: The above three dimensions (room depth from window, room length, and ceiling height) define the typical room dimensions for daylighting calculations. Interpolation routines are used to determine the coefficients of utilization (‘C’ and ‘K’ factors) based on these input values, the wall reflectance, and sensor location. Refer to 1984 IES Lighting Handbook, Reference Volume, Chapter 7, for these tables.

Wall reflectance

Enter percent. A typical value for wall reflectance is 70(%)

Present footcandles in space

Enter footcandles. Enter the lighting footcandles provided by the existing artificial lighting system. This value may be greater than the design footcandles entered below.

Design footcandles for space

Enter footcandles. Enter the lighting design requirement in footcandles for the space.

Sensor location

1=max, 2=mid, 3=min. Refers to the position of the lighting sensor (which determines how much artificial light is required to supplement the daylighting) in the room. The ‘max’ location is 5 feet from the window; ‘min’ location is 5 feet from the back wall; and the ‘mid’ location is centered between these two. In all cases the sensor is assumed to measure at the working plane, 30 inches above the floor and horizontal.

Percent of lights controlled

Percent of the total installed zone lighting wattage (from the previous lighting screen for each function) that uses daylighting. For example, if only 80% of the total lighting watts for this function will be available for daylighting control (the remainder may be interior corridors), enter 80(%) for this value.

Control type

Enter ‘D’ for Dimming (with continuous range); ‘S’ for Step (with up to 4 discrete step intervals). You will define the daylighting control parameters on the next screen.

ASEAM3.0 User's Manual Chapter 5 - Loads Input
Solar Reflectances of Various Foreground Surfaces

Surface	Ground Reflectance
Ocean	0.05
Bituminous Concrete	0.10
Wheat Field	0.07
Dark Soil	0.08
Green Field	0.12 - 0.25
Grass, Dry	0.24
Crushed Rock Surface	0.20
Concrete, Old	0.22
Concrete, Light Colored	0.32
Paved Asphalt	0.18

Daylight Transmittance for Various Types of Glass

Type of Glass	Visible Transmittance
1/8 in. regular sheet or float glass	0.86 to 0.91
1/8 in. gray sheet	0.31 to 0.71
3/16 in. gray sheet	0.61
7/32 in. gray sheet	0.14 to 0.56
1/4 in. gray sheet	0.52
1/4 in. green/float glass	0.75
1/4 in. gray/plate glass	0.44
1/4 in. bronze plate glass	0.49
1/2 in. gray plate glass	0.21
1/2 in. bronze plate glass	0.25
Coated glasses (single, laminated, insulating)	0.07 to 0.50

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5.4.3.3 Daylighting Control Screen (one per zone)

This screen appears only if you specified a daylighting analysis on the lighting screen.

The Daylighting Control screen contains information on the daylighting controls. The more daylight is available, the less artificial light is needed. Turning down the electric lighting may be performed with either step controls (discrete) or dimming (continuous) controls. In either case, both electrical energy consumption of the lights and heat gain due to the lights decrease. Again, each of the daylighting control functions entered here should correspond to the same daylighting function and lighting function. Make sure that you always enter the functions in the same order.

LIDAYCDT

ASEAM3 LOADS INPUT: ZONE 1 -				
DAYLIGHTING CONTROLS			LOAD FILE:	

Ltg Func 1 Ltg Func 2 Ltg Func 3 Ltg Func 4				
Function name (or 'NA')				
For Dimming Control Only				
Minimum FC maintained by lights	___	___	___	___
% of total power at min FC (%)	___	___	___	___
For Stepped Control Only				
Number of Steps (max=4)	-	-	-	-
Step 1 artificial FC	___	___	___	___
Step 1 lighting watts	___	___	___	___
Step 2 artificial FC	___	___	___	___
Step 2 lighting watts	___	___	___	___
Step 3 artificial FC	___	___	___	___
Step 3 lighting watts	___	___	___	___
Step 4 artificial FC	___	___	___	___
Step 4 lighting watts	___	___	___	___

Function name
 For your reference only. Repeat the function name for the corresponding lighting function here. You can also change it.

Minimum FC maintained by lights
 Enter footcandles. This is the minimum light output, in footcandles, that is maintained with dimming controls regardless of the amount of available daylight. The power-footcandle curve is assumed to be linear between the minimum footcandle level and power required (defined below), and 100% power and design footcandle level.

Percent of total power at minimum footcandles
 Enter percent. This input, for dimming control only, is the percent of the total installed artificial lighting power required to maintain the minimum footcandles entered above.

Number of steps
 Enter number 1-4. This is the number of discrete steps of lighting control for stepped daylighting control.

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Artificial FC

Enter footcandles. For each step defined above, proceeding from the lowest to highest footcandle level, enter the step values for the artificial footcandles and power required (below).

Lighting watts

Enter watts. For each step, above, starting with the lowest, enter the artificial lighting watts required to produce the footcandle level for that step.

Note: ASEAM3.0 will calculate the amount of artificial lighting footcandles required to meet the design footcandle level at the sensor location. It will then calculate the power required to produce this footcandle level. If dimming controls are used, a linear equation is used. If stepped controls are used, the step values are used by checking the first set of values, then the second, and so on until the required artificial footcandle first exceeds the step `x' artificial footcandles. It is imperative, therefore, that the step functions be entered from lowest artificial footcandle-power required to the highest artificial footcandle-power required.

5.4.3.4 People Screen (one per zone)

The people screen contains information about the number of people in the zone and the amount of heat they produce. You should weight-average your data entries if the heat output per person varies.

```

                                LIPEOPDT
    _____
    |ASEAM3 LOADS INPUT: ZONE 1 -|
    | PEOPLE                      | LOAD FILE: |
    |-----|
    | PEOPLE                      |
    | |                            |
    | |Number of people in zone   |
    | | (or) Square feet per person |
    | |Sensible load per person   |
    | |Latent load per person     |
    | _____ BTUH per person  |
    | _____ BTUH per person  |
    |_____
  
```

Number of people in zone

Number. Enter the number of people in the zone at full occupancy. Enter either this number or the square feet per person, below.

Square feet per person

Number. Enter the square feet per person in the zone at full occupancy. Enter either this number or the number of people, above.

Sensible load per person

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Enter BTUH per person. See the 1985 ASHRAE Handbook of Fundamentals, Table 18, page 26.21 (reprinted below).

Latent load per person

Enter BTUH per person. See the 1985 ASHRAE Handbook of Fundamentals, Table 18, page 26.21 (reprinted on the following page).

Rates of Heat Gain from Occupants of Conditioned Spaces			
Degree of Activity	Typical Application	<u>Sensible Heat</u> Btu/h	<u>Latent Heat</u> Btu/h
Seated at rest	Theater, movie	210	140
Seated, very light work writing	Offices, hotels, apartments	230	190
Seated, eating	Restaurant	255	325
Seated, light work, typing	Offices, hotels, apartments	255	255
Standing, light work or walking slowly	Retail store, bank	315	325
Light bench work	Factory	345	435
Walking, 3 mph, light machine work	Factory	345	695
Bowling	Bowling alley	345	615
Moderate dancing	Dance hall	405	875
Heavy work, heavy machine work, lifting	Factory	565	1035
Heavy work, athletics	Gymnasium	635	1165

ASEAM3.0 User's Manual Chapter 5 - Loads Input
5.4.3.5 Electrical Equipment Screen (one per zone)

This screen contains information on miscellaneous electrical equipment in the zone. Normally this is the electric receptacle load (e.g., personal computers, coffee machines, copiers). ASEAM3.0 will calculate both the electric KWH consumption of these loads and convert all the electric loads into space heat gains (sensible only).

LIELECDT

ASEAM3 LOADS INPUT: ZONE 1 - EQUIPMENT	LOAD FILE:	
ELECTRICAL EQUIPMENT	Type 1	Type 2
Electric equipment name (or 'NA')	_____	_____
Installed watts/ft ² (times) Percent of zone area	_____	_____
(or) Total installed watts	_____	_____
Hooded (Y/N)	-	-
----- All watts are converted to space heat gains -----		

Electrical equipment name
 For your reference only. Enter `NA' (the default value) if you are not entering electrical equipment data in this column.

Installed watts/ft²
 Enter watts per square foot. Enter the actual power requirements of the electrical equipment installed, expressed in watts per square foot. Neither this input nor the next is required if the total installed watts, entered below, is specified.

Percent of zone area
 Enter percent covered by this wattage equipment. This percentage is used with installed watts per square foot, entered above, and is not required if the total installed watts, entered below, is specified.

Total installed watts
 Enter watts. This is the total amount of installed equipment power, in watts. This value, if entered, has precedence over the installed watts per square foot and the total installed watts, entered above.

Hooded
 Enter `Y' for Yes or `N' for No. ASEAM3.0 determines cooling load factors for these loads from the 1985 ASHRAE Handbook of Fundamentals, Tables 22 and 23, page 26.25.

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5.4.3.6 Miscellaneous Sensible Loads Screen (one per zone)

This screen contains information about miscellaneous sensible loads not covered in the previous categories of lights, people, or electrical equipment. For example, an uninsulated pipe or tank of hot or cold fluid or a gas stove would be placed in this category. Note that any electrical equipment should be listed in the electrical equipment section, so that its electrical KWH consumption is totaled. Only nonelectrical equipment should be entered on this screen.

Miscellaneous sensible loads can be either heat gains (sources) or losses (sinks). Heat gains must be entered as positive (+) numbers and heat losses as negative (-) numbers. You may use different monthly diversity factors to simulate seasonal heat gains or losses. You may specify two different types of miscellaneous sensible loads.

LIMSENDT

ASEAM3 LOADS INPUT: ZONE 1 - MISCELLANEOUS SENSIBLE LOADS		LOAD FILE:	
MISCELLANEOUS SENSIBLE LOADS	Type 1	Type 2	
Load source name (or 'NA')			
Installed BTUH/ft ² (times) Percent of zone area (or) Total installed BTUH	—	—	
Hooded (Y/N)	-	-	
Enter Heat Gains as (+) and Heat Losses as (-)			

Load source name

For your reference only. Enter `NA' (default value) if you are not entering miscellaneous sensible load data in this column.

Installed BTUH/ft²

Enter BTUH per square foot. Enter heat gains as positive numbers and heat losses as negative numbers. This entry is used with the percent of zone area, entered below, and is not required if the total installed BTUH, also entered below, is supplied.

Percent of zone area

Enter percent. This is used with the above entry and is not required if the total installed BTUH, entered below, is specified.

Total installed BTUH

Enter BTUH. Enter heat gains as positive and heat losses as negative numbers. Typical heat gains may be found in the 1985 ASHRAE Handbook of Fundamentals, Tables 20 and 21, pages 26.23-24 for cooking appliances.

Hooded

Enter `Y' for Yes or `N' for No. ASEAM3.0 determines cooling load factors for these loads from the 1985 ASHRAE Handbook of Fundamentals, Tables 22 and

5.4.4 External Load Screens

The External Load screens are used to enter data for typical external loads: walls, roofs, windows, external shading for windows, infiltration, and miscellaneous conduction. Core, or interior, zones typically will not have any external loads, so `NA' must be entered for names of these components.

5.4.4.1 Walls Screen (one per zone)

This screen contains information about the exterior walls of the building. It is used for calculating conductive gains and losses through the walls and the solar CLTD loads.

You may specify up to four different wall types. As in all other multicolumn screens, a name must be entered on the first row if you want to specify data for the component. Otherwise, enter `NA' for the name.

Walls that have the same orientation, U-factor, construction group, and color correction factor, as described below, but which are not one contiguous wall, may be combined and treated as one wall. The combined wall should have an area equal to the sum of the areas of the individual walls.

LIWALLDT

ASEAM3 LOADS INPUT: ZONE 1 -				
WALLS	LOAD FILE:			
WALLS	Wall 1	Wall 2	Wall 3	Wall 4
Name (or 'NA')				
Wall Orient (N,NE,etc)	-	-	-	-
Area (ft ²)	-	-	-	-
U-Factor (BTUH/ft ² -°)	-	-	-	-
Wall Construction Group	-	-	-	-
Color Correction	-	-	-	-

Wall Construction Groups - see page F26.9 ('A' through 'G')				
Color Correction Codes 1=Dark .83=Medium .65=Light				

Name
For your reference only. Enter `NA' (the default value) if you are not entering wall data in this column.

Wall orientation
Enter N, NW, etc. Specify with one or two letters.

Area
Enter square feet. All walls that have the same orientation, U-factor,

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construction group, and color correction factor but which are not contiguous walls may be combined and treated as one wall. The area of the combined wall should be equal to the sum of the individual wall areas. *Note that this is net wall area and does not include windows or doors.*

U-factor

Enter BTUH/square foot degree F. You can calculate these values using the information in the 1985 ASHRAE Handbook of Fundamentals, Chapter 23.

Wall construction group

Enter A through G. See the 1985 ASHRAE Handbook of Fundamentals, Table 6, page 26.9. (see the "GROUP NO" reprinted on the following page). The wall construction group is used by ASEAM3.0 to refer to the correct wall CLTD factors.

Color correction

1=dark, .83=medium, .65=light. These color correction factors are found in the 1985 ASHRAE Handbook of Fundamentals, Note 2 to Table 7, page 26.10.

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Wall Construction Group Description			
Group No.	Description of Construction	Weight (lb/ft ²)	U-Value (Btu/h•ft ² •F)
4-in. Face Brick + (Brick)			
C	Air Space + 4-in. Face Brick	83	0.358
D	4-in. Common Brick	90	0.415
C	1-in. Insulation or Air Space + 4-in. Common Brick	90	0.174-0.301
B	2-in. Insulation + 4-in. Common Brick	88	0.111
B	8-in. Common Brick	130	0.302
A	Insulation or Air Space + 8-in. Common Brick	130	0.154-0.243
4-in. Face Brick + (H.W. Concrete)			
C	Air Space + 2-in. Concrete	94	0.350
B	2-in. Insulation + 4-in. Concrete	97	0.116
A	Air Space or Insulation + 8-in. or more Concrete	143-190	0.110-0.112
4-in. Face Brick + (L.W. or H.W. Concrete Block)			
E	4-in. Block	62	0.319
D	Air Space or Insulation + 4-in. Block	62	0.153-0.246
D	8-in. Block	70	0.274
C	Air Space or 1-in. Insulation + 6-in. or 8-in. Block	73-89	0.221-0.275
B	2-in. Insulation + 8-in. Block	89	0.096-0.107
4-in. Face Brick + (Clay Tile)			
D	4-in. Tile	71	0.381
D	Air Space + 4-in. Tile	71	0.281
C	Insulation + 4-in. Tile	71	0.169
C	8-in. Tile	96	0.275
B	Air Space or 1-in. Insulation + 8-in. Tile	96	0.142-0.221
A	2-in. Insulation + 8-in. Tile	97	0.097
H.W. Concrete Wall + (Finish)			
E	4-in. Concrete	63	0.585
D	4-in. Concrete + 1-in. or 2-in. Insulation	63	0.119-0.200
C	2-in. Insulation + 4-in. Concrete	63	0.119
C	8-in. Concrete	109	0.490
B	8-in. Concrete + 1-in. or 2-in. Insulation	110	0.115-0.187
A	2-in. Insulation + 8-in. Concrete	110	0.115
B	12-in. Concrete	156	0.421
A	12-in. Concrete + Insulation	156	0.113
L.W. and H.W. Concrete Block + (Finish)			
F	4-in. Block + Air Space/Insulation	29	0.161-0.263
E	2-in. Insulation + 4-in. Block	29-37	0.105-0.114
E	8-in. Block	47-51	0.294-0.402
D	8-in. Block + Air Space/Insulation	41-57	0.149-0.173
Clay Tile + (Finish)			
F	4-in. Tile	39	0.419
F	4-in. Tile + Air Space	39	0.303
E	4-in. Tile + 1-in. Insulation	39	0.175
D	2-in. Insulation + 4-in. Tile	40	0.110
D	8-in. Tile	63	0.296
C	8-in. Tile + Air Space/1-in. Insulation	63	0.151-0.231
B	2-in. Insulation + 8-in. Tile	63	0.099
Metal Curtain Wall			
G	With/without air Space + 1-in./ 2-in. 3-in. Insulation	5-6	0.091-0.230
Frame Wall			
G	1-in. to 3-in. Insulation	16	0.081-0.178

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5.4.4.2 Roofs Screen (one per zone)

This section contains information about the external roofs of the building. It is assumed that the roof is horizontal and flat, as is typical of commercial buildings. Because the ASHRAE CLTD tables apply only to horizontal flat roofs, ASEAM3.0 cannot model a tilted roof. Based on the information supplied here, heat gains and losses, including the effects of solar radiation, are calculated.

LIROOFDT

ASEAM3 LOADS INPUT: ZONE 1 -			
ROOFS	LOAD FILE:		
ROOFS	Roof 1	Roof 2	
Name (or 'NA')	_____	_____	
Area (ft ²)	_____	_____	
U-Factor (BTUH/ft ² -°)	_____	_____	
Roof Construction Code	__	__	
Color Correction	__	__	
Susp Ceil Plenum (Y/N)	-	-	

Roof Construction Codes see ASHRAE T26.8, T5			
Color Correction Codes 1 = Dark Colored or in an industrial area			
.5 = permanently light colored or in rural area			

Name

For your reference only. Enter `NA' (default value) if you are not entering roof data in this column.

Area

Enter square feet.

U-factor

Enter BTUH/square foot degree F. Consult the 1985 ASHRAE Handbook of Fundamentals, Chapter 23, if necessary.

Roof construction code

Enter number 1-13. This number describes the roof construction type. See the 1985 ASHRAE Handbook of Fundamentals, Table 5, page 26.8 (reprinted below).

Color correction

1=dark, industrial area; 0.5=light, rural area. See the 1985 ASHRAE Handbook of Fundamentals, Note 2b to Table 5, page 26.8.

Suspended ceiling plenum

Enter `Y' for Yes, `N' for No.

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Roof Construction Codes for Calculating Cooling Load from Flat Roofs		
Roof No.	Description of Construction	Weight lb/ft.²
1	Steel sheet with 1-in.	7
2	(or 2-in.) insulation 1-in. wood with 1-in. insulation	(8) 8
3	4-in. l.w. concrete	18
4	2-in. h.w. concrete with 1-in. (or 2-in.) insulation	29
5	1-in. wood with 2-in. insulation	9
6	6-in. 1.w. concrete	24
7	2.5-in. wood with 1-in.	13
8	insulation 8-in. 1.w. concrete	31
9	4-in. h.w. concrete with 1-in. (or 2-in.) insulation	52
10	2.5 in. wood with 2-in. insulation	(52) 13
11	Roof terrace system	75
12	6-in. h.w. concrete with 1-in. (or 2-in.) insulation	(75) 75
13	4-in. wood with 1-in. (or 2-in.) insulation	17 (18)

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5.4.4.3 Windows Screen (one per zone)

The windows screen contains information that will be used to calculate solar gains and conductive gains and losses through windows. Infiltration for windows is calculated using the crack length method.

You can input as many as four different window types. If several windows have the same characteristics, they may be modeled together as one large window. In this case, the area must be the sum of all the individual areas, and the crack length the sum of all the individual crack lengths.

Important: On this screen, specify whether a window has external shading by entering a "model number." Unlike other zone screens, however, window shading details for each model number apply to the entire building; they are not zone specific. Thus, if you enter a window shading model number of `1', for example, the data entered for shading model `1' apply to windows *in all zones*. Therefore, windows in zones 2, 3, 4, etc. can *all* refer to model #1 without having to re-enter the same window geometry for each zone. However, if you change the geometry entries in model #1, you have also changed the values for all zones. There is only one window shading geometry screen, but it applies to *all* zones. You may have up to three different window shading geometries for the entire building.

LIWNDODT

ASEAM3 LOADS INPUT: ZONE 1 -				
WINDOWS	LOAD FILE:			
WINDOWS	Window 1	Window 2	Window 3	Window 4
Name (or 'NA')	-	-	-	-
Window orient (N,NE,etc)	-	-	-	-
Fenestration area (ft ²)	-	-	-	-
Shading coefficient	-	-	-	-
U-Factor (BTUH/ft ² -°)	-	-	-	-
Space mass code (1=light 2=medium 3=heavy)	-	-	-	-
Crack length (lin ft)	-	-	-	-
Leakage coefficient	-	-	-	-
INPUTS REQUIRED FOR SHADING				
Window shading model # 0=None OR 1,2, or 3	-	-	-	-
Percent window area	-	-	-	-

Name

For your reference only. Enter `NA' (default value) if you are not entering window data in this column.

Window orientation

Enter N, NW, etc.

Fenestration area

Enter square feet. Enter the total window area, in square feet, regardless of

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whether exterior window shading is used or not. The "percent window area" entry below determines the amount of the total window area that has exterior shading.

Shading coefficient

Enter number 0 to 1. The shading coefficient is defined as the ratio of the solar heat gain of fenestration to the solar heat gain of reference glass. Values for a range of commonly used glasses are reprinted at the end of this section from the 1985 ASHRAE Handbook of Fundamentals, Table 29, page 27.29; if the building has internal shades or blinds, refer to ASHRAE Tables 23-39, pages 27.34-37.

ASEAM3.0 assumes that the shading coefficient is the same for every hour of the year (i.e., movable insulation or shading is not explicitly modeled).

U-factor

Enter BTUH/square foot degrees F. See the 1985 ASHRAE Handbook of Fundamentals, Table 13, page 27.10, if necessary (reprinted at the end of this section).

Space mass code

1=light: frame exterior wall, 2" concrete floor slab (30 pounds per square foot)

2=medium: 4" concrete exterior wall, 4" concrete floor slab (70 pounds per square foot)

3=heavy: 6" concrete exterior wall, 6" concrete floor slab (130 pounds per square foot)

Consult the 1985 ASHRAE Handbook of Fundamentals, Table 13, page 26.17, if additional information is needed (reprinted at the end of this section).

Crack length

Linear feet. This is the total perimeter crack length for all windows, not a typical window.

Leakage coefficient

1=tight-fitting window. Approximately 1/64-inch crack (weatherstripped).

2=average-fitting window. Approximately 1/64-inch crack (nonweatherstripped) or 3/32 inch crack (weatherstripped).

6=loose-fitting window. Approximately 3/32-inch crack (nonweatherstripped).

See the table printed at the end of this section.

Window shading model

Enter number 0-3. This number corresponds to the number of the window shading model to be used. '0' indicates no external window shading. Up to three different external shading models may be specified for the entire building. *They are, not zone specific.* Configurations of the shading models are specified on the following screen.

Percent window area

Enter percent. This is the percent of the total window area specified above

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that is shaded by the specified shading model. For example, if you have five 3 by 5 foot windows, three of which are shaded by overhangs, the total window area is 75 square feet, and the percent window area shaded is 45 square feet, or 60%.

Shading Coefficients for Single Glass and Insulating Glass				
A. Single Glass				
Type of Glass	Nominal Thickness	Solar Trans.	Shading Coefficient	
			$h_0 = 4.0$	$h_0 = 3.0$
Clear	1/8 in.	0.86	1.00	1.00
	1/4 in.	0.78	0.94	0.95
	3/8 in.	0.72	0.90	0.92
	1/2 in.	0.67	0.87	0.88
Heat Absorbing	1/8 in.	0.64	0.83	0.85
	1/4 in.	0.46	0.69	0.73
	3/8 in.	0.33	0.60	0.64
	1/2 in.	0.24	0.53	0.58
B. Insulating Glass				
Clear Out, Clear In	1/8 in.	0.71	0.88	0.88
Clear Out, Clear In	1/4 in.	0.61	0.81	0.82
Heat Absorbing Out, Clear In	1/4 in.	0.36	0.55	0.58

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Crack Method Infiltration Leakage Coefficients for Windows

Tight Fitting Window k=1.0	Weatherstripped Average Gap (1/64 in. crack)	Wood casement and awning windows; weatherstripped metal casement windows; weatherstripped
Average Fitting Window k=2.0	Non-Weatherstripped Average Gap (1/64 in. crack) or Weatherstripped Large Gap (3/32 in. crack)	All types of vertical and horizontal sliding windows; weatherstripped. Note: if average gap (1/64 in. crack) this could be tight fitting window. Metal casement windows; non-weatherstripped Note: if large gap (3/32 in. crack) this could be a loose fitting window
Loose Fitting Window k=6.0	Non-weatherstripped Large gap (3/32 in. crack)	Vertical and horizontal sliding windows; non-weatherstripped

Overall Coefficients of Heat Transmission (U-Factor) of Windows, Sliding Patio Doors, and Skylights
Btu/hr•ft²•F
Exterior Vertical Panels

	No Storm Sash				Glass Outdoor Storm Sash 1-in. Air Space Added to Described Product			
	No Shade		Indoor Shade		No Shade		Indoor Shade	
	Winter*	Summer**	Winter*	Summer**	Winter*	Summer**	Winter*	Summer**
Flat Glass Single Glass, Clear Single Glass, Low Emittance Coating e = 0.60 e = 0.40 e = 0.20	1.10 1.02 0.91 0.79	1.04 1.00 0.90 0.75	0.83 0.76 0.68 0.59	0.81 0.80 0.70 0.55	0.50 0.47 0.44 0.40	0.50 0.60 0.60 0.50	0.44 0.39 0.37 0.33	0.49 0.55 0.55 0.45
Insulating Glass, Double 3/16-in. air space 1/4-in. air space 1/2-in. air space 1/2-in. air space low emittance coating e = 0.60 e = 0.40 e = 0.20	0.62 0.58 0.49	0.65 0.61 0.56	0.52 0.48 0.42	0.58 0.55 0.52	0.37 0.35 0.32	0.40 0.39 0.39	0.29 0.28 0.25	0.37 0.36 0.37
Insulating Glass, Triple 1/4-in. air space 1/2-in. air space	0.39 0.31	0.44 0.39	0.31 0.26	0.40 0.36	0.27 0.23	0.32 0.31	0.22 0.19	0.30 0.29
	Glass Indoor Storm Sash 1-in. Air Space Added to Described Product				Acrylic Indoor Storm Sash 1-in. Air Space Added to described product			
	No Shade		Indoor Shade		No Shade		Indoor Shade	
	Winter*	Summer**	Winter*	Summer**	Winter*	Summer**	Winter*	Summer**
Flat Glass Single Glass, Clear Single Glass, Low Emittance Coating	0.50	0.50	0.44	0.49	0.48	0.48	0.42	0.47

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e = 0.60	0.47	0.50	0.39	0.45	0.45	0.50	0.38	0.45
e = 0.40	0.42	0.45	0.36	0.40	0.41	0.45	0.35	0.40
e = 0.20	0.37	0.35	0.32	0.30	0.36	0.35	0.31	0.30
Insulating Glass, Double								
3/16-in. air space	0.37	0.40	0.29	0.36	0.35	0.39	0.28	0.35
1/4-in. air space	0.35	0.39	0.28	0.36	0.34	0.38	0.27	0.34
1/2-in. air space	0.31	0.38	0.25	0.35	0.30	0.37	0.24	0.33
1/2-in. air space								
Low emittance coating								
e = 0.60	0.29	0.37	0.24	0.33	0.28	0.35	0.23	0.31
e = 0.40	0.27	0.33	0.22	0.30	0.26	0.32	0.22	0.29
e = 0.20	0.25	0.29	0.20	0.26	0.24	0.28	0.20	0.25
Insulating Glass, Triple								
1/4-in. air space	0.27	0.32	0.22	0.30	0.26	0.31	0.22	0.29
1/2-in. air space	0.23	0.30	0.19	0.28	0.22	0.29	0.18	0.28

5.4.4.4 External Shading for Windows Screen (one per zone)

The external shading screen is accessed only if you specified external shading to be available on the windows screen by entering a nonzero value for at least one of the external shading models. Note that data may be entered only for the model numbers specified.

This screen contains data for the external shading calculations for a *typical* window located in the zone. The orientation of the window is taken from the previous window screen. All dimensions apply to the typical window, not to the entire zone. Fixed overhangs and side fins are external shading devices. Movable shading devices are not modeled by ASEAM3.0.

Up to three types of external shading can be modeled, but note that this is *per building, not per zone*. After you complete this screen for any one zone, the information is automatically transferred to all other zones. Based on the information supplied here, ASEAM3.0 calculates a percentage of window area shaded due to the overhang and/or side fins for each hour. This is then multiplied by the percentage of windows that have this shading model, as specified on the windows screen.

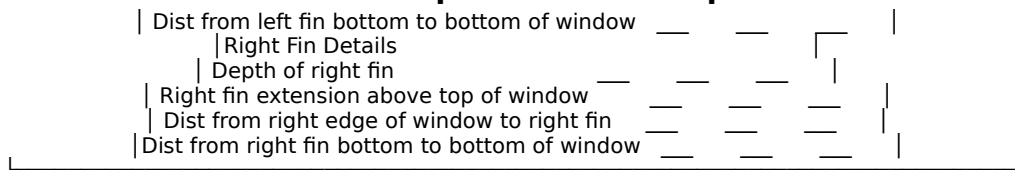
Important: All dimensions are entered in inches, not feet. All "left" and "right" fin details are entered as viewed from the outside looking at the window, *not* from the inside looking out.

LISHADDT

```

ASEAM3 LOADS INPUT: ZONE 1 -
EXTERNAL SHADING FOR WINDOWS                                LOAD FILE:
-----
SHADING DETAILS (All dimensions in inches)  Model 1  Model 2  Model 3
Window Model Name (or 'NA')
Window Width
Window Height
Overhang Details
Overhang Depth
Top of Window to Overhang
Overhang extension beyond left edge of window
Overhang extension beyond right edge of window
Depth of vert projection at end of overhang
Left Fin Details
Depth of left fin
Left fin extension above top of window
Distance from left edge of window to left fin
    
```

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ASEAM3.0 uses an ASHRAE window shading algorithm. A sketch of a typical overhang and side fin configuration is shown at the end of this section. After each input description, below, the corresponding labels on the sketch are given.

Window model name

For your reference only.

Window width

Actual glass dimension in inches, for a typical window only, not the combined width of all windows. (FL)

Window height

Actual glass dimension in inches, for a typical window only, not the combined window height. (HT)

Overhang depth

Measured in inches from wall out to the end of the overhang. If there is no overhang on this model number, enter `0'. (FP)

Top of window to overhang

Measured in inches from top of glass to bottom edge of overhang. (AW)

Overhang extension beyond left edge of window

Measured in inches from left edge of glass to left edge of overhang. (BWL). Use an arbitrarily high number (e.g. 9999) to simulate continuous overhangs.

Overhang extension beyond right edge of window

Measured in inches from right edge of glass to right edge of overhang. (BWR). Use an arbitrarily high number (e.g. 9999) to simulate continuous overhangs.

Depth of vertical projection at end of overhang

Measured in inches from top to bottom of overhang at free end. (D)

Depth of left fin

Measured in inches out from window. (FP1)

Left fin extension above top of window

Measured in inches from top of glass to top of fin. (A1)

Distance from left edge of window to left fin

Measured in inches from edge of glass to edge of fin. (B1)

Distance from left fin bottom to bottom of window

Measured in inches from bottom of fin down to bottom of window. (C1)

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Depth of right fin

Measured in inches out from window. (FP2)

Right fin extension above top of window

Measured in inches from top of glass to top of fin. (A2)

Distance from right edge of window to right fin

Measured in inches from edge of glass to edge of fin. (B2)

Distance from right fin bottom to bottom of window

Measured in inches from bottom of fin down to bottom of window. (C2)

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5.4.4.5 Doors Screen (one per zone)

This section contains data about doors in exterior walls. Infiltration due to the doors is calculated by the crack length method.

You can specify up to two types of doors in each zone. If there are multiple doors of the same type, you can combine them all into one door with an area equal to the sum of the individual door areas; the crack length is the sum of the individual door crack lengths. If no doors are to be simulated, enter `NA' for the name in both columns.

LIDOORDT

ASEAM3 LOADS INPUT: ZONE 1 -		LOAD FILE:	
DOORS	Door 1	Door 2	
DOORS			
Name (or 'NA')	_____	_____	
Area (ft ²)	_____	_____	
U-Factor (BTUH/ft ² -°)	_____	_____	
Crack length (lin ft)	_____	_____	
Leakage coefficient	_____	_____	

Name

For your reference only.

Area

Enter square feet; actual door area only.

U-factor

Enter BTUH/square foot degree F. Refer to the 1985 ASHRAE Handbook of Fundamentals, Table 5A, if needed (reprinted on next page).

Crack length

Enter in linear feet.

Leakage coefficient

1=tight-fitting door; 2=average-fitting door; 6=loose-fitting door. Refer to the 1984 ASHRAE Cooling and Heating Load Calculation Manual, Table 5.7 (reprinted on next page).

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Coefficients of Transmission (U) for Wood Doors, Btu/h•ft²•°F						
		Winter			Summer	
Door Thickness, in.	Description	No Storm Door	Wood Storm Door	Metal Storm Door	No Storm Door	
1-3/8	Hollow core flush door	0.47	0.30	0.32	0.45	
1-3/8	Solid core flush door	0.39	0.26	0.28	0.38	
1-3/8	Panel door with 7/16-in. panels	0.57	0.33	0.37	0.54	
1-3/4	Hollow core flush door	0.46	0.29	0.32	0.44	
1-3/4	with single glazing	0.56	0.33	0.36	0.54	
1-3/4	Solid core flush door	0.33	0.28	0.25	0.32	
1-3/4	With single glazing	0.46	0.29	0.32	0.44	
1-3/4	With insulating glass	0.37	0.25	0.27	0.36	
1-3/4	Panel door with 7/16-in. panels	0.54	0.32	0.36	0.52	
1-3/4	With single glazing	0.67	0.36	0.41	0.63	
1-3/4	With insulating glass	0.50	0.31	0.34	0.48	
1-3/4	Panel door with 1-1/8 in. panels	0.39	0.26	0.28	0.38	
2-1/4	With single glazing	0.61	0.34	0.38	0.58	
2-1/4	With insulating glass	0.44	0.28	0.31	0.42	
2-1/4	Solid core flush door	0.27	0.20	0.21	0.26	
2-1/4	With single glazing	0.41	0.27	0.29	0.40	
2-1/4	With insulating glass	0.33	0.23	0.25	0.32	

Coefficients of Transmission (U) for Steel Doors, Btu/h•ft²•°F						
		Winter			Summer	
Door Thickness, in.	Description	No Storm Door	Wood Storm Door	Metal Storm Door	No Storm Door	
1-3/4	Solid urethane foam core with thermal break	0.19	0.16	0.17	0.18	
1-3/4	Solid urethane foam core without thermal break	0.40	--	--	0.39	

Infiltration Leakage Coefficients for Residential-Type Door Classification

Tight Fitting Door k=1.0	Very small perimeter gap and perfect fit weatherstripping - often characteristic of new doors
Average Fitting Door k=2.0	Small perimeter gap having stop trim fitting properly around door and weatherstripped
Loose Fitting Door k=6.0	Large perimeter gap having poor fitting stop trim and weatherstripped or small perimeter gap with no weatherstripping

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5.4.4.6 Infiltration Screen (one per zone)

This section contains information on the air change infiltration rate. It does not include infiltration by the crack length method, since that is accounted for separately in the windows and doors sections. The air change method can be used to account for infiltration caused by opening and closing of doors and windows, outlets and other penetrations through the building envelope. The total infiltration for a zone is the sum of the infiltrations calculated by the air change and the crack length methods.

Note: The ASEAM3.0 systems calculations do not check to insure that the outside air entering a zone (through infiltration and ventilation) is equal to the air exiting in the zone (through exfiltration, exhaust, and return). Therefore, if the zone has high exhaust requirements that are not made up by additional ventilation air, then you should enter this difference through infiltration.

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ASEAM3 LOADS INPUT: ZONE 1 -	
INFILTRATION	LOAD FILE:

INFILTRATION	
Occupied air change rate	___ air changes per hour
Unoccupied air change rate	___ air changes per hour

These entries exclude infiltration by crack length method	

Occupied air change rate

Enter air changes per hour. One air change per hour is defined as the volume of the zone being replaced once every hour.

Unoccupied air change rate

Enter air changes per hour for the unoccupied cycle only.

5.4.4.7 Miscellaneous Conduction Screen (one per zone)

The miscellaneous conduction screen is used to simulate any miscellaneous conduction losses and/or gains of the $\{U\text{-factor} * \text{area} * [T(\text{space}) - T(\text{ref})]\}$ type that have not been accounted for by walls, windows, roofs, or doors. Generally, the miscellaneous conduction screen is used to model heat losses and/or gains to reference temperatures other than ambient, or outdoor temperature.

Examples of miscellaneous conduction losses or gains may include zones that are adjacent to unconditioned garages, a refrigerated warehouse, basement, or crawl spaces. Both the area and the U-factor for the common wall or floor of the zone experiencing the conductive loss or gain must be entered. In addition, reference

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temperatures for the adjacent space at both design summer and design winter outside conditions are entered. ASEAM3.0 will interpolate linearly between these temperatures to find the temperature of the adjacent space at any given ambient temperature. This calculated reference temperature is used to calculate the conduction heat loss or gain from the zone to the adjacent space.

To model a constant-temperature adjacent space, such as a refrigerated warehouse, enter the same temperature for both winter and summer design reference temperatures. A below-grade basement will lose heat not to ambient but to ground temperature. For this case, estimate the ground temperature for both winter and summer design temperatures and combine all the below-ground wall and floor areas into one area (if the U-factors are the same). Miscellaneous conduction gains or losses are independent of orientation because it is assumed that there is no solar effect. You can specify up to two miscellaneous conduction types per zone.

LIMCONDT

ASEAM3 LOADS INPUT: ZONE 1 - MISCELLANEOUS CONDUCTION	LOAD FILE:	
MISCELLANEOUS CONDUCTION	Type 1	Type 2
Name (or 'NA')	_____	_____
Area (ft ²)	_____	_____
U-Factor (BTUH/ft ² -°)	_____	_____
Reference temperature at design summer (°F)	_____	_____
Reference temperature at design winter (°F)	_____	_____

Name

For your reference only. Enter `NA' (default value) if you are not entering miscellaneous conduction data in this column.

Area

Enter square feet. This is the heat transfer surface area between the zone and the adjacent space. Different walls or floors may be combined and treated as one area (e.g., basement walls and floor) providing the U-factors are equal. If the U factors are not equal for multiple sections, you should "weight-average" the U factor for the combined areas. Alternatively, if there is only two adjacent spaces, you may enter data for each space in a separate column (type 1 and type 2). These conductive gains/losses are independent of orientation.

U-factor

Enter BTUH/square foot degree F. This is the heat transfer coefficient for the wall or floor between the conditioned zone and adjacent space.

Reference temperature at design summer

Enter in degrees F. Enter the temperature of the adjacent space when the outside air temperature is at design summer conditions.

Reference temperature at design winter

Enter in degrees F. Enter the temperature of the adjacent space when the

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outside air temperature is at design winter conditions.

5.4.5 Profile Screens

The profile screens contain information on profiles or diversity factors. Internal energy gains due to people, lighting, electrical equipment, and miscellaneous sensible loads have been specified on previous input screens. These gains probably are not constant throughout the day or the year. To account for "average," or diversified, loads for these internal gains, occupied and unoccupied diversity factors are entered on this screen.

Each internal load component has its own diversity factor. Each function name will appear to the left of the diversity factor. Enter the appropriate diversity factor for each function type. Functions not previously entered will be labeled 'NA', and you will not be able to enter data for them.

A diversity factor is defined as the percent of total occupancy, installed watts, or BTUH that occurs *on average*. For example, if a conference room is used only four hours a day in an occupied period of eight hours, and the lights are turned off at other times, both the occupancy and lighting diversity factors for the occupied period might be 0.50 and 0.0 for the unoccupied period. Diversity factors need not be 0.0 during unoccupied periods, however. It is typical to leave some of the lights on at all times (for security or fire exit lighting, for example).

A monthly diversity factor table number must also be entered for each component. Diversity factors can vary month by month; the table number references the hourly schedule to the monthly schedule on the second screen. Examples of buildings with differing monthly diversities are schools (lower diversities during vacations and holiday seasons) and retail stores (higher people diversities during Christmas, etc.).

Warning: Like the external shading screen, there is *one* **monthly** diversity factor input screen for the entire building. This monthly screen is *not* zone specific. You must reference the appropriate "table number" from the first screen. It is possible that all internal load components use the same monthly diversity factor table number. Note, however, that when you change the values in a monthly diversity table number, you have changed them for all components in all zones that reference this table number. Four different monthly diversity factor tables can be used.

ASEAM3.0 calculates the "peak" loads for these components assuming a 100% diversity factor, that is, the installed capacity is used. When the diversified loads are calculated, however, the occupied and unoccupied diversity factors as well as the monthly diversity factors are used as scalar multipliers. For example, assume a zone has 1000 watts of lighting installed. The peak hourly cooling load would be given by the following equation:

Hourly peak cooling load due to lights = 1000 watts * 3.413 BTUH/watt * CLF
where CLF is the hourly cooling load factor.

The equation for diversified lighting loads, on the other hand, is:

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Hourly diversified cooling load due to lights = 1000 watts * 3.413 BTUH/watt * CLF * DF1 * DF2

where CLF is the hourly cooling load factor;
 DF1 is the occupied or unoccupied cycle diversity factor (in decimal form);
 DF2 is the monthly diversity factor (in decimal form).

Note: The example above is actually a simplification. ASEAM3.0 uses the principle of "superposition" to determine the cooling load factors. The ASHRAE tables assume a "step" function in determining the cooling load factors; the tables do not account for the fact that a portion of these lights, for example, may be on during the unoccupied cycle. The ASEAM3.0 values for cooling load factors, therefore, will be identical to the ASHRAE values only when you use '0' for the unoccupied cycle diversity factor. If other values are used, the cooling load factors used by ASEAM3.0 will be higher.

5.4.5.1 Internal Load Diversity Factors

LIDIVRDT

ASEAM3 LOADS INPUT: ZONE 1 - OPERATING USE PROFILES (DIVERSITIES)		LOAD FILE:			
		OCCUPIED PERIOD	UNOCCUPIED PERIOD	MONTHLY DIV TABLE # (1-4)	FC
People:					
	Avg % of full occupancy	___	___	___	___
Lights:					
function 1	Avg % of installed capacity	___	___	___	___
function 2	Avg % of installed capacity	___	___	___	___
function 3	Avg % of installed capacity	___	___	___	___
function 4	Avg % of installed capacity	___	___	___	___
Electric Equipment:					
type 1	Avg % of installed capacity	___	___	___	___
type 2	Avg % of installed capacity	___	___	___	___
Miscellaneous Sensible Loads:					
type 1	Avg % of installed capacity	___	___	___	___
type 2	Avg % of installed capacity	___	___	___	___

People: average percent of full occupancy
 Enter percent. The first two columns are the average percent of full occupancy, as defined on the "People" screen, for both the occupied and unoccupied periods. The last column references the monthly diversity table number, specified on the screen below, which is to be used as an additional diversity factor.

Lights: average percent of installed capacity
 Enter percent. The first two columns are the average percent of installed

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capacity, as defined on the "Lighting" screen, for both the occupied and unoccupied periods. The last column references the monthly diversity table number, specified on the screen below.

Electric equipment: average percent of installed capacity

Enter percent. The first two columns are the average percent of installed capacity, as defined on the "Electric Equipment" screen, for both the occupied and the unoccupied periods. The third column references the monthly diversity table number.

Miscellaneous sensible loads: average percent of installed capacity

Enter percent. The first two columns are the average percent of installed capacity, as defined on the "Miscellaneous Sensible Loads" screen, for both the occupied and unoccupied periods. The last column references the monthly diversity table number.

5.4.5.2 Monthly Diversities

The monthly diversity factors are input on this screen. The schedules of people, equipment, etc. may change from month to month. For example, an office building may close for a week during winter vacation. ASEAM3.0 cannot model the building being operated for three weeks and shut down for a fourth, but you can, for example, set the monthly diversity factor for December at 0.75, which models the building operating with only 75% of the lights on during the month. Note that this 75% value is an additional scalar multiplier to be applied to the previously entered occupied and unoccupied diversity factors. The default values for these inputs are 100, or no monthly diversities.

Warning: There is *one* monthly diversity input factor screen for the entire building. This screen is *not zone specific*. When you change the values in a monthly diversity table number, you have changed them for all zones that reference this table number.

Up to four different schedules of monthly diversity factors can be modeled. Make sure that the monthly diversity table number entered on the previous screen corresponds to the schedules entered on this screen.

LIMONDDT

ASEAM3 LOADS INPUT: ZONE 1 - MONTHLY DIVERSITIES		LOAD FILE:			
Enter Monthly Diversity Factors (0 - 100 %) for each month/schedule					
Month		Mon Sch 1	Mon Sch 2	Mon Sch 3	Mon Sch 4
January		—	—	—	—
February		—	—	—	—
March		—	—	—	—
April		—	—	—	—
May		—	—	—	—
June		—	—	—	—
July		—	—	—	—
August		—	—	—	—
September		—	—	—	—
October		—	—	—	—
November		—	—	—	—
December		—	—	—	—

This concludes the description of the Loads Input screens. After data have been entered for all screens, you are ready to run a Loads analysis or to enter Systems data. When exiting from the Loads Input segment of ASEAM3.0, *remember to use the Save Files command before you Exit.*

