Apache Calc User Guide

IES Virtual Environment 6.3

Apache
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1 Introduction


Results from CIBSE Heat Loss & Heat Gain are displayed by the program Vista. For an account of calculation methods used in CIBSE Heat Loss & Heat Gain (ApacheCalc) see CIBSE Heat Loss & Heat Gain Calculation Methods.

CIBSE Heat Loss & Heat Gain interface:
2 Heat Loss

Heat Loss implements CIBSE procedures for the calculation of room heating requirements and the sizing of heating plant. Steady-state room heat losses are calculated in the absence of casual and solar heat gains. The calculation optionally includes conduction heat gains from adjacent rooms and the effects of mechanical and natural ventilation air exchanges. Results are presented (in the program Vista as tables or graphs of room or zone heat loss, broken down by heat loss mechanism. Losses can be expressed on a floor area or room volume basis. Room temperatures are also displayed. The data may be exported to other applications such as spreadsheets and word processors. Post-processing options include the following:

- Radiator selection.

For a description of the calculation methods used in Heat Loss see CIBSE Heat Loss & Heat Gain Calculation Methods.

2.1 Interface for Heat Loss Calculation

2.1.1 Heating Loads

Tick this box to include a Heat Loss calculation when you click on Calculate.

2.1.2 Auxiliary ventilation air exchange

Air exchanges specified in Room Data are divided into three categories: infiltration, auxiliary ventilation and natural ventilation. Any infiltration air exchanges are included unconditionally, but auxiliary and natural ventilation air exchanges may be switched on or off at calculation time.

Tick this box if you wish to include Room Data auxiliary ventilation air exchanges in the Heat Loss calculation.

Air exchanges are specified in Room Data in terms of a Maximum Value and a Variation Profile. In Heat Loss the Variation Profile requires interpretation because the calculation does not involve the time variable. The assumption is that the exchange rate takes the Maximum Value
unless the profile is ‘Off continuously’ or a formula profile (which is not supported by Heat Loss), when it takes the value zero.

2.1.3 Natural ventilation air exchange

Tick this box if you wish to include Room Data natural ventilation air exchanges in the Heat Loss calculation.

Variation Profiles for natural ventilation are interpreted as for mechanical ventilation.

2.1.4 Include heat gains from adjacent rooms

If you tick this box, the calculation will include the effects of heat gains from neighbouring rooms, leading to reduced figures for net heat loss. The gains may be from conduction or air movement. A strict application of CIBSE recommendations requires this box to be un-ticked. However, by including heat gains from adjacent rooms a more realistic calculation of heat loss is obtained.

For rooms with Heating Profile set to ‘Off continuously’, or to a formula profile (which Heat Loss does not support), no heat is supplied and the room temperature free-floats. For such rooms, which typically represent buffer spaces such as roof voids, heat gains from neighbouring rooms are always included in order to provide correct boundary conditions for the heated rooms.

2.1.5 Time settings for profiles

The profile settings determine whether heating is available in each room, and, where appropriate, the adjustment for intermittent heating. If the heating profile is off at the specified hour, week day and month there is assumed to be no heating. In the case of annual profiles the profile is evaluated for the indicated weekday in the central week of the month. The adjustment applied to steady state heating loads for intermittent operation follows the treatment described in CIBSE Guide A, where it is calculated as a function of the number of hours of plant operation per day. The thermal response characteristic of the room (‘response factor’) also plays a part in the calculation. In the ApacheCalc interface the number of hours of operation is derived (if you tick the box ‘Adjust for intermittent heating using profiles?’) from the heating profile for a particular month and week day. You specify these in the box labelled ‘Time settings for profiles’.

2.1.6 Calculate

Click on this button to start the Heat Loss and Heat Gain calculations.

2.1.7 Cancel

Click on this button to leave the ApacheCalc interface.
Heat Gain

Heat Gain calculates room cooling loads and free-floating temperatures using the CIBSE admittance procedure.

The calculation is carried out for one design day in each of a user-selected range of months, using weather data provided in APlocate. The calculation takes into account the timing and nature of each gain, applying the appropriate radiant fraction to all sources of heating and cooling. Inter-room dynamic conduction and ventilation heat transfer is accounted for. Glazing solar transmission properties are treated using an analysis based on the Fresnel equations. At the user’s option the effects of ventilation air exchanges and external solar shading, as calculated by SunCast, may be incorporated.

The program APreview presents the Heat Gain results in tabular or graphical form in a variety of formats. Gains are broken down by heat transfer mechanism and by type (sensible or latent). Results may be displayed by room, by zone or totalled over the building and peak loads are identified. Various measures of room temperature are displayed, together with room relative humidity. Data may be exported to other applications.

Post-processing facilities are provided as follows:

- Calculation of ventilation supply conditions that will meet the calculated cooling loads.
- User-definable tables of loads.

For a description of the calculation methods used in Heat Gain see APcalc Methods.

3.1 Interface for Heat Gain Calculation
3.1.1 Cooling Loads

Tick this box to include a Heat Gain calculation when you click on Calculate.

3.1.2 Auxiliary ventilation air exchange

Air exchanges specified in Room Data are divided into three categories: infiltration, auxiliary ventilation and natural ventilation. Any infiltration air exchanges are included unconditionally, but auxiliary and natural ventilation air exchanges may be switched on or off at calculation time.

Tick this box if you wish to include Room Data auxiliary ventilation air exchanges in the Heat Loss calculation.

3.1.3 Natural ventilation air exchange

Tick this box if you wish to include Room Data natural ventilation air exchanges in the Heat Loss calculation.

Variation Profiles for natural ventilation are interpreted as for mechanical ventilation.

3.1.4 SunCast Link?

Tick this box to include the effects of external solar shading, as calculated by SunCast, in the Heat Gain calculation.

It is important to ensure that the shading data is kept up to date with any changes to the building geometry. The shading calculations should be repeated after any such changes.

3.1.5 Design Days

Select the months for which Heat Gain calculations are required.

3.1.6 Time settings for profiles

The Heat Gain calculation is carried out for one design day per month. Indicate which day of the week is to be used to set the profiles used in Heat Gain for casual gains, ventilation rates and (if appropriate) temperature boundary conditions.

3.1.7 Calculate

Click on this button to start the Heat Loss and Heat Gain calculations.

3.1.8 Cancel

Click on this button to leave the ApacheCalc interface.