

This document intends to help you get the most out of your heat loss report. It will explain what the results are and how to use them for your heating system design.

1. Heat Losses

The report gives the heat loss of each room in watts. The room heat loss is a sum of the ventilation losses and the fabric heat losses (heat losses through windows, doors, external walls, floors and roofs) for the room. The calculated heat losses are equal to the minimum amount of energy needed to maintain the desired room temperature at the specified outdoor design temperature.

2. Pumps sizing and boiler/heat pump sizing

At the end of each zone, the report gives the total zone heat loss. This is the sum of the heat losses of all the rooms in the zone. As well as being informative, this data is used to calculate the zone flow rate, which is also shown in the report. The zone flow rate can be used for sizing the zone circulating pump.

At the bottom of the report is the total heat loss for the whole building. This is what is needed to size the heat pump or boiler. Remember that the heat loss is what is needed to maintain the temperature at the design outdoor temperature, it is a good idea to oversize the system a bit to be able to increase the temperature faster, instead of just maintaining it. Remember to account for domestic hot water generation if applicable.

Next to the total heat loss is the total heat generator flow rate. This flow rate is calculated using the highest zone flow temperature in the system and the combined mixed return temperature from all the zones. This flow rate can be used to size the heat generator's circulating pump.

3. Radiator Sizing

If you selected radiators as the heat emitters for a zone you will be presented with three pieces of information. First is the number of aluminium radiator sections needed if you are using the 500 mm high Plus Evo 500 radiators supplied by NRG Awareness. This number can also be used as guidance for similar radiators. The second piece of information is the radiator correction factor for radiators rated at ΔT 50°C, and the third piece of information is the radiator correction factor for radiators rated at ΔT 60°C. The usage of these correction factors is explained below.

All radiators are rated at either ΔT 50°C (for newer radiators), ΔT 60°C (for older radiators), or both. When a radiator is rated at ΔT 50°C it means that the output of the radiator was measured when the temperature difference between the radiator and the room was 50 °C. So if the room temperature was 20°C the average temperature across the radiator was 70°C. A radiator rated at ΔT 60°C had an even higher temperature when tested.

In low-temperature systems, like heat pump systems, the radiators are run at a much lower temperature. Typically, a heat pump system is designed for 45°C flow and 40°C return, which gives an average temperature across the radiator of 42.5°C. If the room is 20°C the ΔT is only 22.5°C, which is very far from the 50°C used in the testing. The radiator correction factors are used to adjust the output of each radiator section based on the temperature of the room and the temperature of the radiator.

Example:

The room heat loss is **500** watts

The output of a radiator section rated at **ΔT 50°C** is **100** watts.

The flow temperature is **45°C**, return temperature is **40°C**.

And the desired room temperature is **18°C**.

Using the heat calculator, we see that the correction factor for radiators rated at ΔT 50°C under these conditions is 0.396.

$$100 \text{ watts per section} * 0.396 = 39.6 \text{ watts per sections}$$

This means that each radiator section's output is 39.6 watts under these conditions.

$$500 \text{ watts} / 39.6 \text{ watts per section} = 12.6 \text{ sections} \rightarrow 13 \text{ radiator sections}$$

The room will need 13 radiator sections to heat.

4. Underfloor heating

If you selected underfloor heating as the heat emitter for one of your zones you will be presented with two important pieces of information. Firstly, you have the watts per square meter, secondly, you have the recommended pipe centres for the underfloor heating loops.

When using underfloor heating the whole floor acts as one big radiator. This means the floor temperature required for the floor to heat a room is lower than the temperature of a radiator since it is much larger than a radiator.

However, if the heat losses of a room are too great compared to the floor area you cannot use underfloor heating. With radiators, if the heat losses are high, you can either increase the radiator size, the radiator temperature, or both. With underfloor heating, the size of the floor is fixed, and you cannot increase the floor temperature too much as this would cause discomfort to people's feet as well as potentially damaging the floor.

The heat output of the floor is determined by the construction of the floor, floor surface, the length of underfloor heating pipes embedded in the floor and the temperature of the water in the pipes. As stated above the usable temperature range is limited so the main factor, we as heating system designers can influence is the length of pipework. This is done by increasing or decreasing the pipe centres in the loop.

The calculator is programmed to recommend 150 mm pipe centres if the heat loss is under 60 w/m² and 100 mm centres if the heat loss is between 60 and 100 w/m². We do not recommend using underfloor heating if the heat losses exceed 100 w/m² because this will require increasing the floor temperature to uncomfortable levels. It is important to be aware that all these values are recommendations, they will depend on the construction of the floor and the material of the floor surface. Proper design by a competent underfloor heating system designer should be done before installing the underfloor heating pipe loops.