Documents to be submitted for calculation of window profiles and window installation situations for the Passive House building certification

Basically all those documents should be submitted that will allow the tester to carry out calculations for checking purposes. Specifically, these are as follows:

1. True-to-scale CAD drawings of the window profile. It must be possible to clearly assign the used materials in the drawings.
2. If the thermal bridge coefficient at the glazing edge was also calculated:
    a. Verification of the U-value of the glazing used, to 2 decimal places exactly in accordance with EN ISO 673 or ISO 15099.
    b. Name and manufacturer of the glazing spacer used, in case there is no PHI certificate for the spacer, data sheet of the Working Group 'Warm Edge' or detailed CAD drawings stating the materials and their thermal conductivities.
3. True-to-scale CAD drawings of the installation situation. The airtight layer should sketched and described in all details. It must be possible to clearly assign the used materials in the drawings.
4. Verification of the rated value of thermal conductivity of all materials in accordance with the relevant standards (e.g. ISO 10077-2, ISO 10456, DIN 4108-4) or ETA , DIBt or equivalent certificates. In case of doubt, a factor of 1.25 should be added to the measured values.
5. A report on the determination of the thermal characteristics, by which all steps according to the following section can be followed.

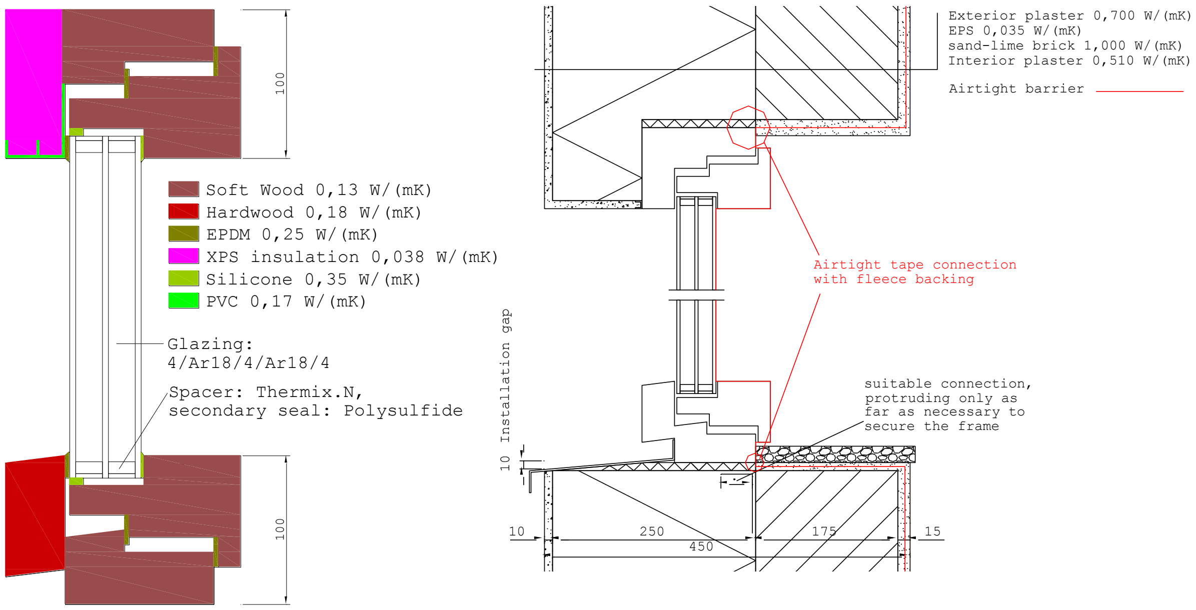

Fig. 1: Example with a drawing of the frame and installation situation with the necessary information.

Calculation of characteristic values of windows for input in the PHPP in five steps:

Step 1: Determining the heat transfer coefficient of the window frame Uf (W/(m²K))

Model the window frame using a 2D heat flow program. In place of the glass pane, use a calibration panel with exactly the same geometry as the pane and a thermal conductivity of 0.035 W/(mK). The height of the calibration panel and window frame is 400 mm. Select the boundary conditions in accordance with DIN EN ISO 10077-2, but with an outdoor temperature of -10°C. This will result in a heat flow (W/m).

Using the heat flow, the U-value of the calibration panel and the length of the calibration panel and the window frame, calculate Uf in accordance with the formula in Fig. 2.

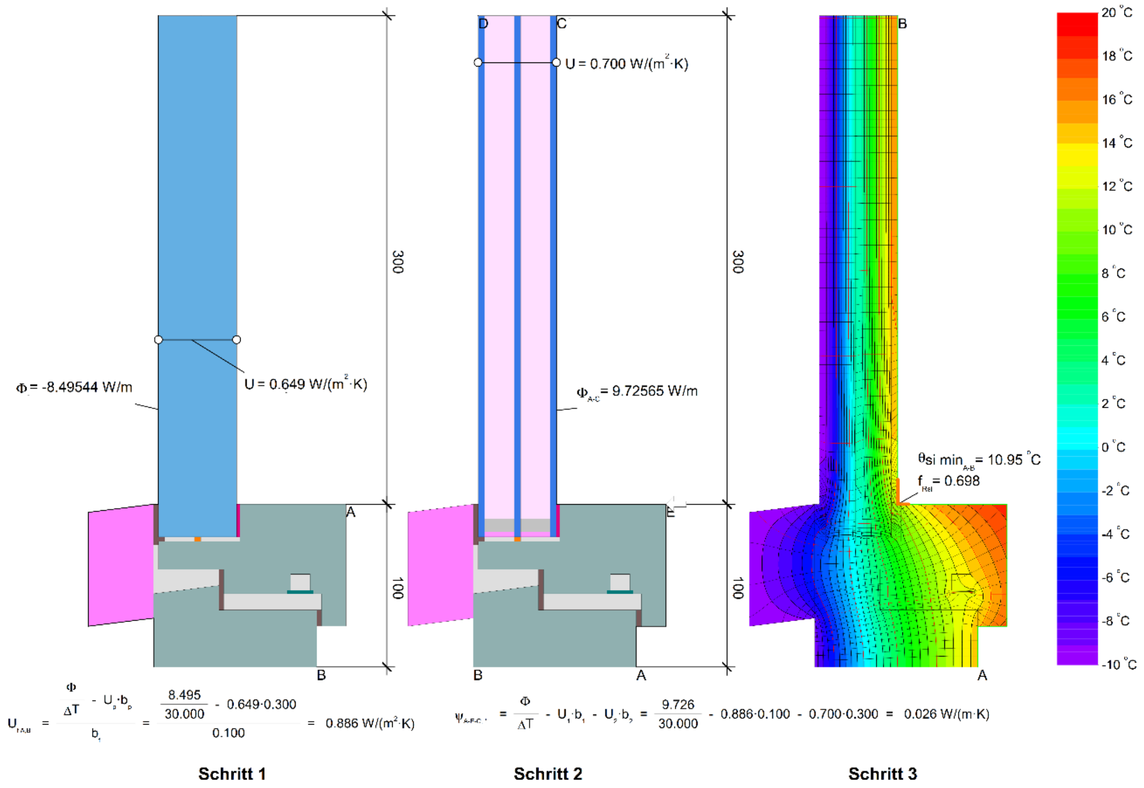

Fig.

Fig. 2: Steps 1, 2 and 3

Step 2: Determining the thermal bridge loss coefficient at the glazing edge Ψg (W/(mK))

In the model used in Step 1, use the original glazing in place of the calibration panel, do not make any other changes to the model. It will still have a total height of 400 mm. For the spacer, use the 2-box models in the PHI certification for spacers if possible. For the gas filling, use a substitute thermal conductivity resulting from the desired U-value of the glass, the thickness of the spaces between panes as well as the glass panes and their thermal conductivities in conjunction with the boundary conditions. This will result in a heat flow (W/m).

In accordance with the formula in Fig. 2, calculate Ψg using this heat flow value, the U-value of the glazing, the Uf values from Step 1 and the length of the glazing and the calibration panel as well as the window frame.

Step 3: Determining the temperature factor f_{Rsi} = 0.25 m²K/W (-)

Use the model in Step 2 and enter a heat transmission resistance of 0.25 m²K/W for the interior boundary condition. Delete all areas that are in contact with indoor air which are not ventilated or are slightly ventilated. Do not make any changes to the model otherwise. The simulation will result in a minimum temperature at the interior surface. Determine $\mathbf{f_{Rsi}}$ according to the following formula

$$f_{Rsi} = \frac{\theta_{si} - \theta_e}{\theta_i - \theta_e}$$

Mit
- θ_{si}: Minimum interior surface temperature from heat flow simulation. [°C]
- θ_e: Outdoor temperature from heat flow simulation [°C]
- θ_i: Indoor temperature from heat flow simulation [°C]

Step 4: Determining the installation thermal bridge coefficient Ψi (W/(mK))

Model the wall in which the window is to be installed and insert the model of the window frame from Step 1. The model must correspond exactly with that in Step 1. As a rule, the wall height should be 1010 mm, at least 3 times its thickness. This will result in a heat flow (W/m).

Calculate the installation thermal bridge coefficient Ψi in accordance with the formula in Fig. 3 using the heat flow, the U-value of the wall and its length, and the heat flow of the window model from Step 1.

Step 5: Determining the temperature factor f_{Rsi} = 0.25 m²K/W (-) of the installation situation

Use the model in Step 4 and enter a heat transmission resistance of 0.25 m²K/W for the interior boundary condition. Delete all areas that are in contact with the indoor air which are not ventilated or are slightly ventilated. Do not make any changes to the model otherwise. The simulation will result in a minimum temperature at the interior surface of the installation situation – take care that the measuring range for the coldest point is selected in such a way that it does not contain the glazing edge. Determine $\mathbf{f_{Rsi}}$ according to the formula in Step 3.

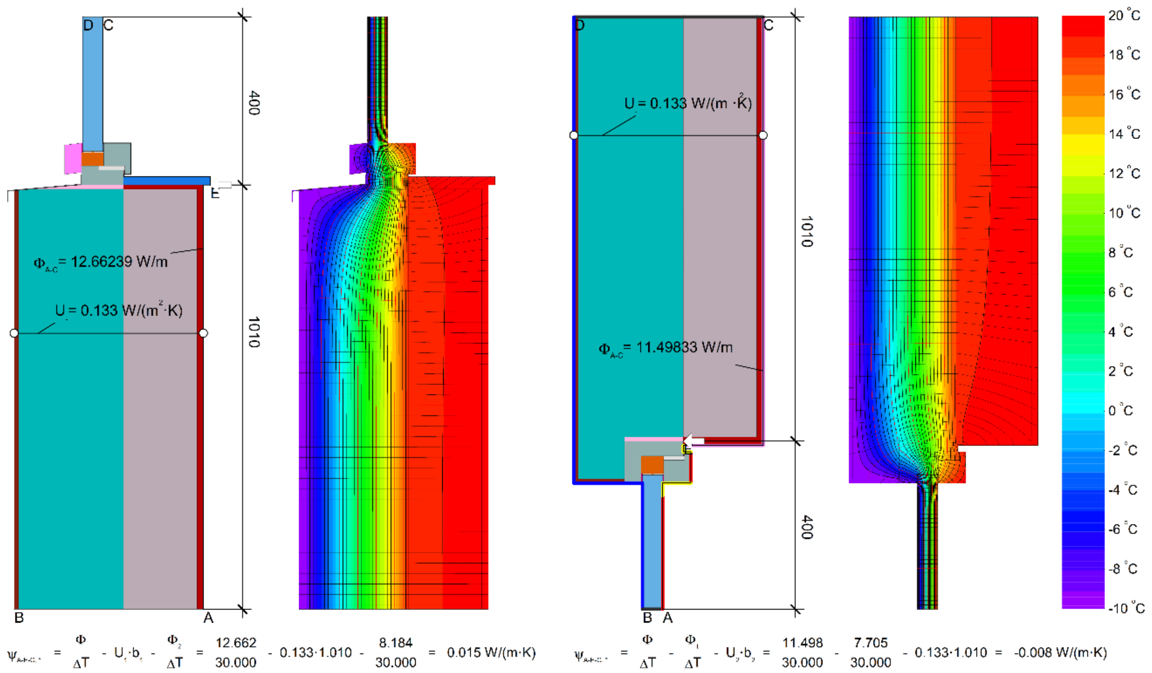

Fig. 3: Step 4