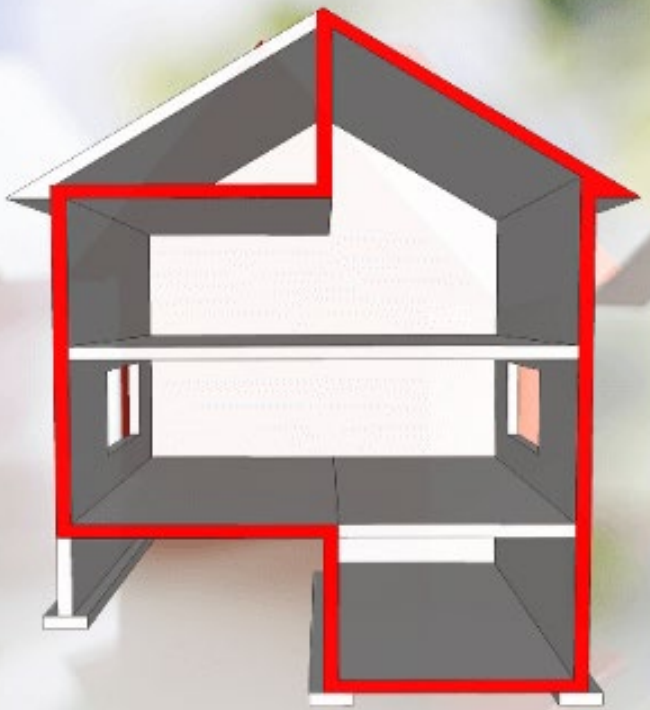
PRACTICE EXERCISES

ENG-445 Building Energetics



Building Envelope

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Exercise 1: Opaque Building Element

Determine the thermal transmittance (*U-value)* of the vertical wall structure *adjacent* to exterior. The composition of the wall structure is given in the table.

1. Check whether it is *lower* than the permissible limiting value U_{limit} for **renovation projects** per SIA 380.
2. Determine the required thickness of the thermal insulation (rock wool) layer so that the U-value of the wall will comply with the requirements for **new buildings**.

	d (cm)	λ (W/mK)
cement mortar	2	1.40
hollow brick	19	0.52
rock wool	15	0.041
façade mortar	2	0.70

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Exercise 2: Window Performance

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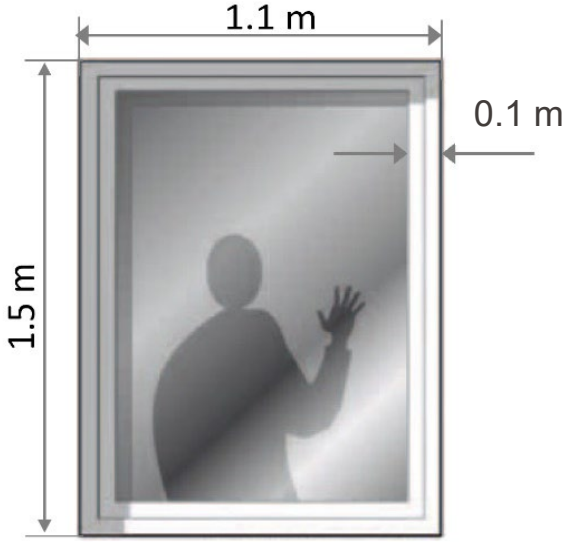
Consider a standard window facing outdoors shown on the picture. Two options of glazing for an air-tight double-pane window (filled with air) are available:

(a) uncoated (U_g = 2.9 $\frac{W}{m^2 \cdot K}$, g = 0.73);

(b) coated with low-e film (U_g = 2.0 $\frac{W}{m^2 \cdot K}$, g = 0.65)

Linear thermal transmittance of the glazing is 0.06 $\frac{W}{m \cdot K}$ for uncoated glass and 0.08 $\frac{W}{m \cdot K}$ for low-emissivity glass. The frame is a PVC-hollow profile (U_f = 2.0 $\frac{W}{m^2 \cdot K}$).



Determine which option of the glazing provides lower thermal transmittance of the window U_w and whether it complies with:

(i) maximum permitted ($U_{w,max}$) values for windows per SIA 180

(ii) the limiting value ($U_{w,limit}$) for windows per SIA 380 standard