FEDERATIE ALUMINIUM CONSTRUCTEURS

BASISCURSUS GEVELTECHNIEK 2023

MODULE 3 BOUWFYSICA

GEVALSTUDIES - WARMTETRANSPORT

physibel

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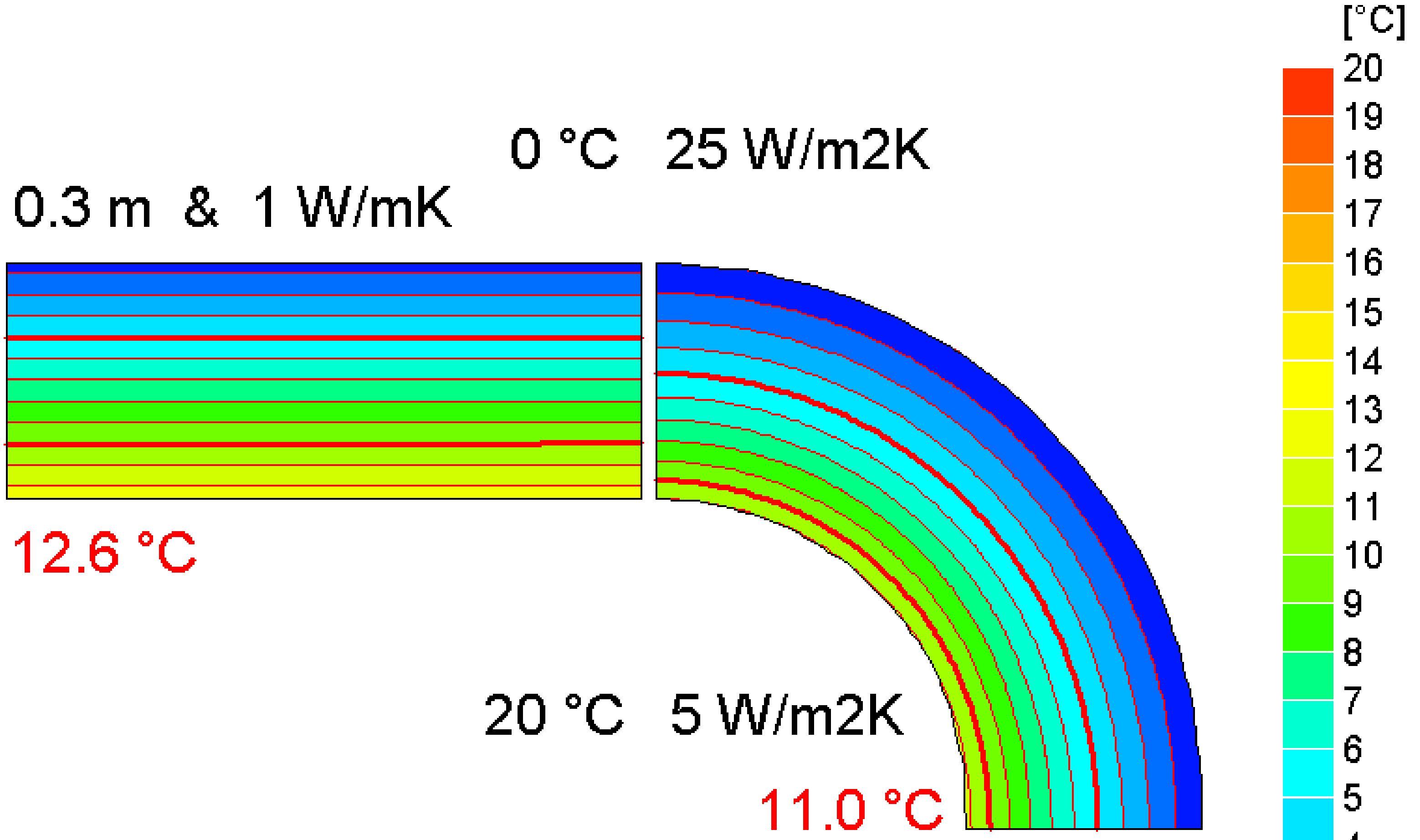
Inhoud

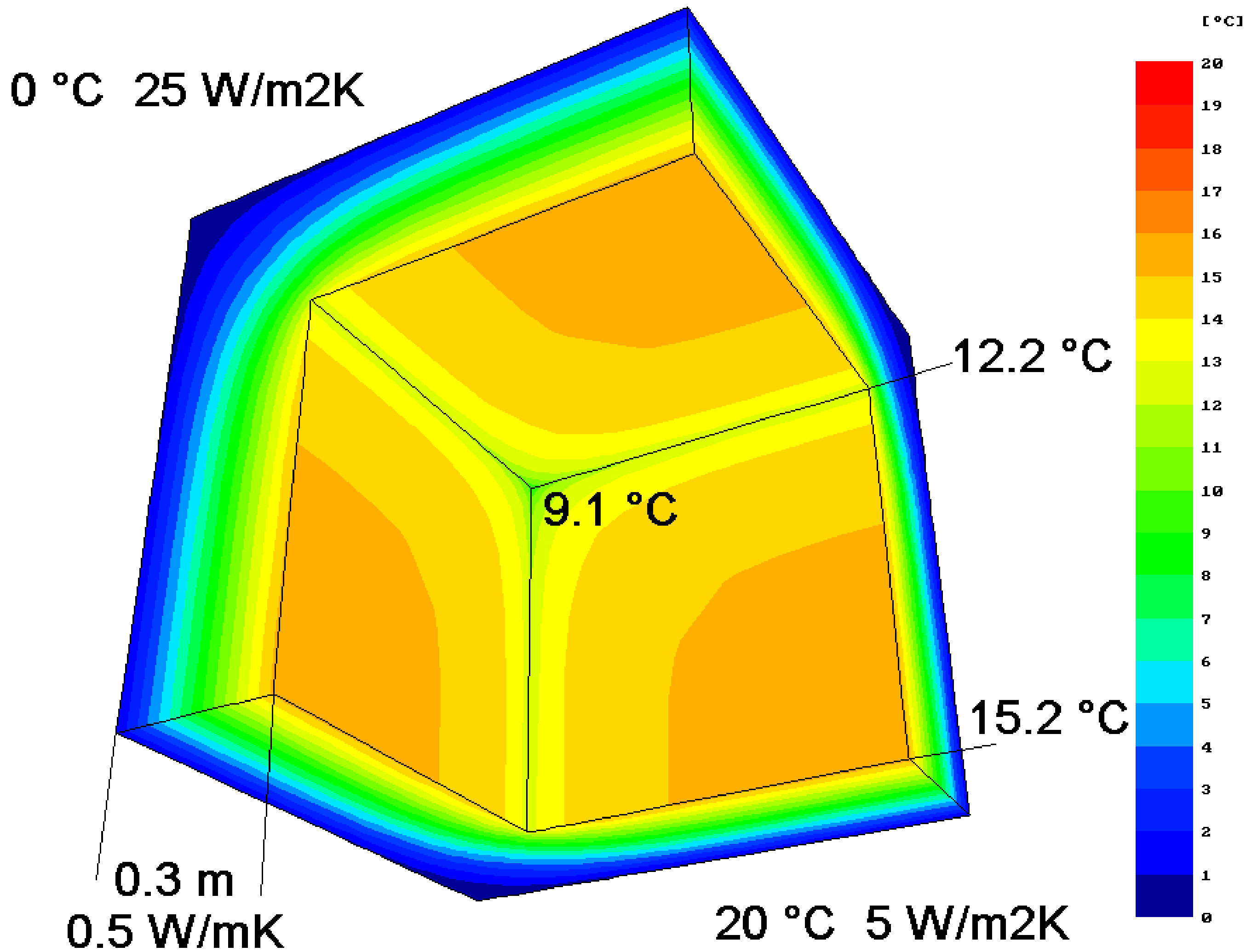
Gevalstudies

- hoekeffect
- koelvineffect
- kortsluitingseffect
- koelvineffect & kortsluitingseffect
- binnendoosconstructie
- gevel met buitenisolatie
- warmteverliesreductie

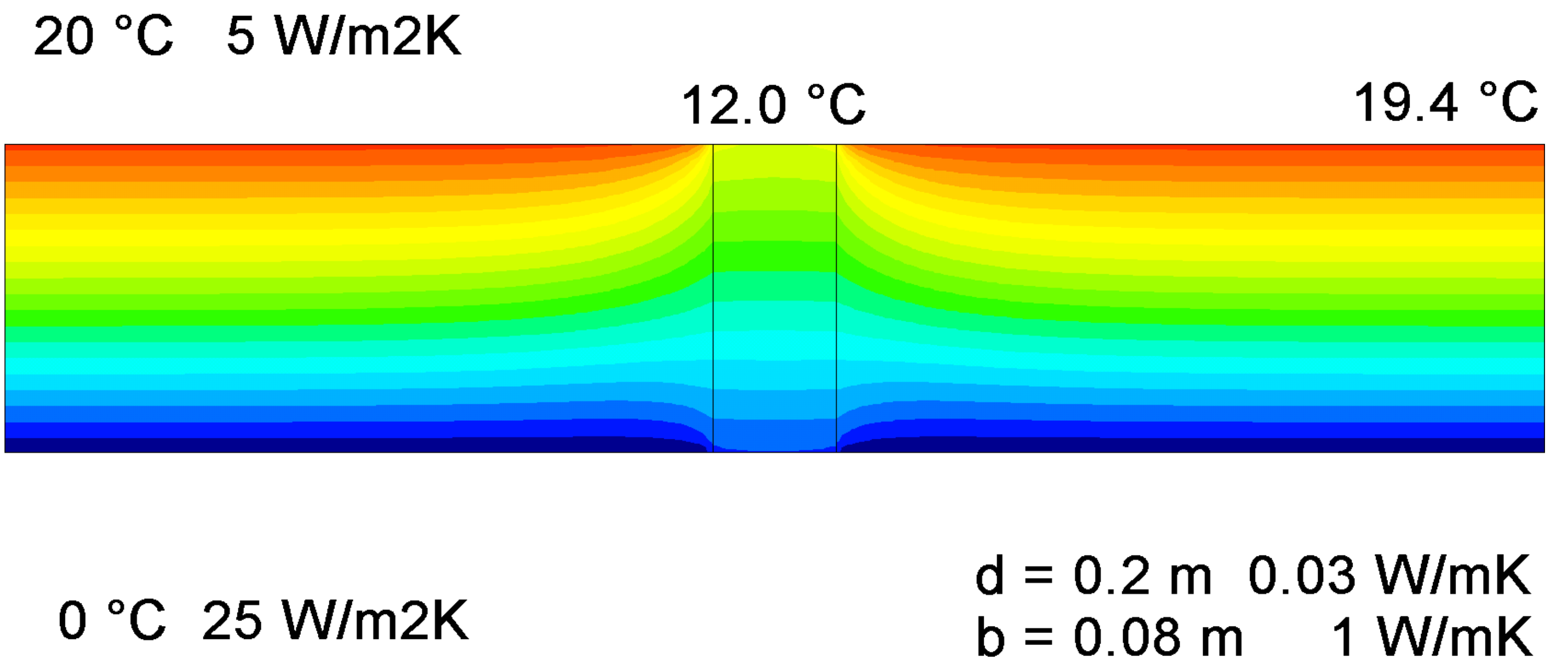
Gevalstudie: hoekeffect



Gevalstudie: hoekeffect



Discontinuïteit van de isolatie



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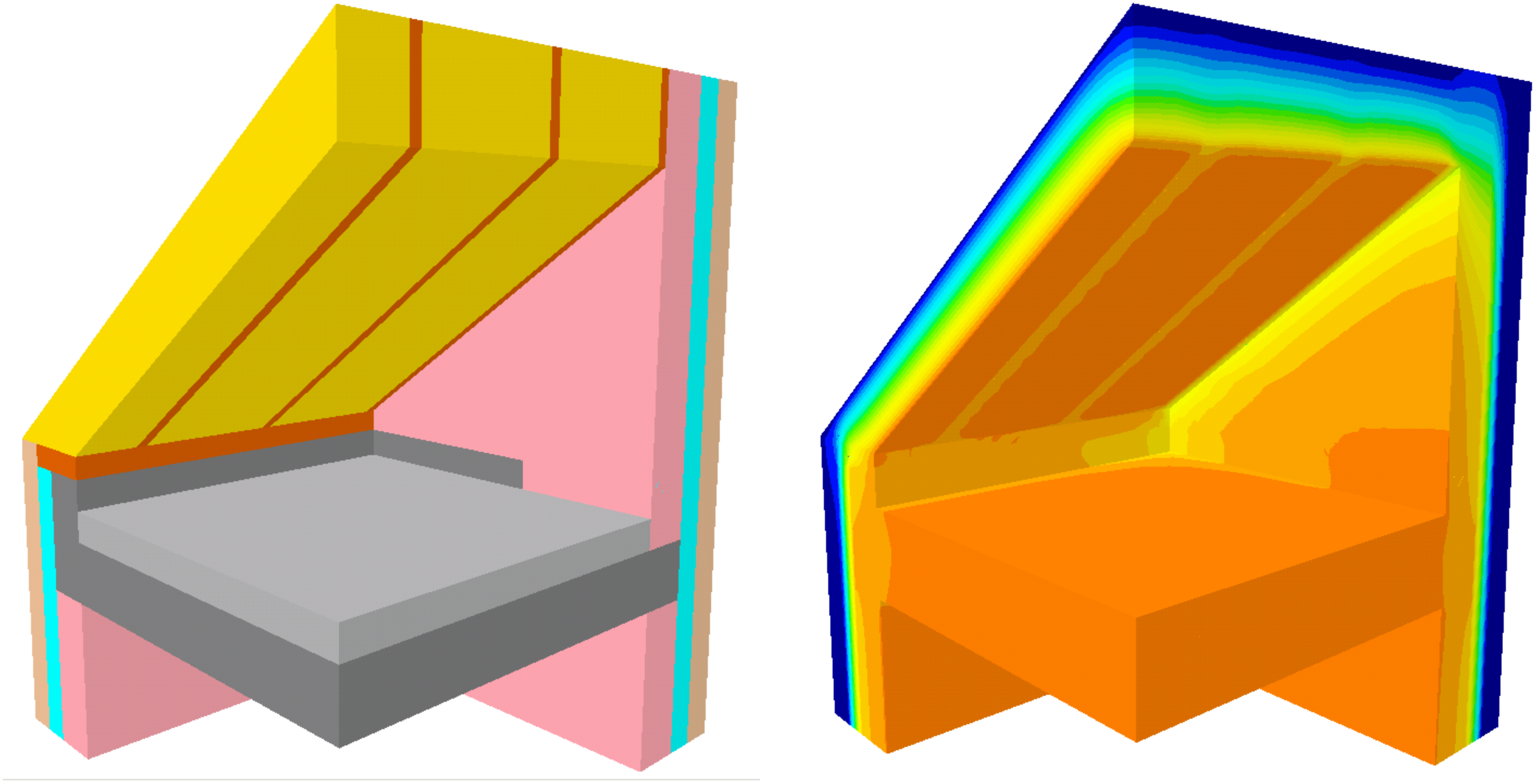
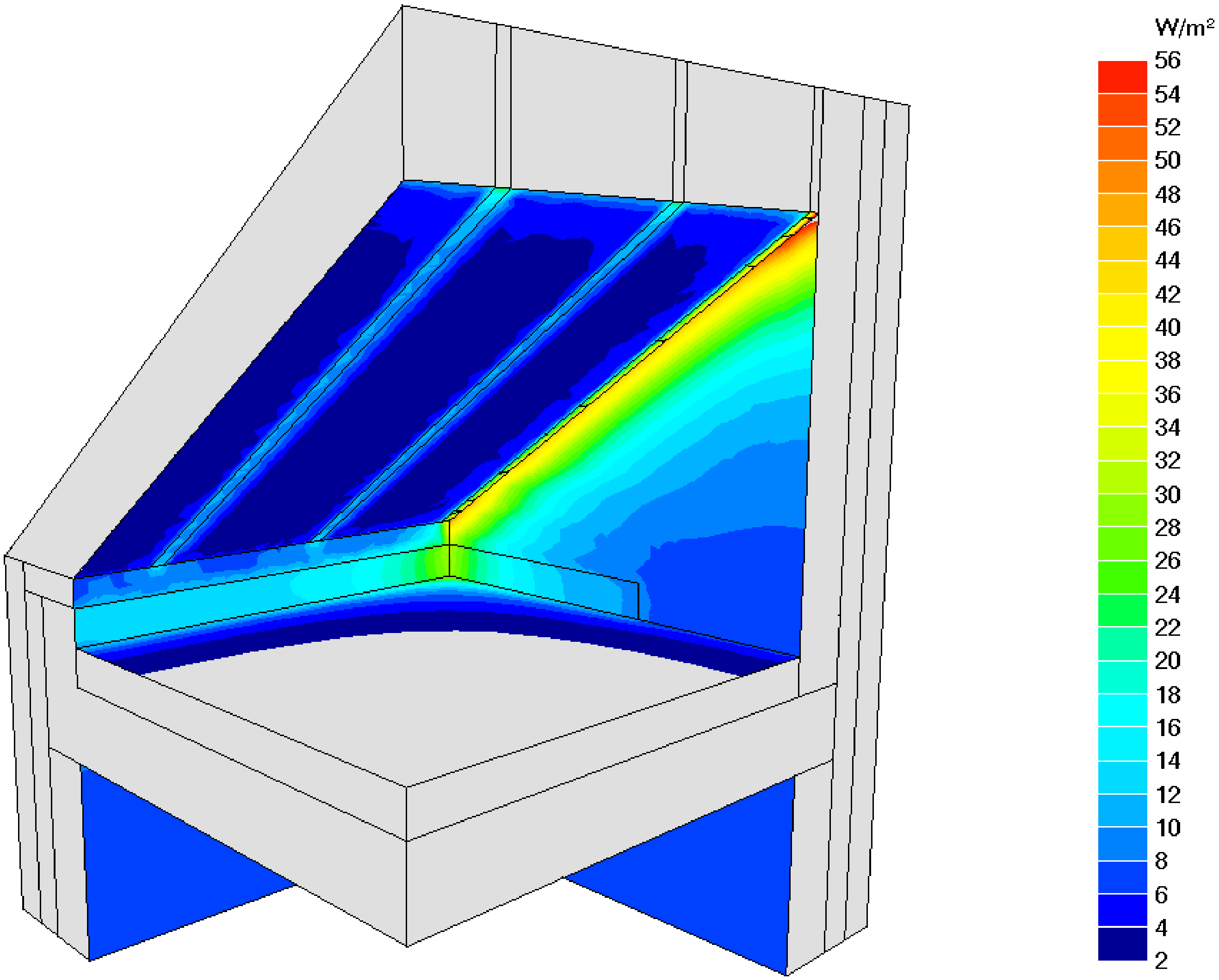
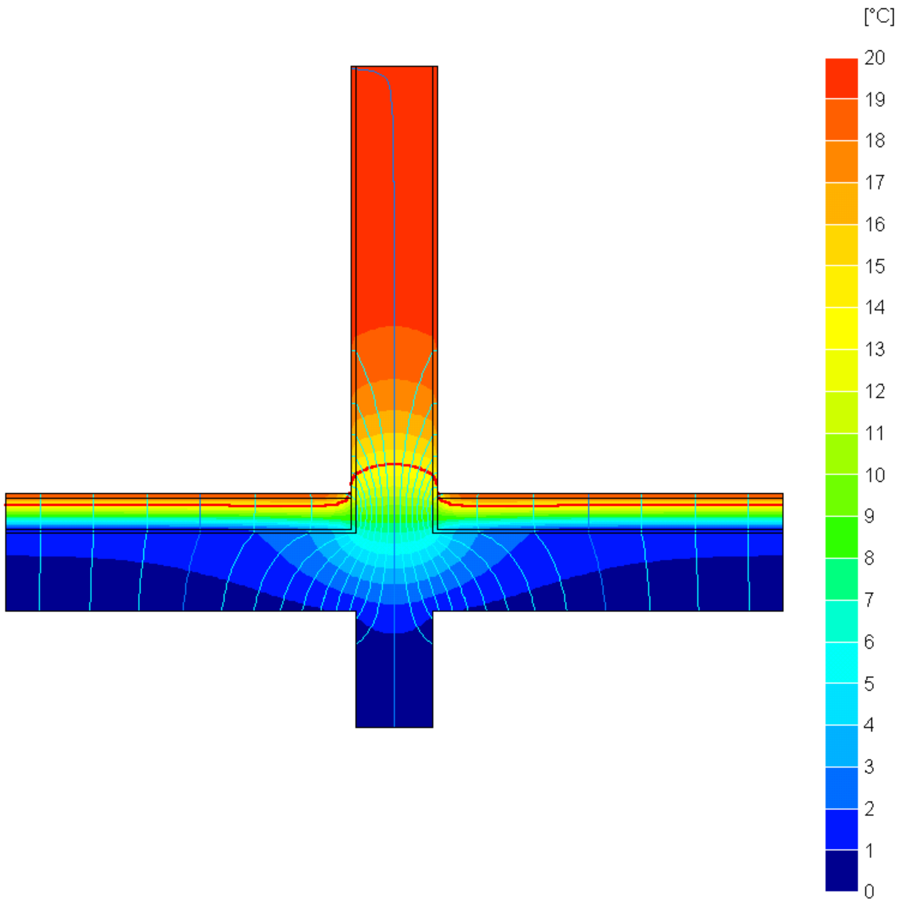
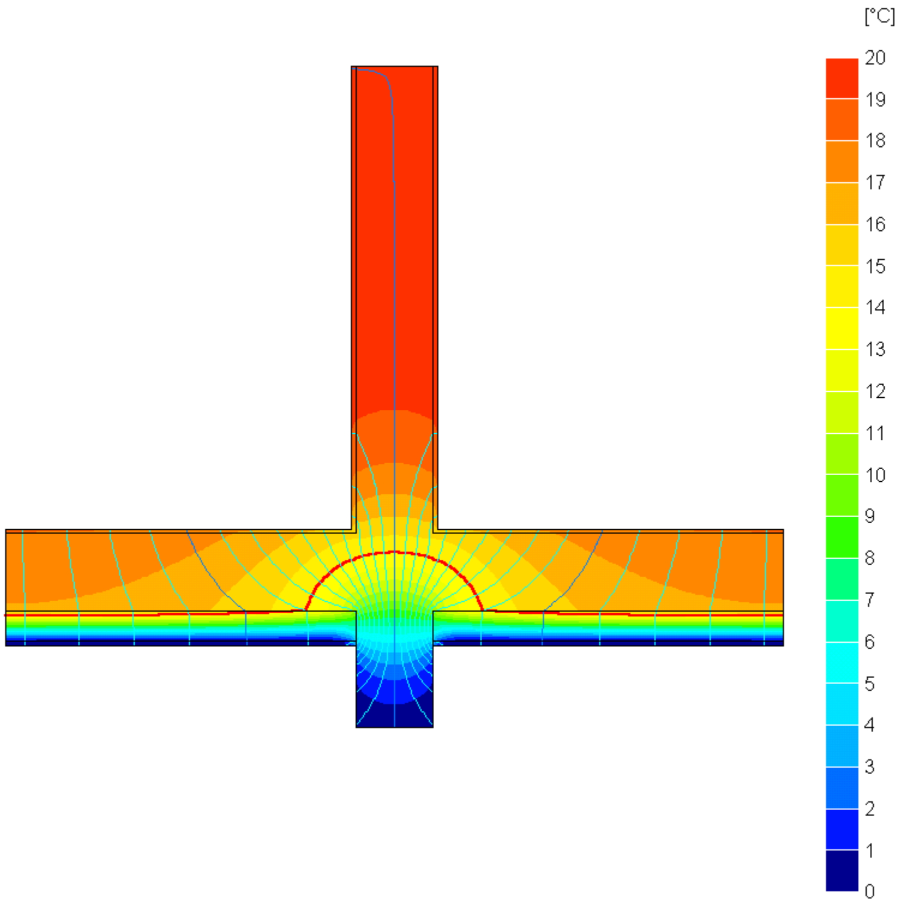


Discontinuïteit van de isolatie

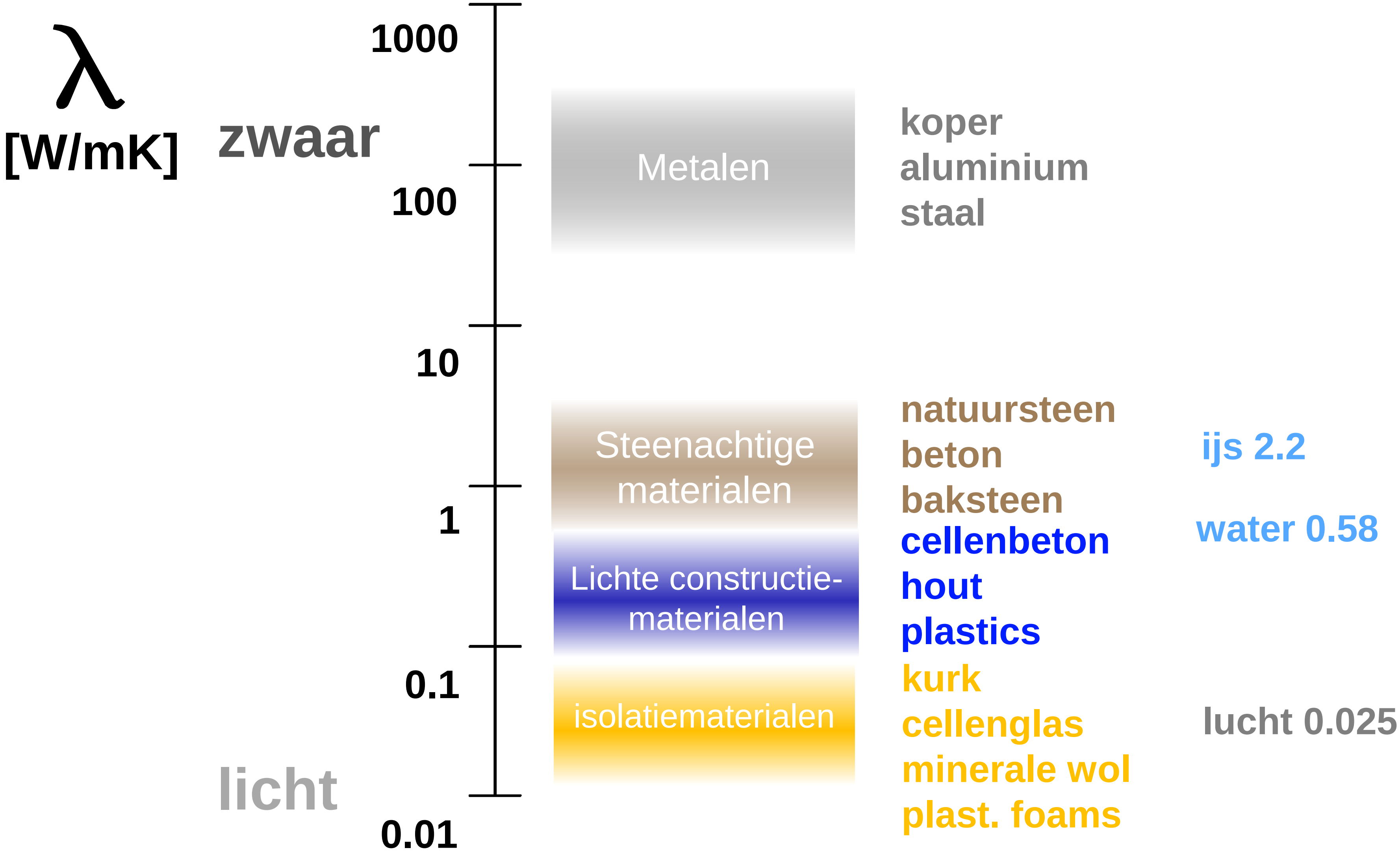


Locatie van de isolatie

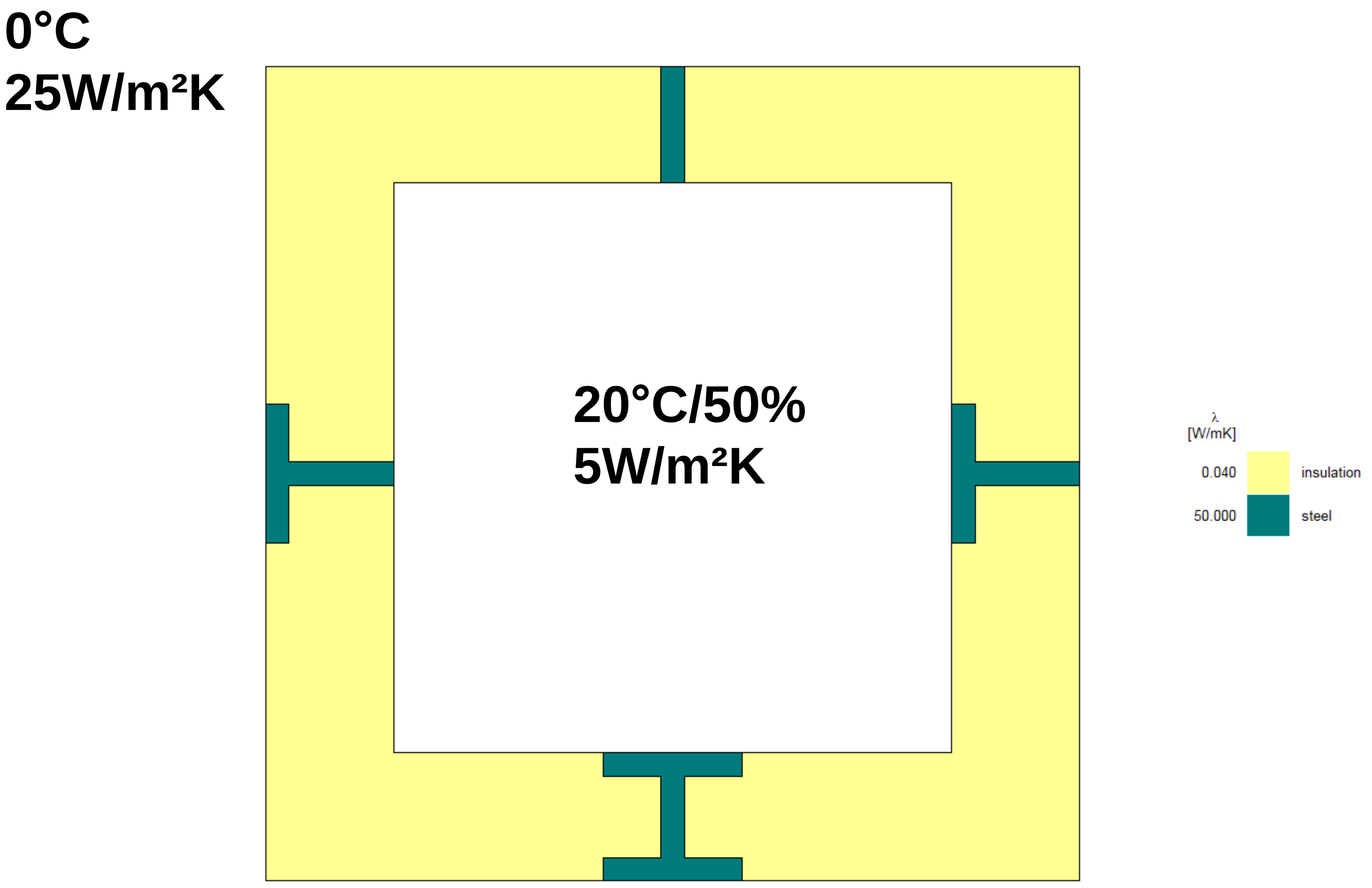




Koelvineffect

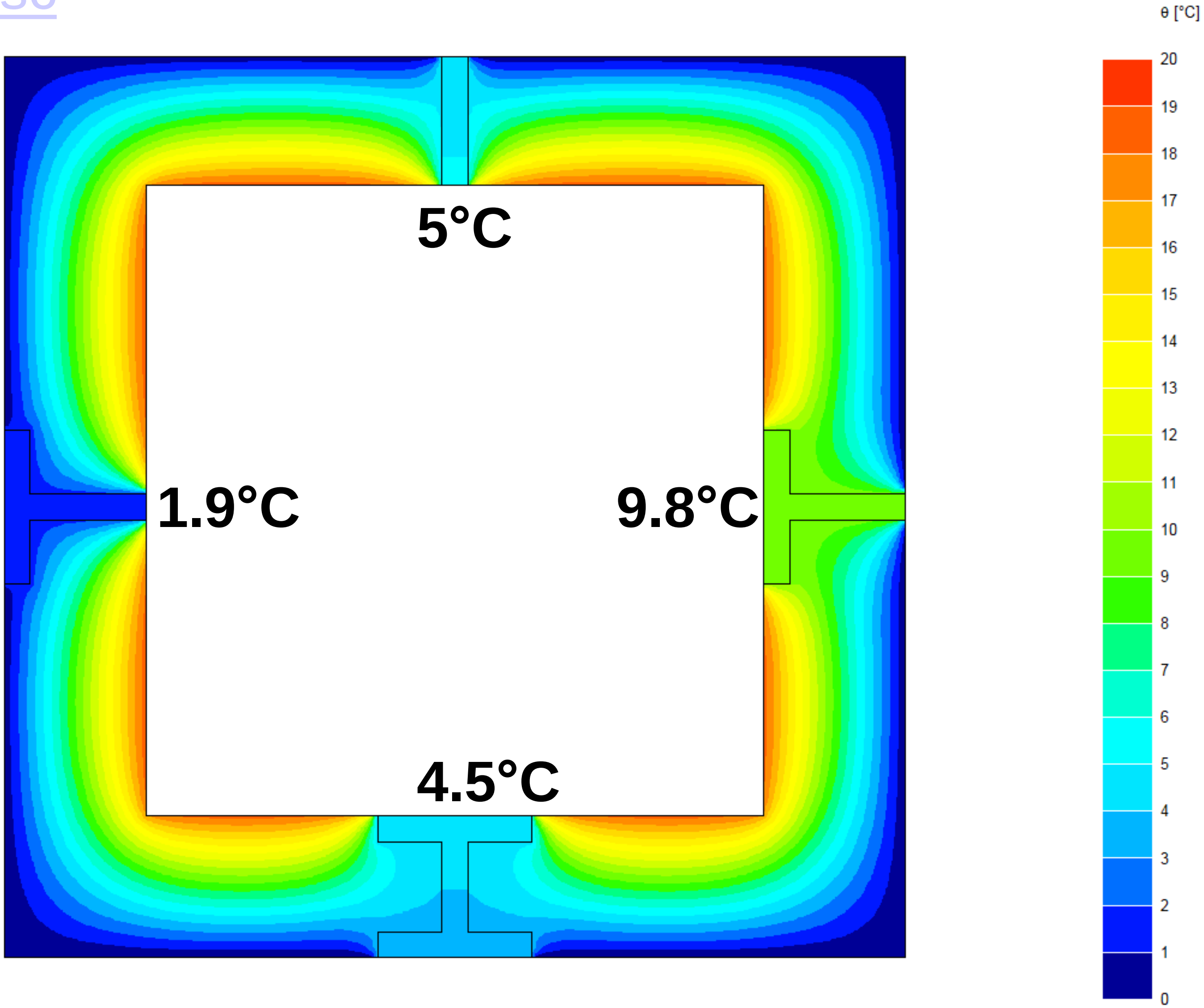


Koelvineffect



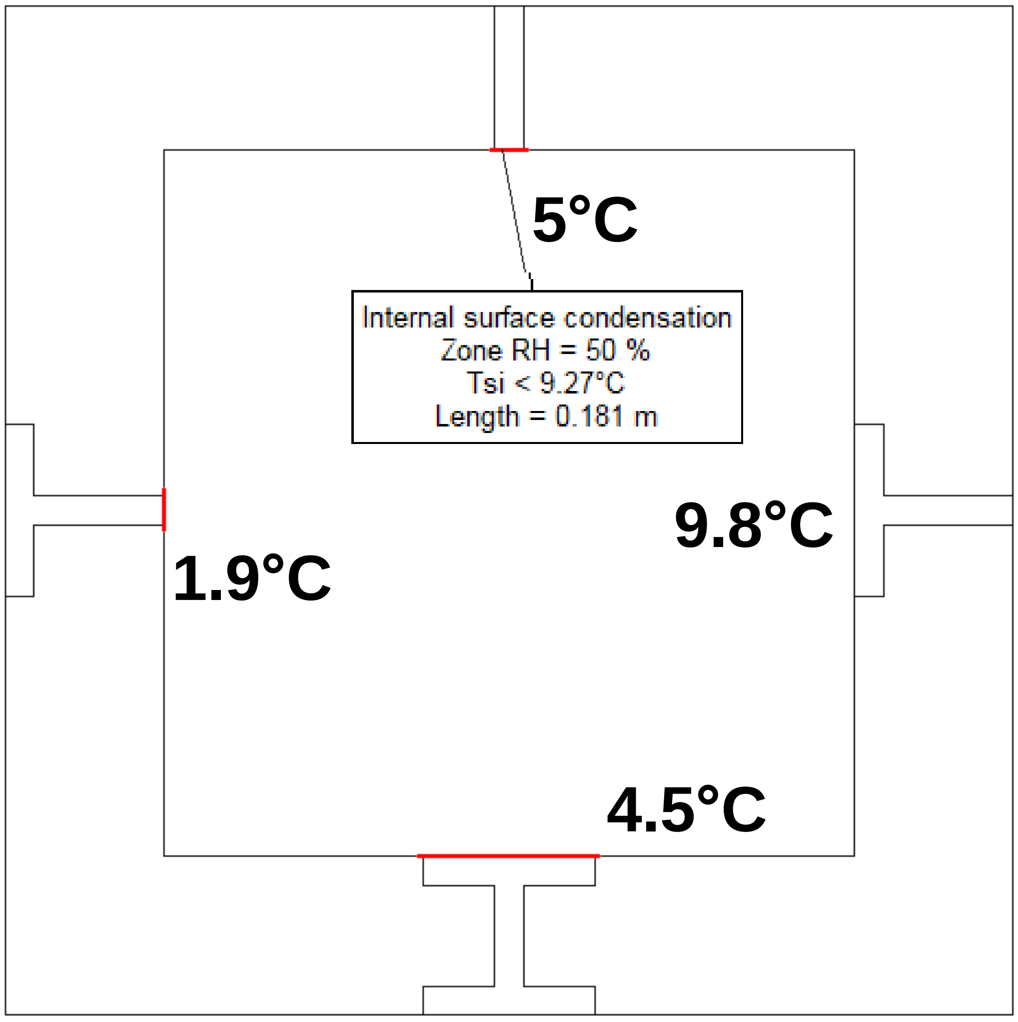
Koelvineffect

koelvin_b.bsc

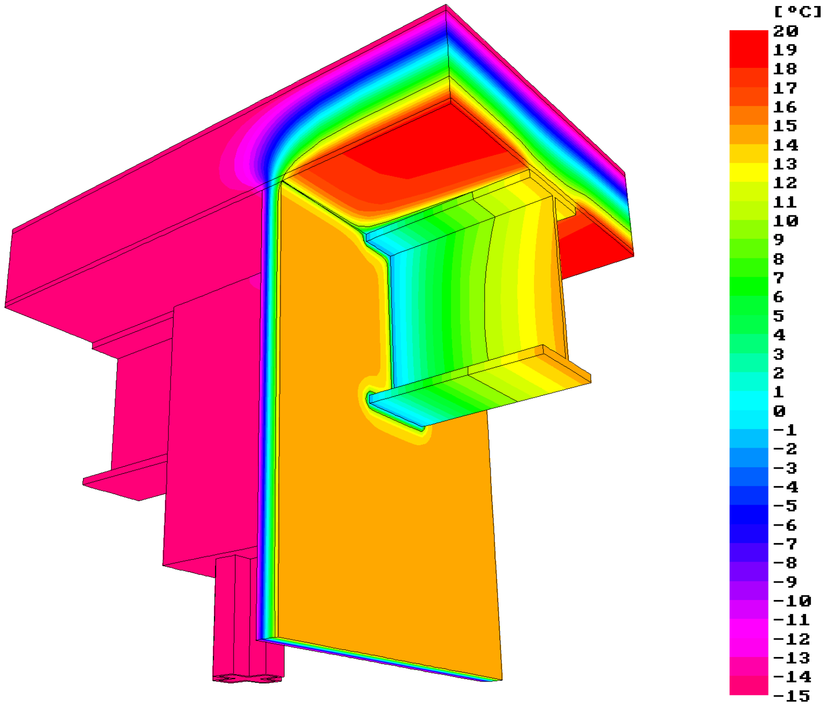


Koelvineffect

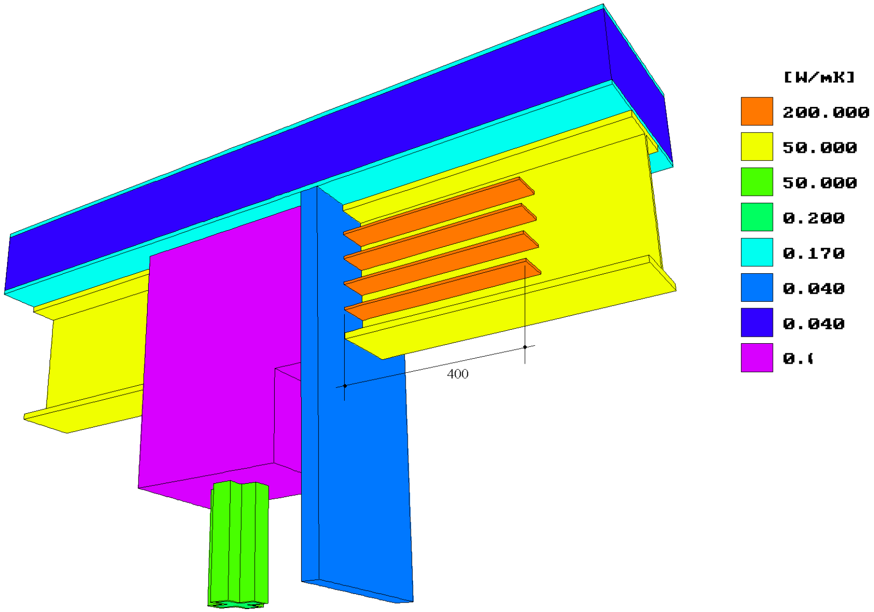
— RH=100%

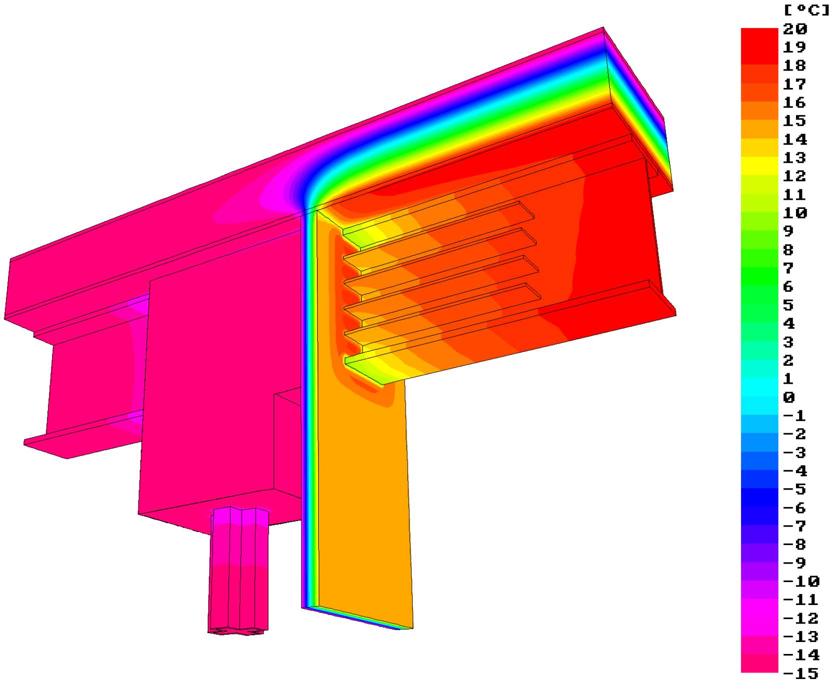


Koelvineffect



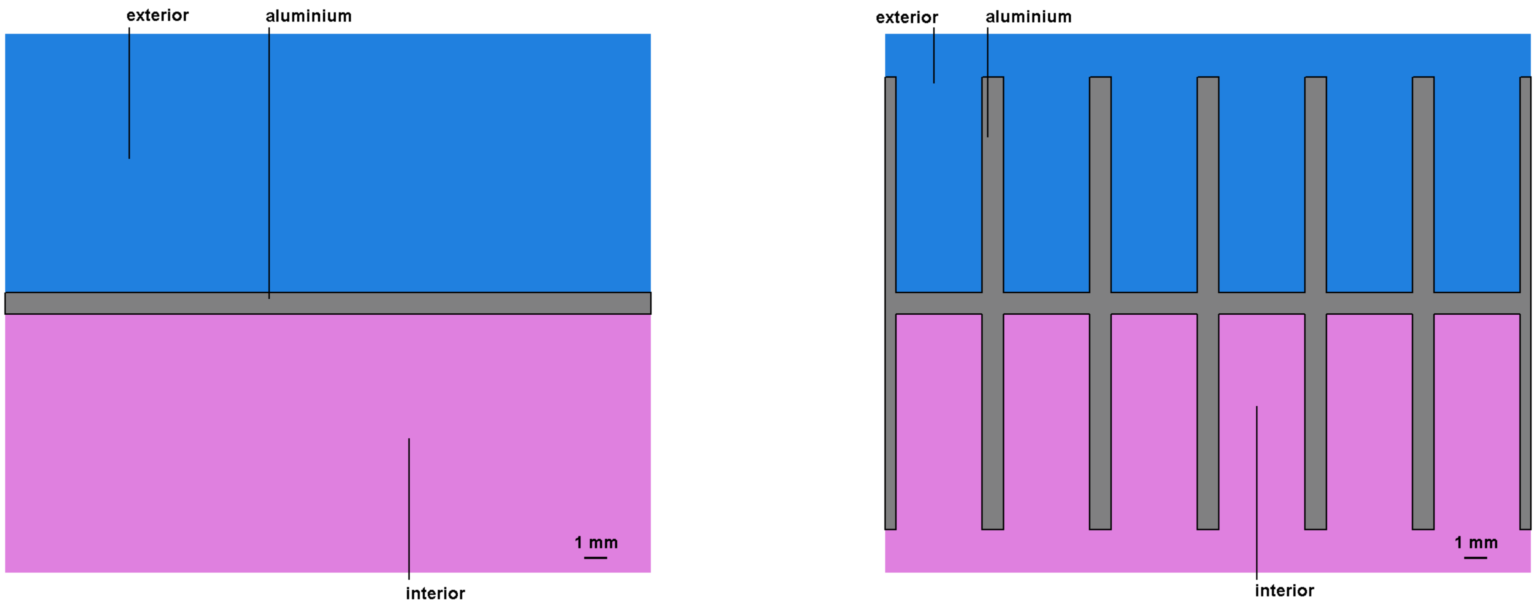
Koelvineffect





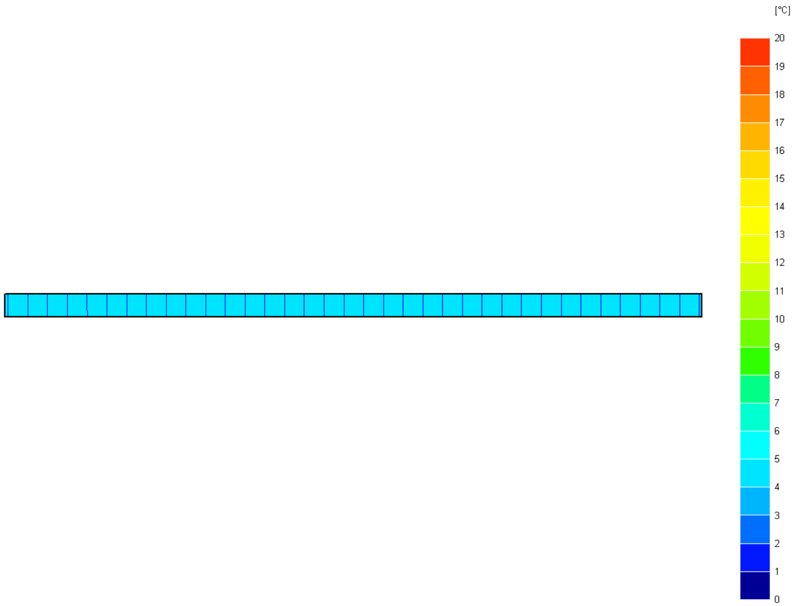
Gevalstudie: koelvineffect

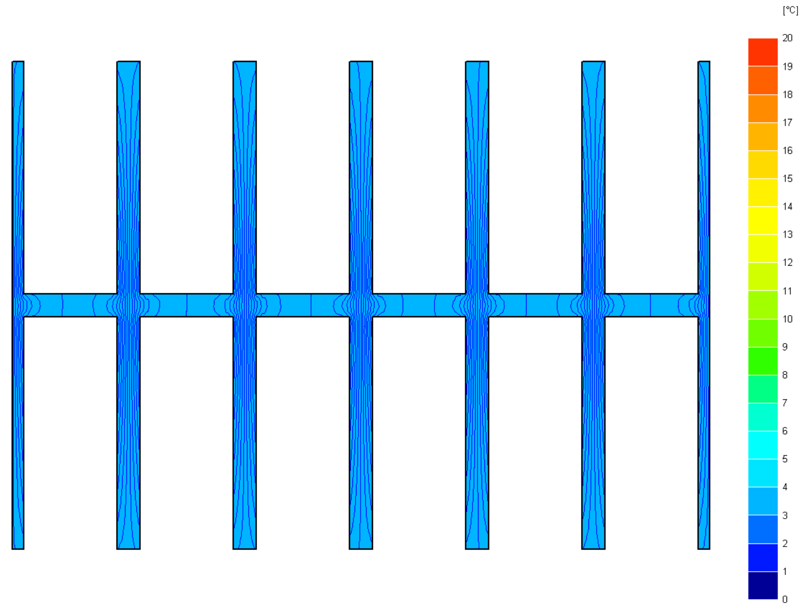
U-waarde van een niet-vlakke metalen wand



Gevalstudie: koelvineffect

U-waarde van een niet-vlakke metalen wand

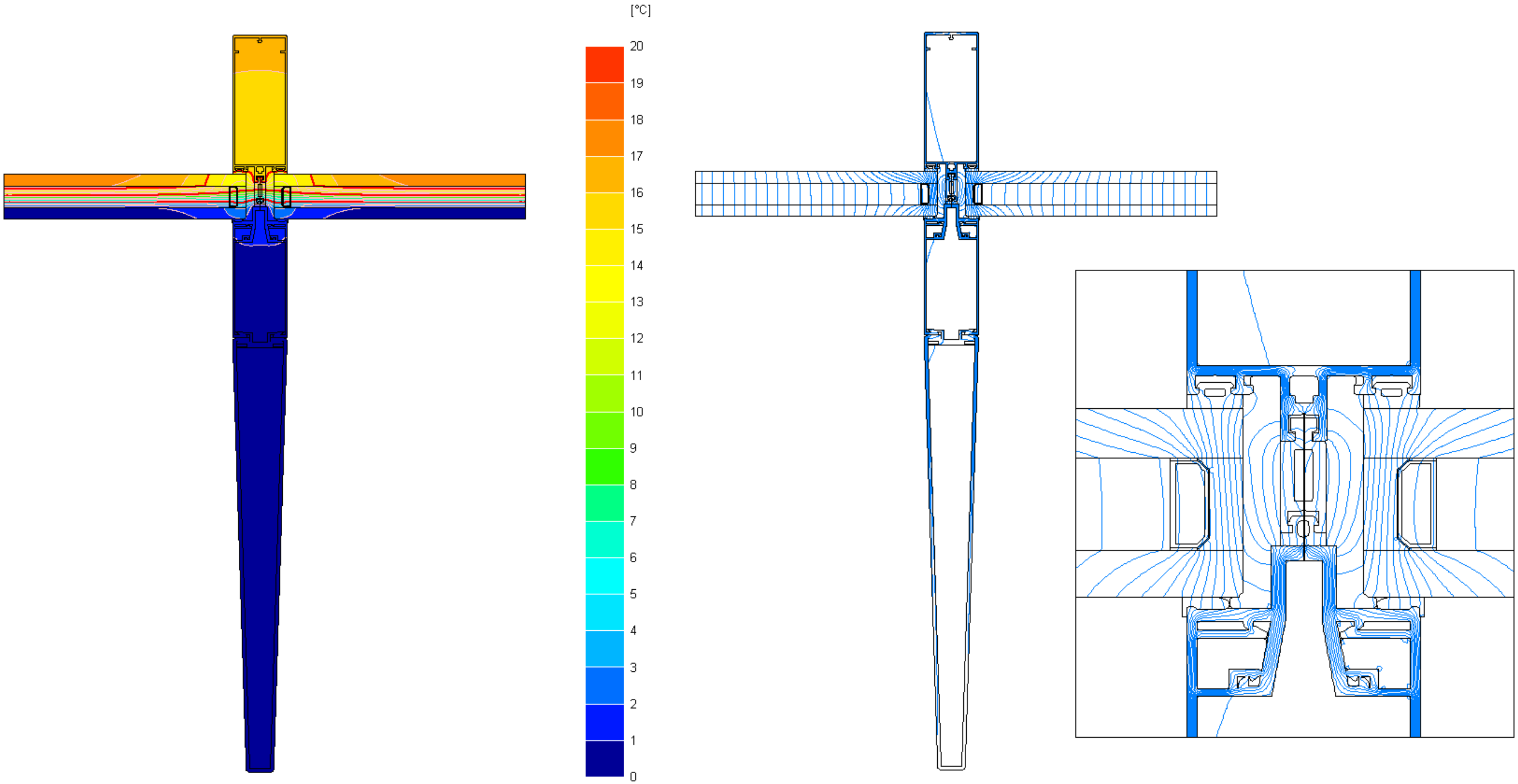




U = 5.9 W/m^{2}K

U = 10.9 W/m^{2}K

Gevalstudie: koelvineffect

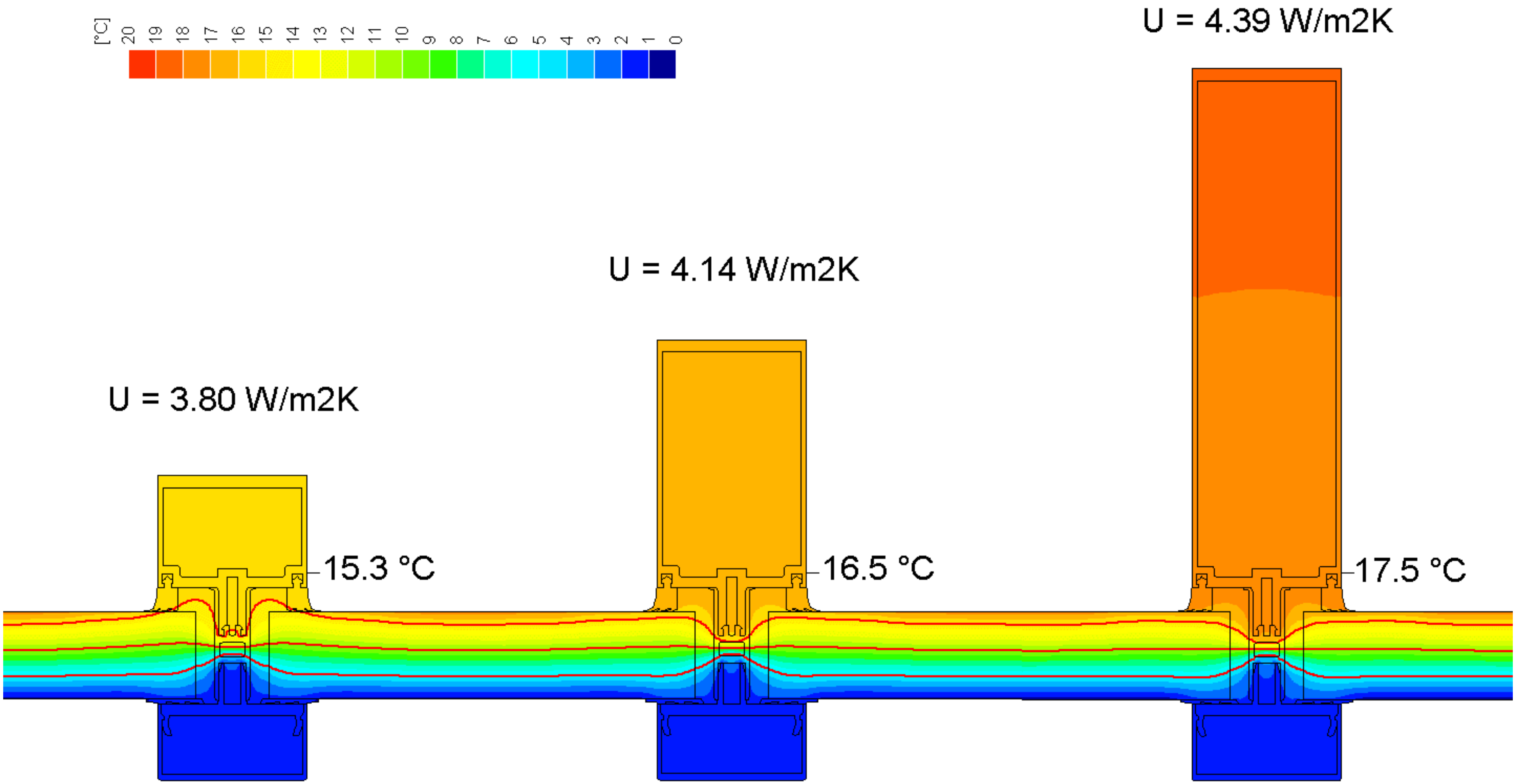


hachette_2013.bsc

$U_{glas} = 1.0\ W/m^2K$

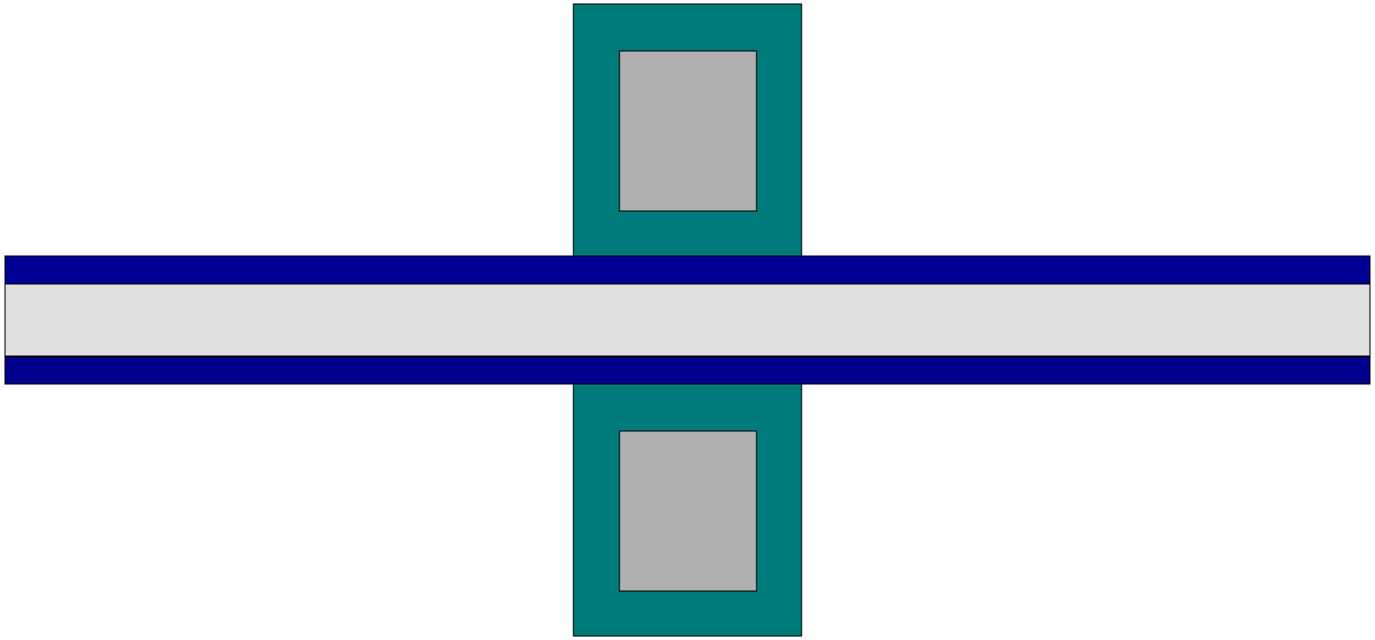
$U_{frame+edge} = 8.3\ W/m^2K$ $\psi_{frame+edge} = 0.365\ W/mK$

Gevalstudie: koelvineffect



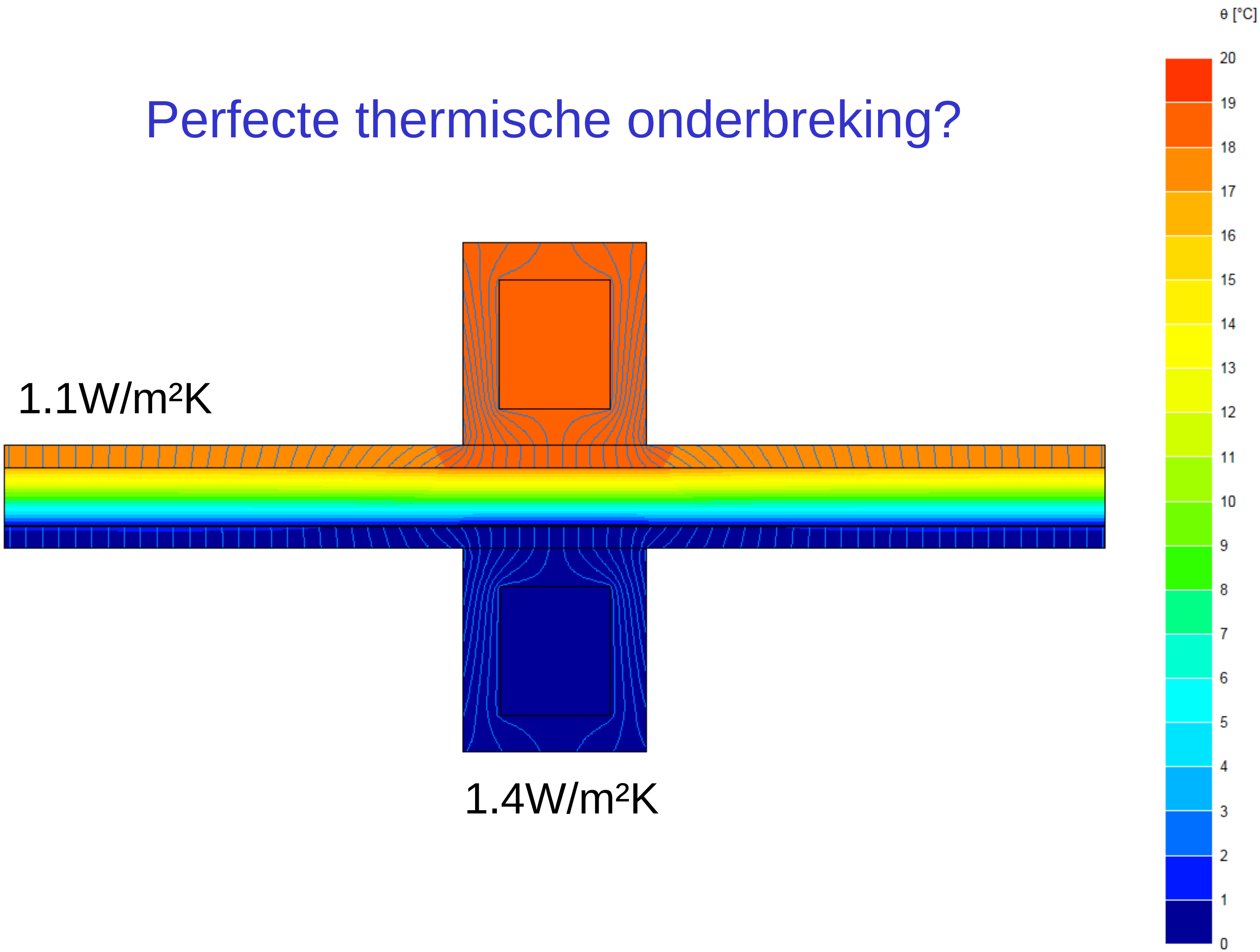
Gevalstudie: koelvineffect

Perfecte thermische onderbreking?



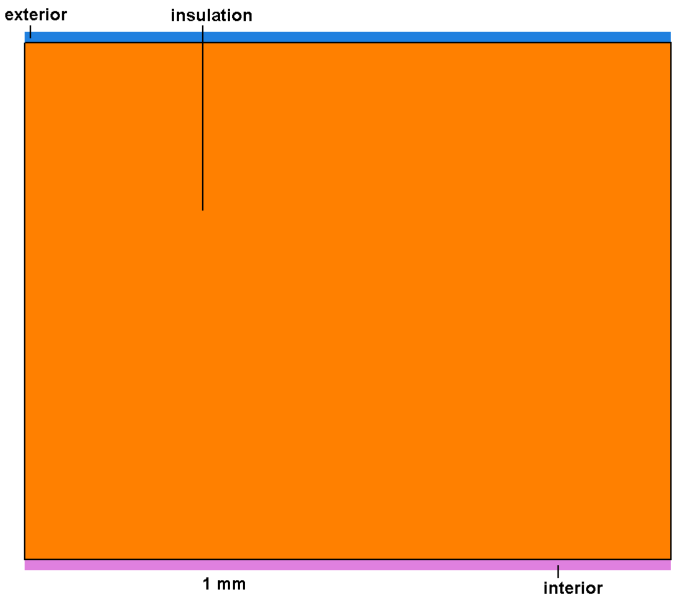
Gevalstudie: koelvineffect

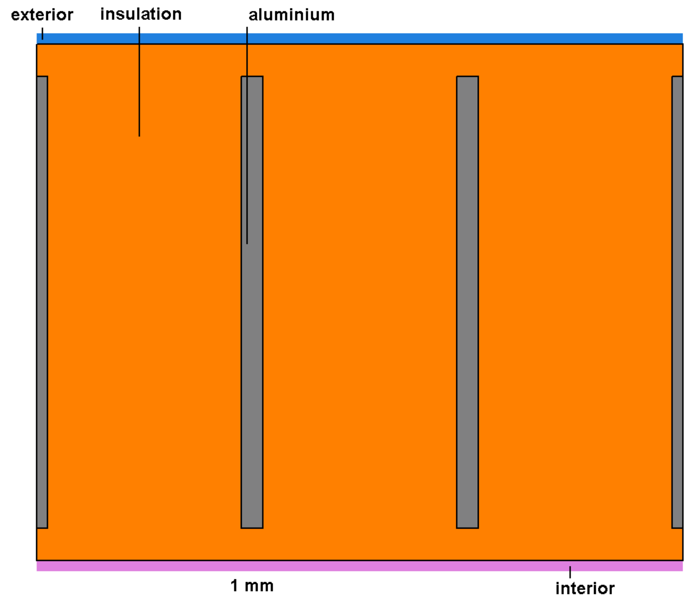
Perfecte thermische onderbreking?



Gevalstudie: kortsluitingseffect

U-waarde van een isolatielaag met aluminium-platen





Gevalstudie: kortsluitingseffect

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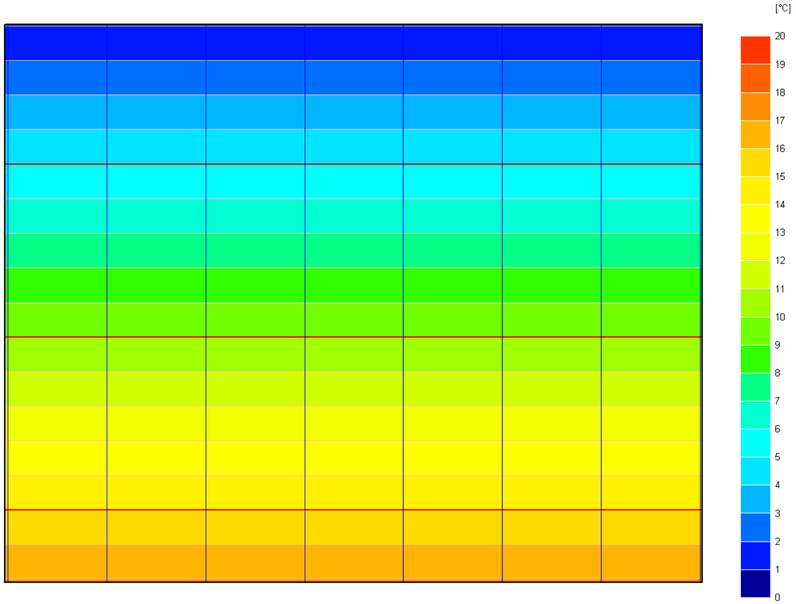
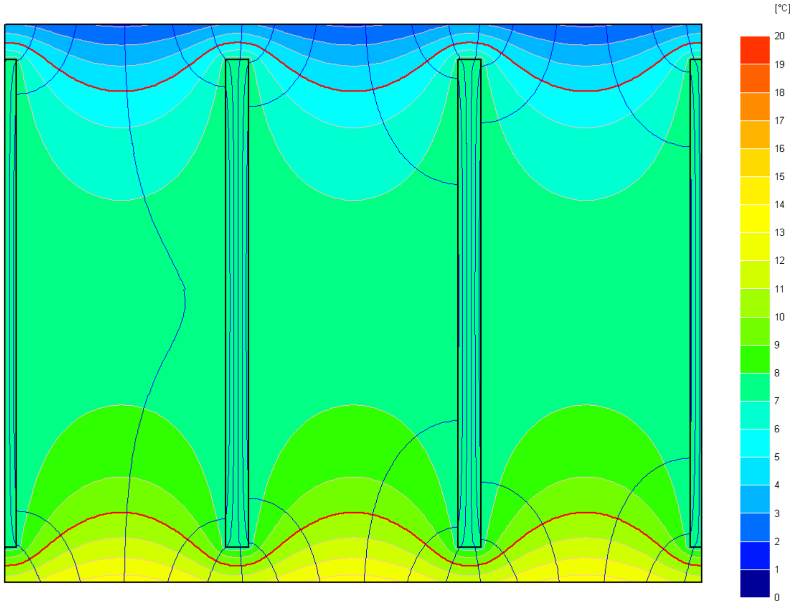
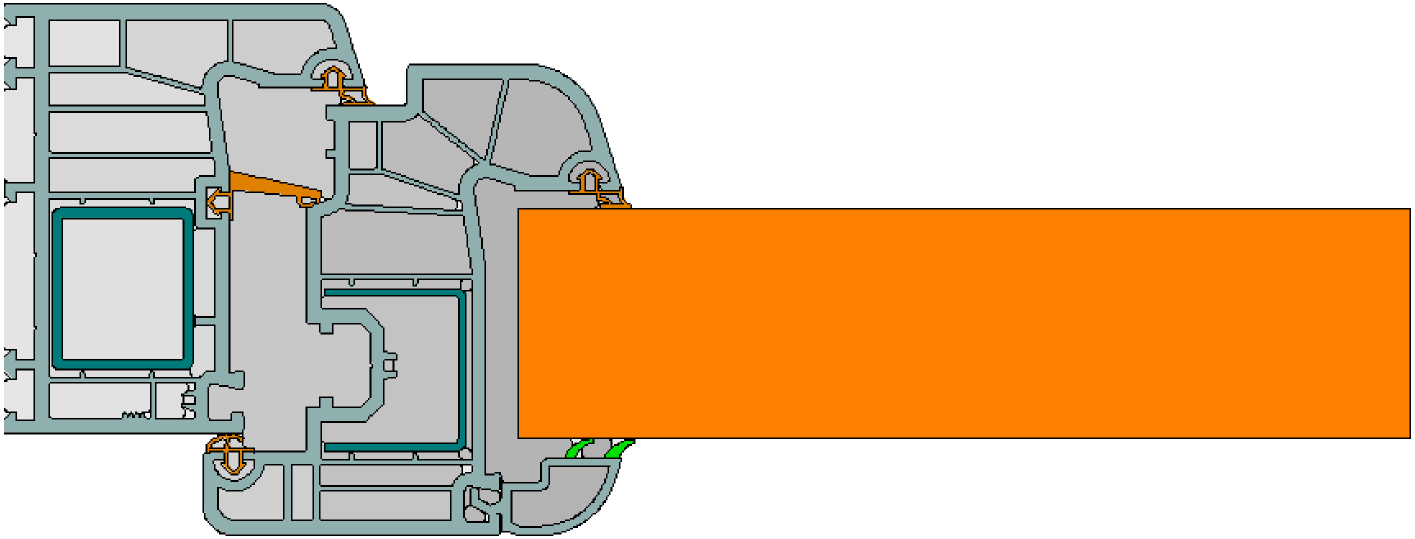


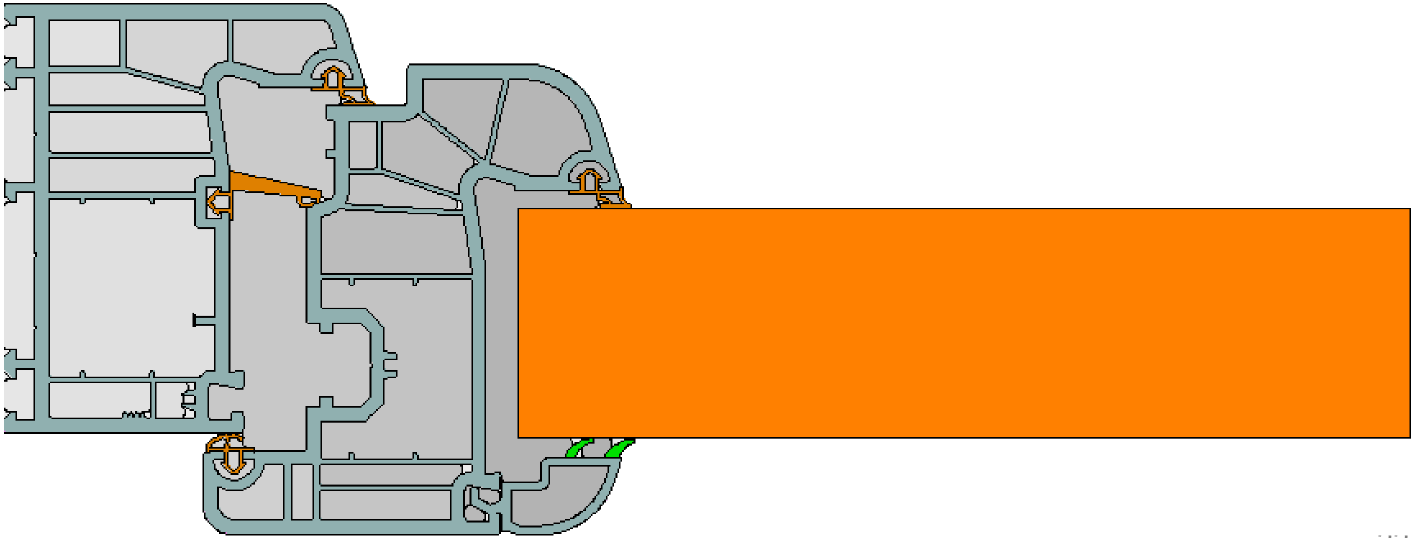


U = 1.17 W/m²K

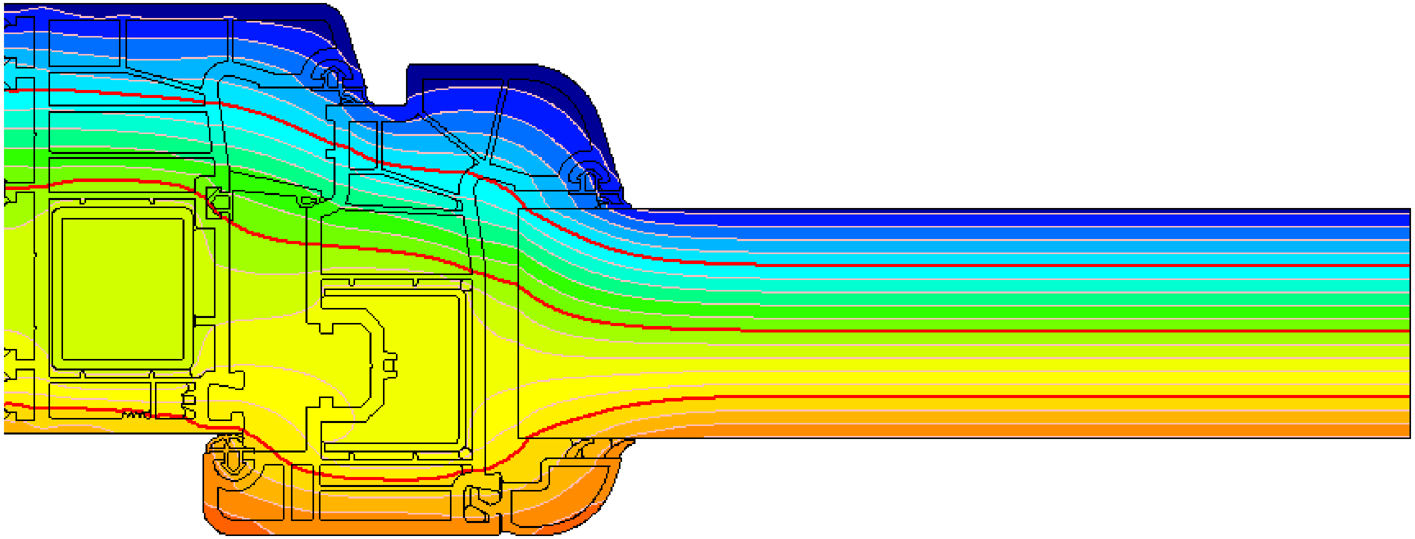
U = 2.91 W/m²K

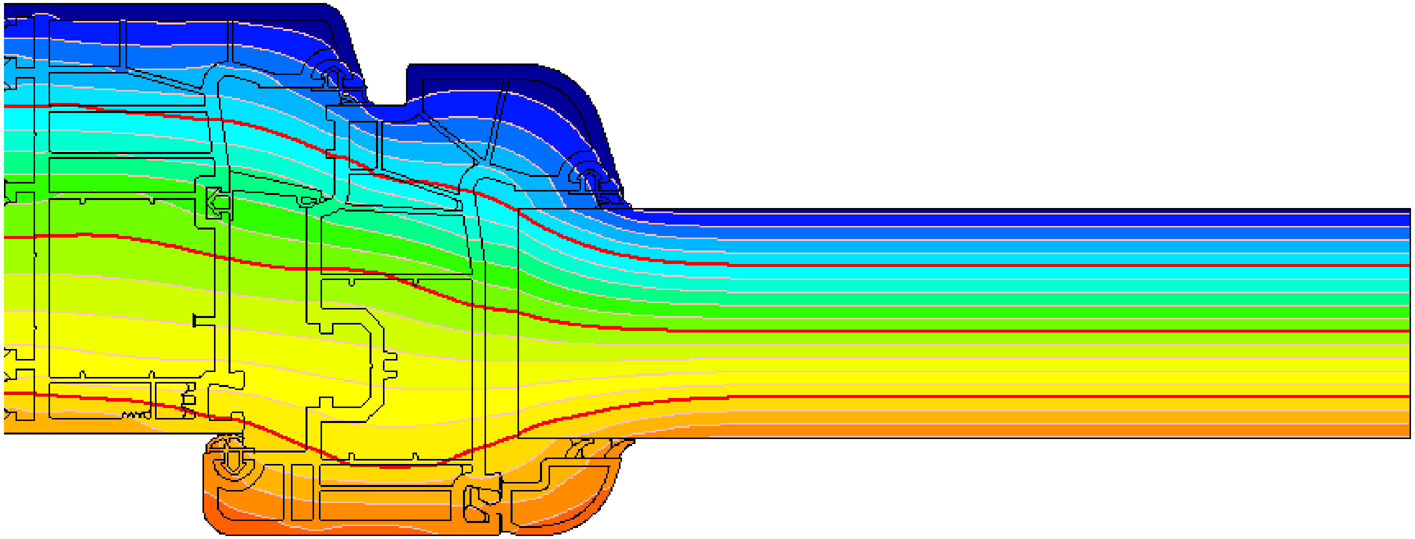
kortsluitingseffect



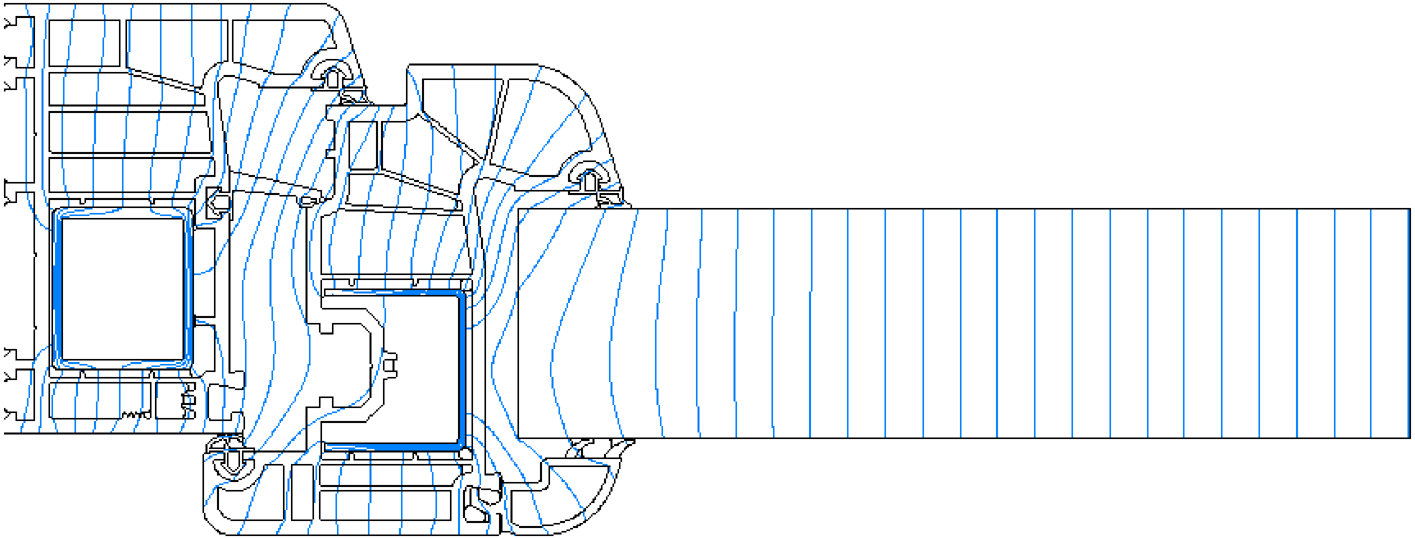


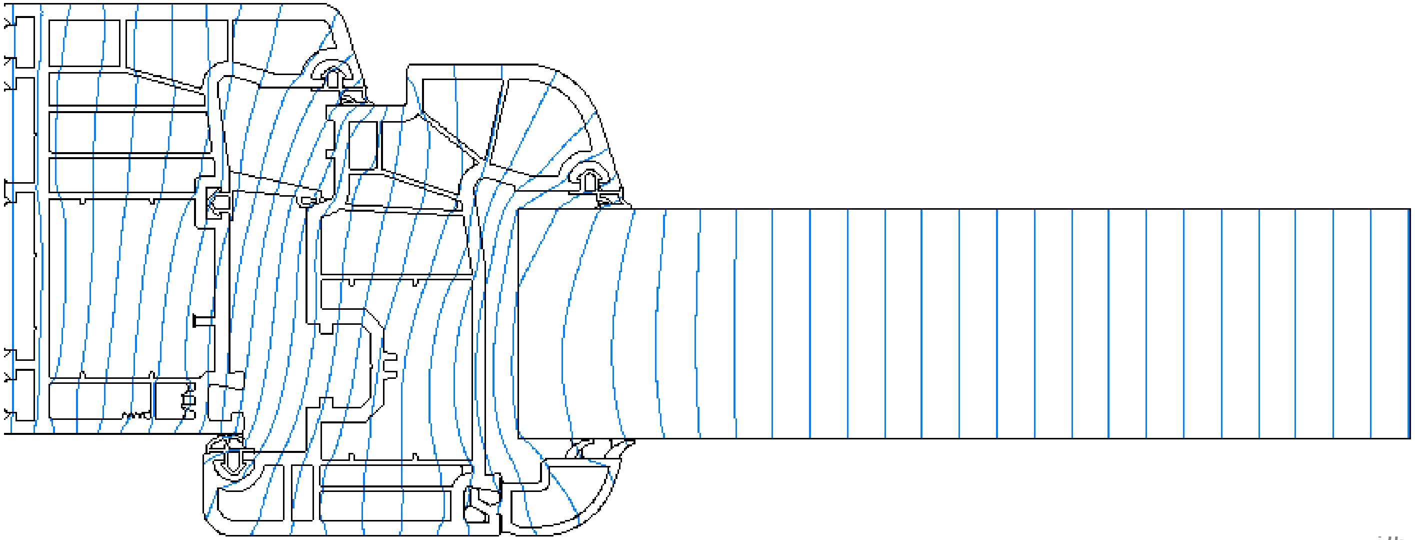
kortsluitingseffect





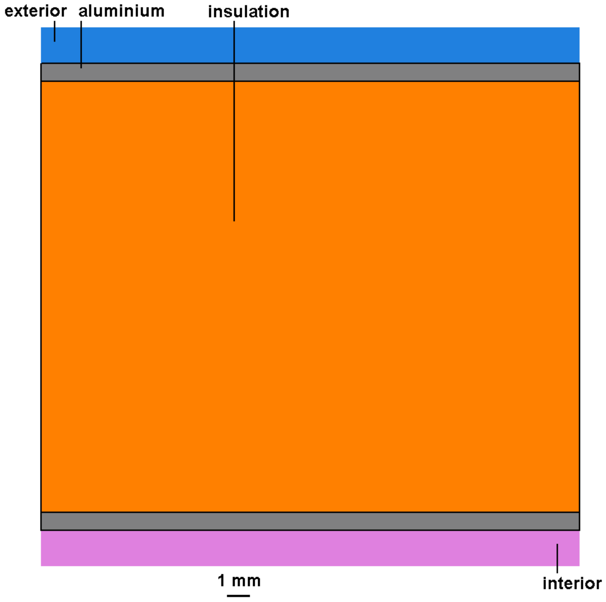
kortsluitingseffect

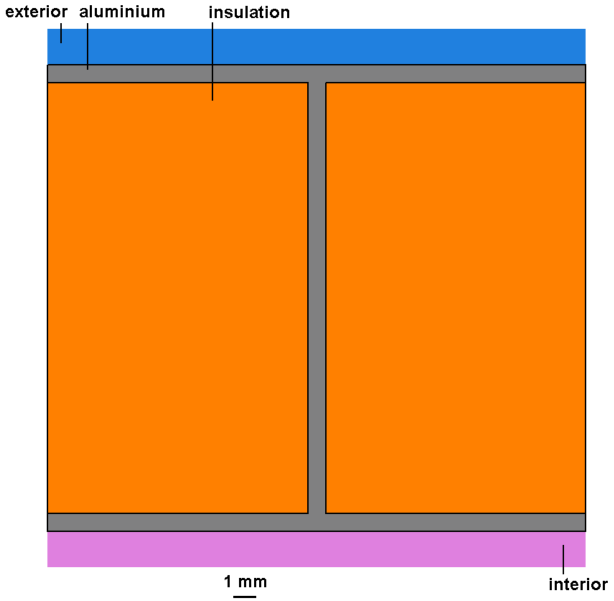




Gevalstudie: koelvineffect en kortsluitingseffect

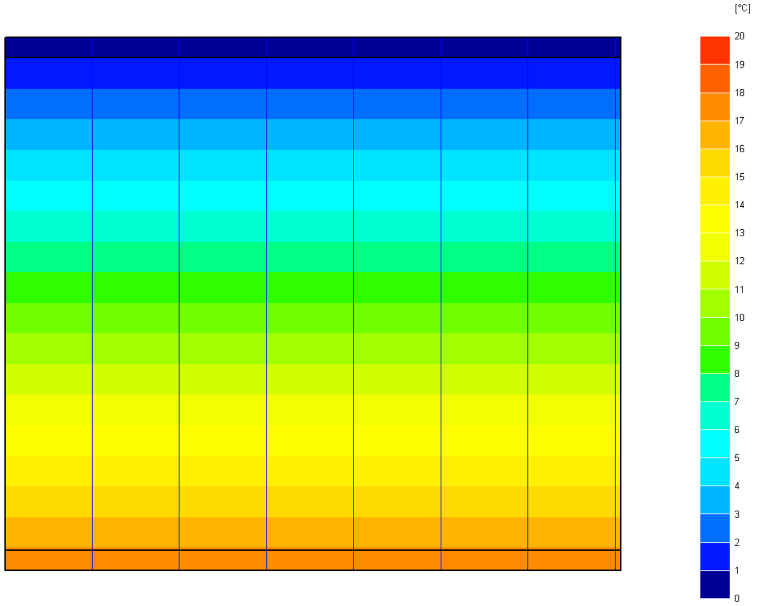
koelvineffect en kortsluitingseffect kunnen mekaar versterken

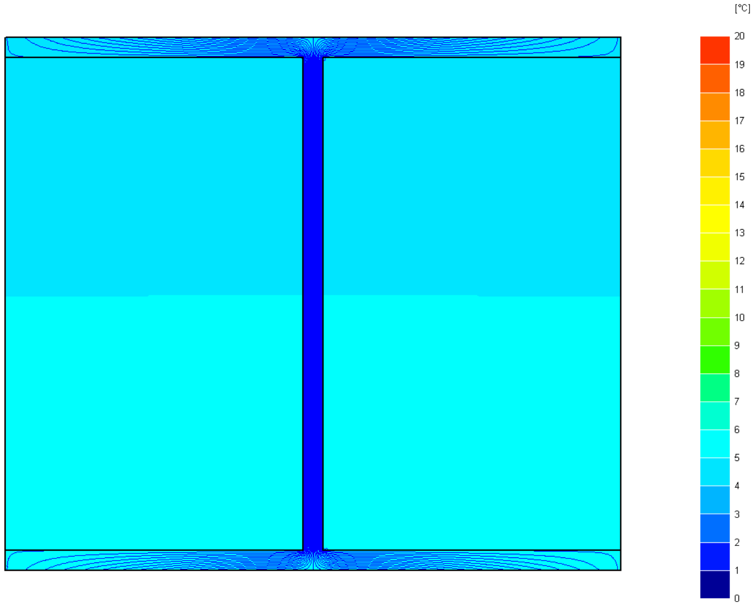




Gevalstudie: koelvineffect en kortsluitingseffect

koelvineffect en kortsluitingseffect kunnen mekaar versterken

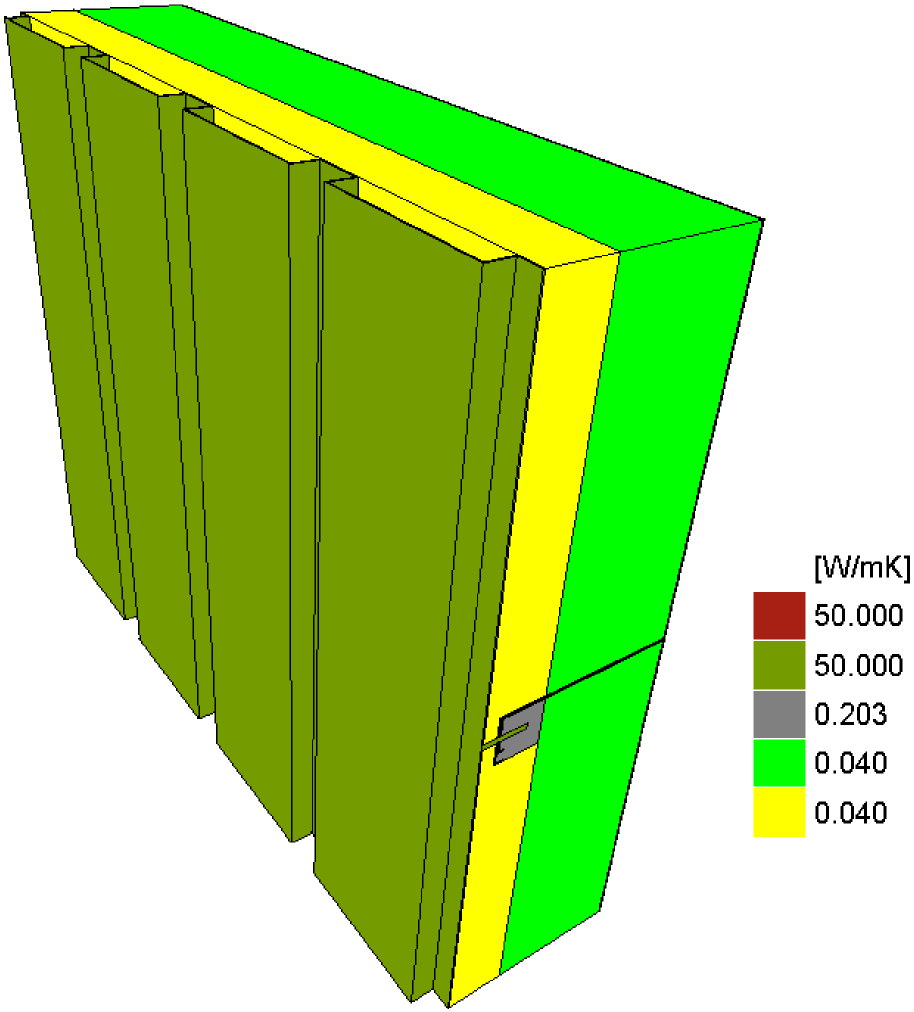


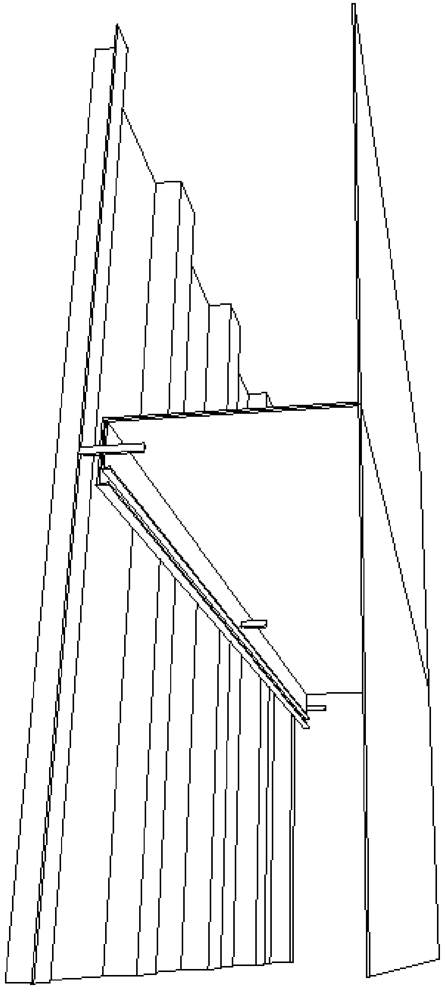


U = 1.17 W/m²K

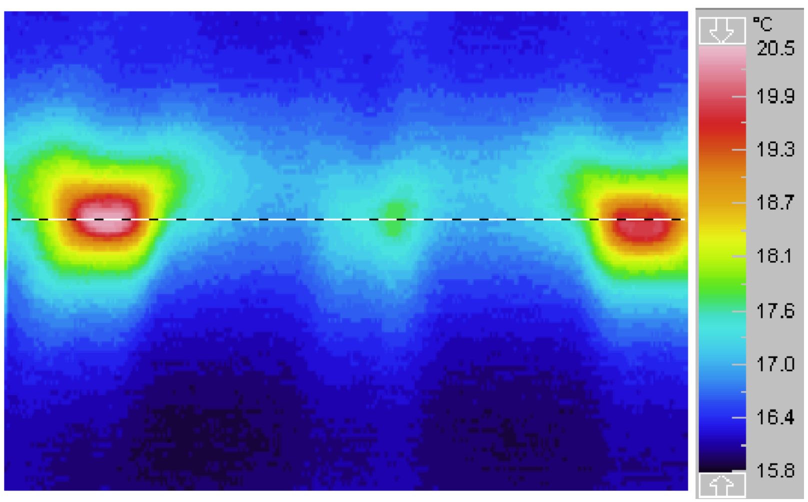
U = 4.53 W/m²K

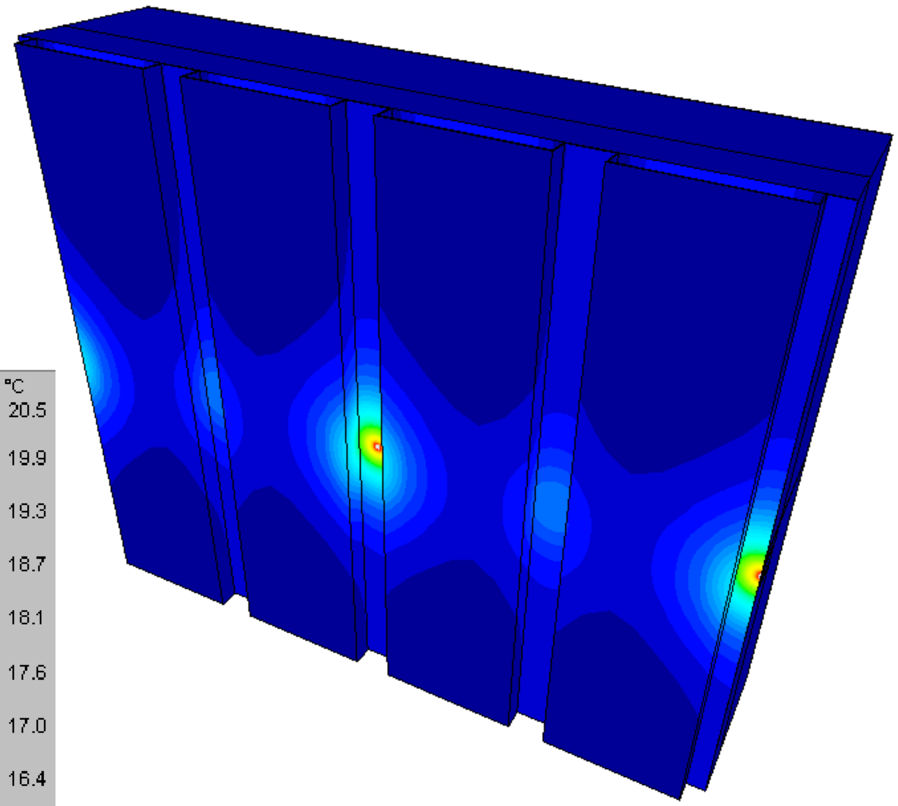
Gevalstudie: koelvineffect en kortsluitingseffect





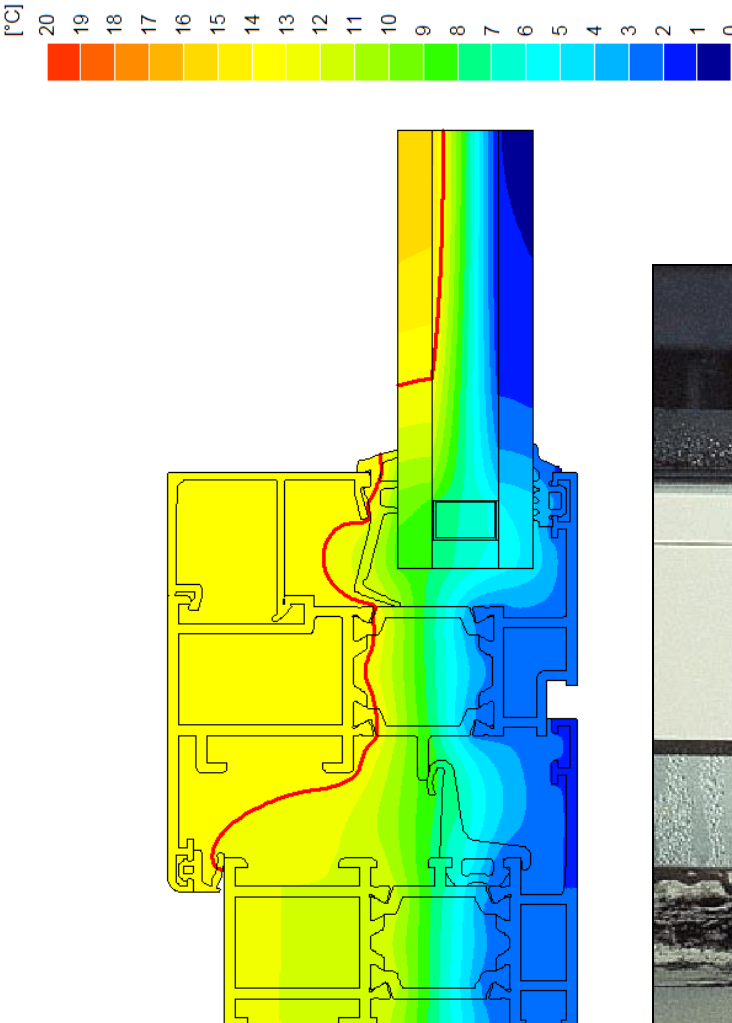
Gevalstudie: koelvineffect en kortsluitingseffect



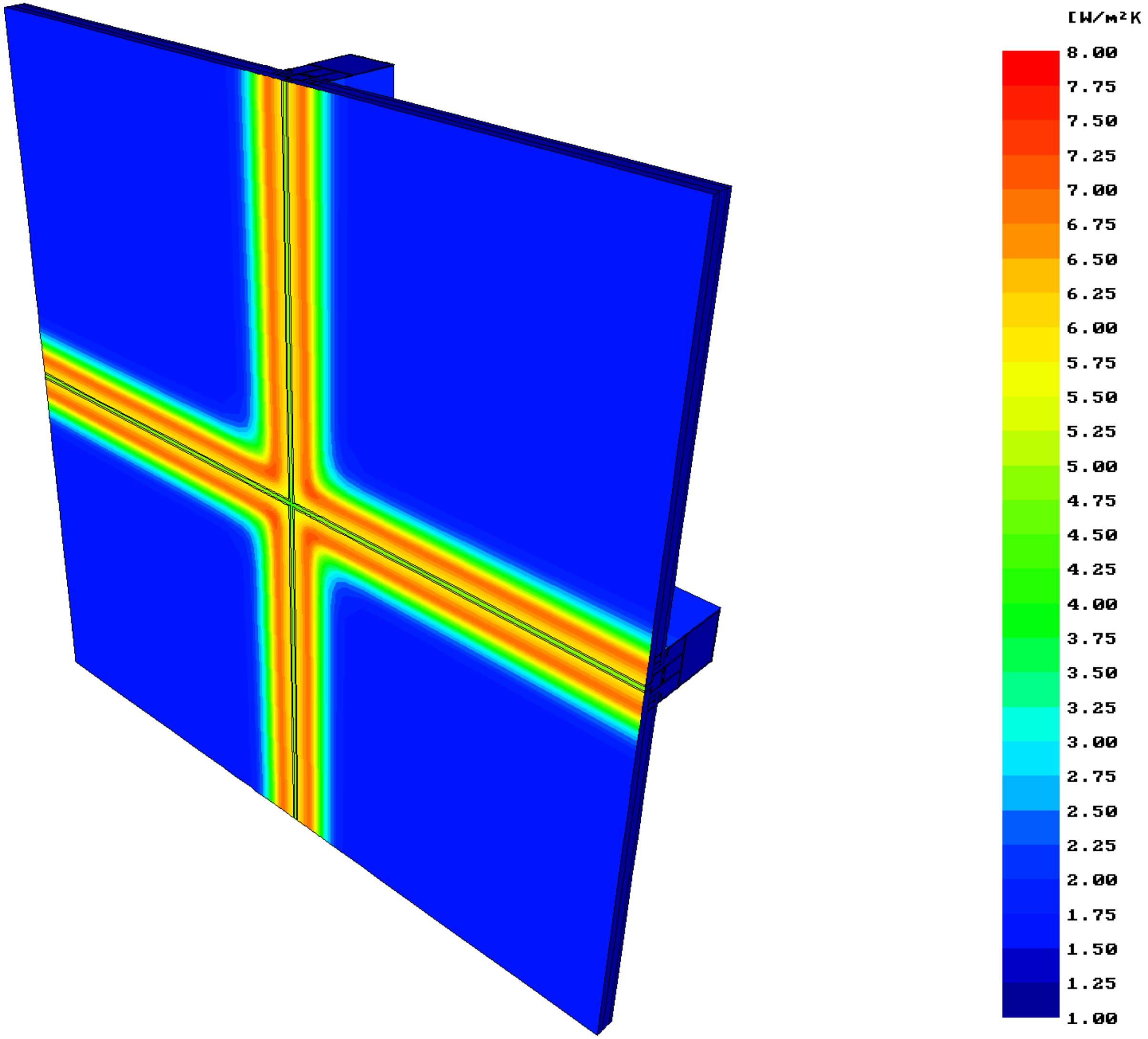


U 1D = 0.24 W/m2K (160 mm / 0.040 W/mK)
U 3D = 0.53 W/m2K

Gevalstudie: koelvineffect en kortsluitingseffect

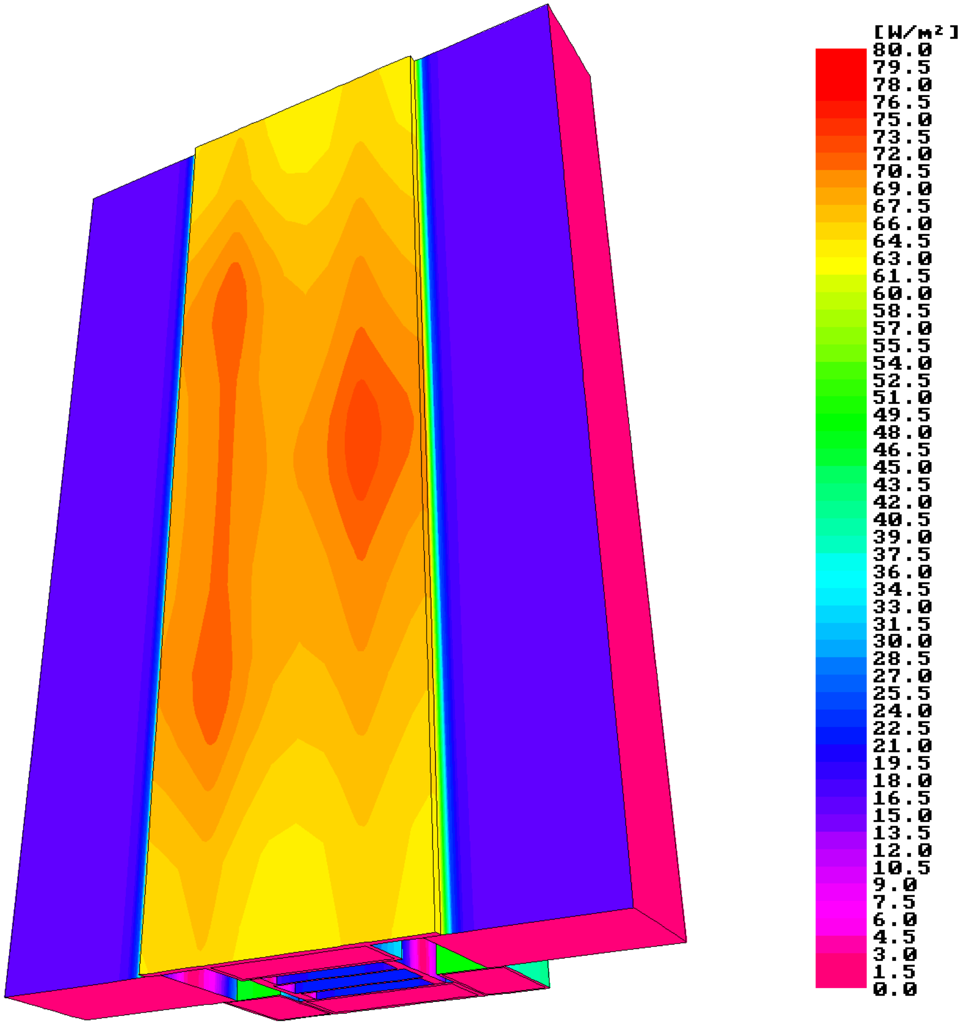


Gevalstudie: koelvineffect en kortsluitingseffect

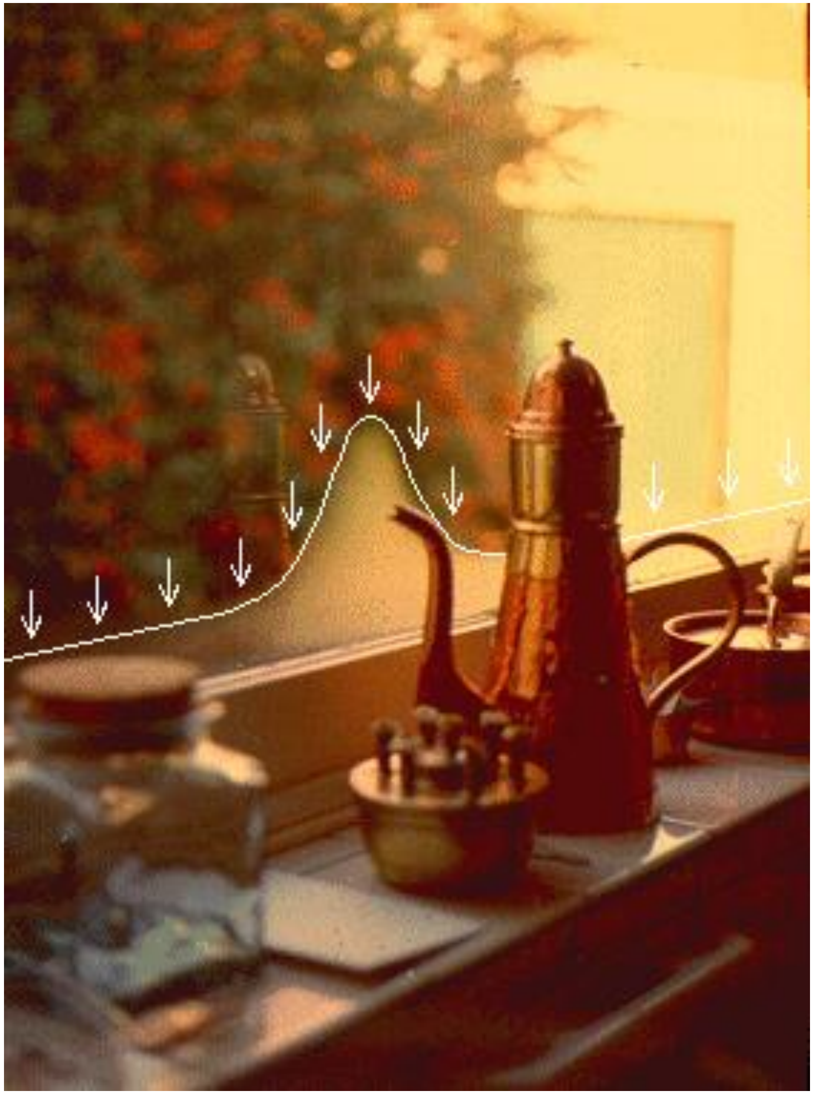


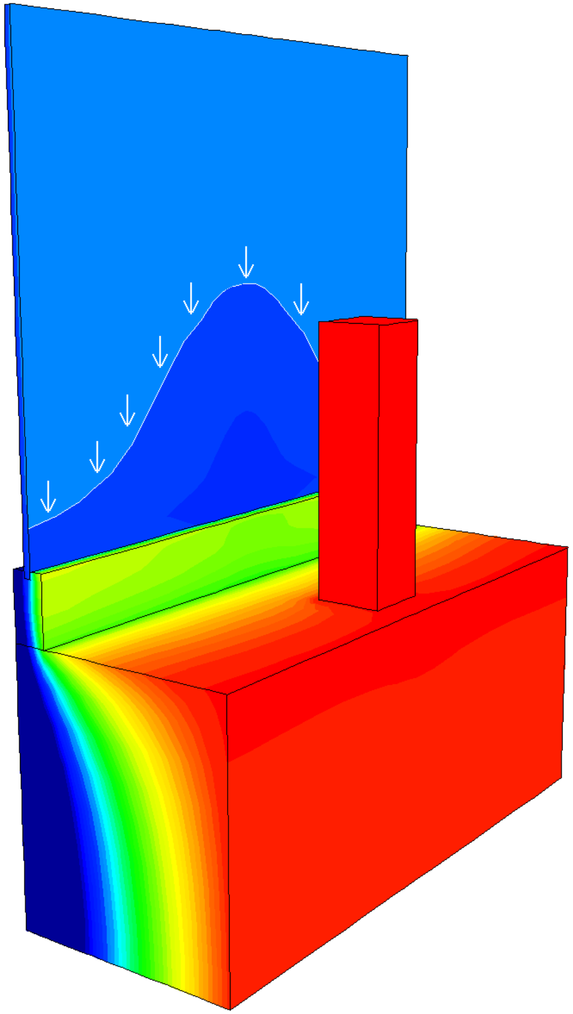
Gevalstudie: koelvineffect en kortsluitingseffect

Fixations



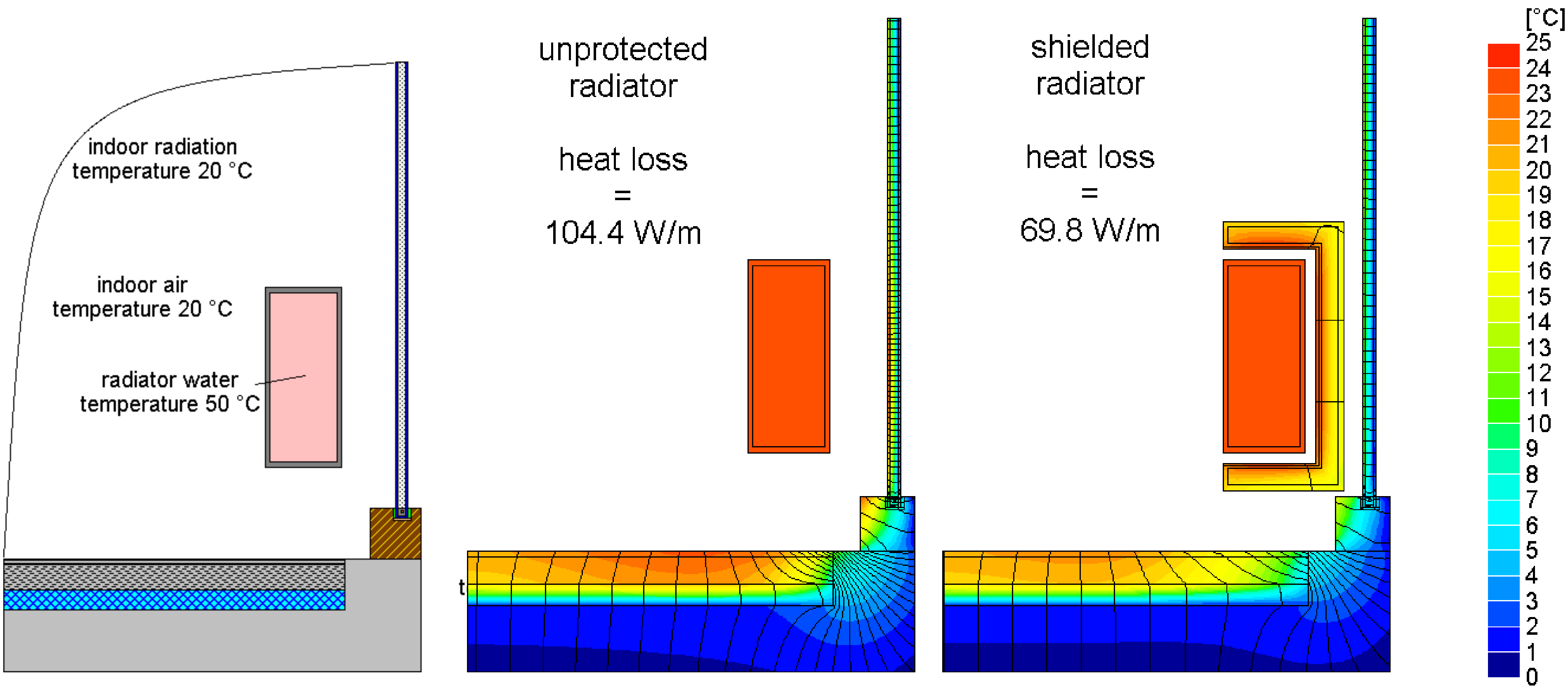
Straling



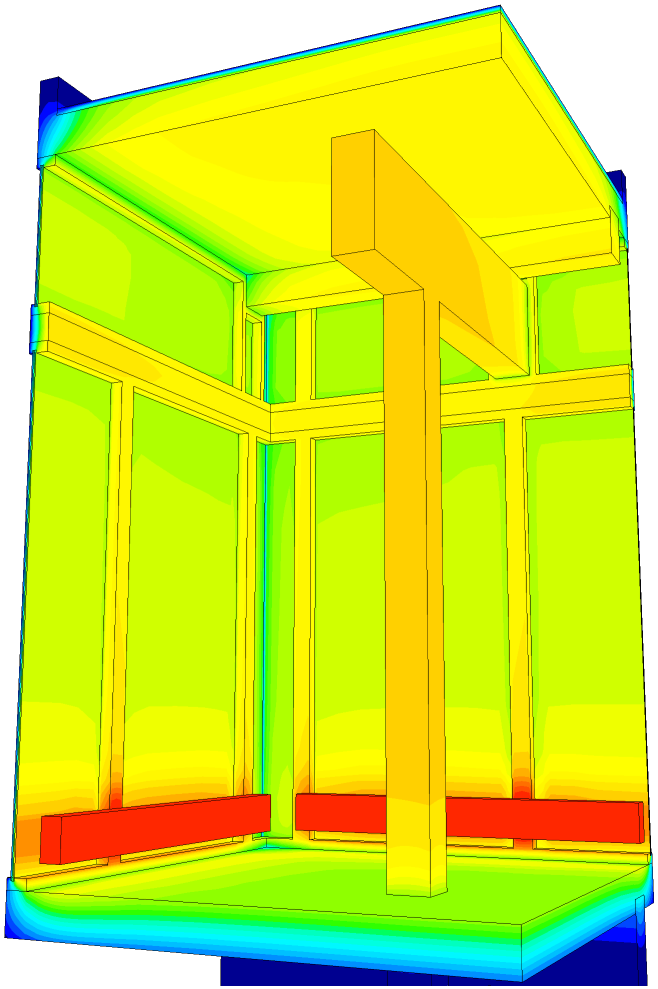


Straling en convectie

Radiator voor venster



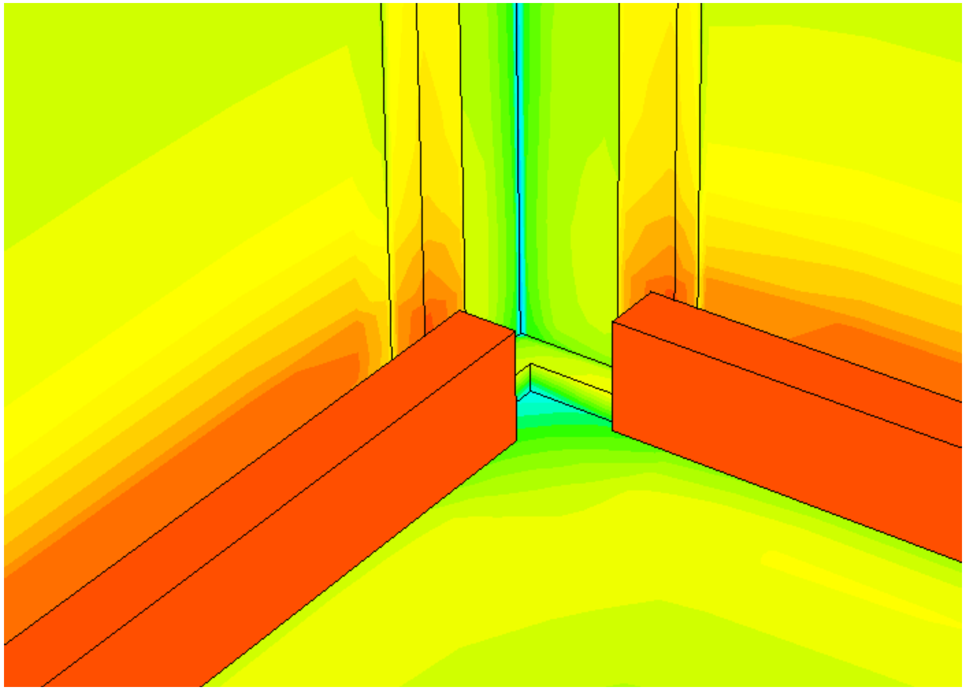
Straling en convectie



Radiator voor venster

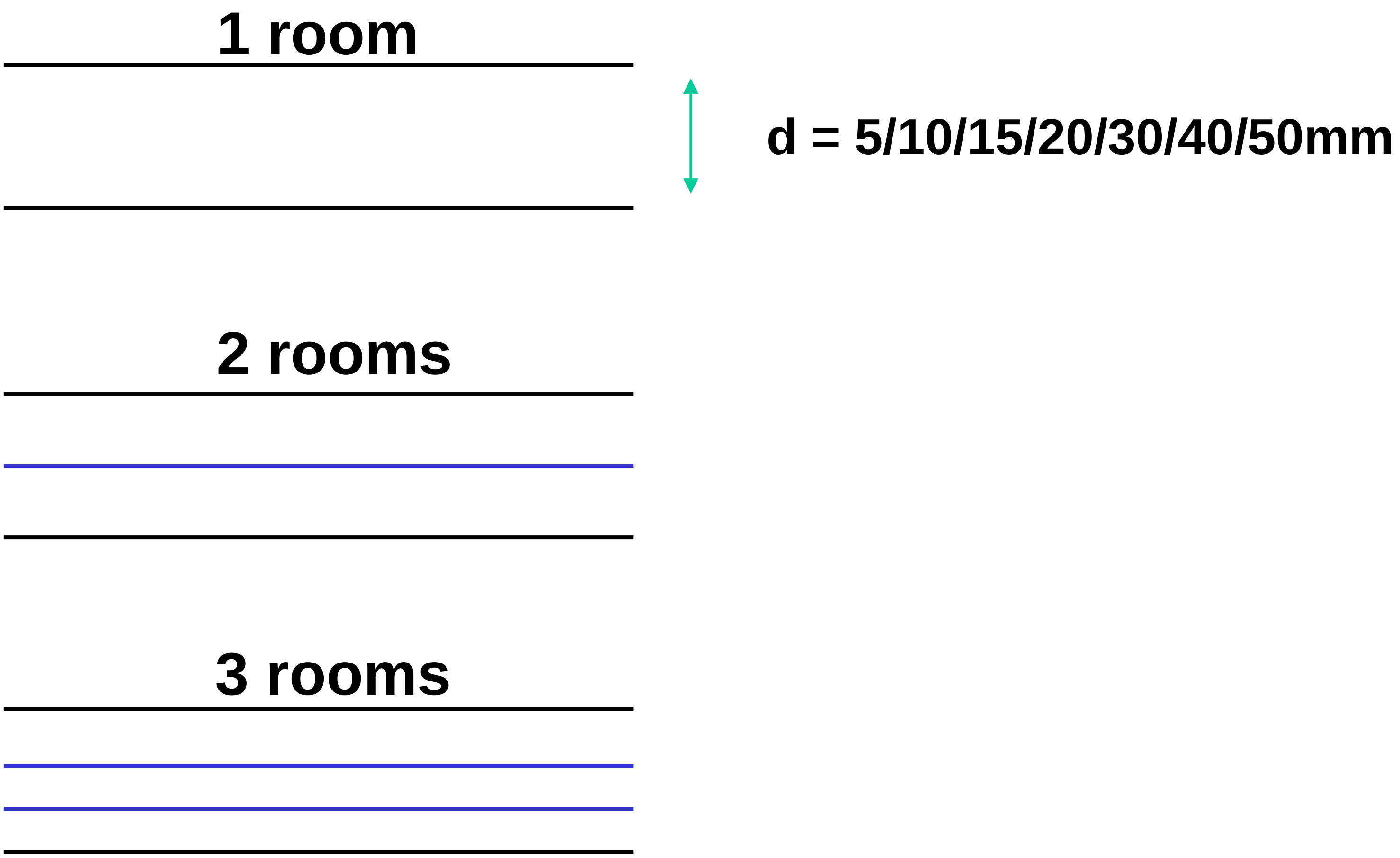
Straling en convectie

Radiator voor venster



Straling en convectie

Verbetering van een thermische onderbreking



Straling en convectie

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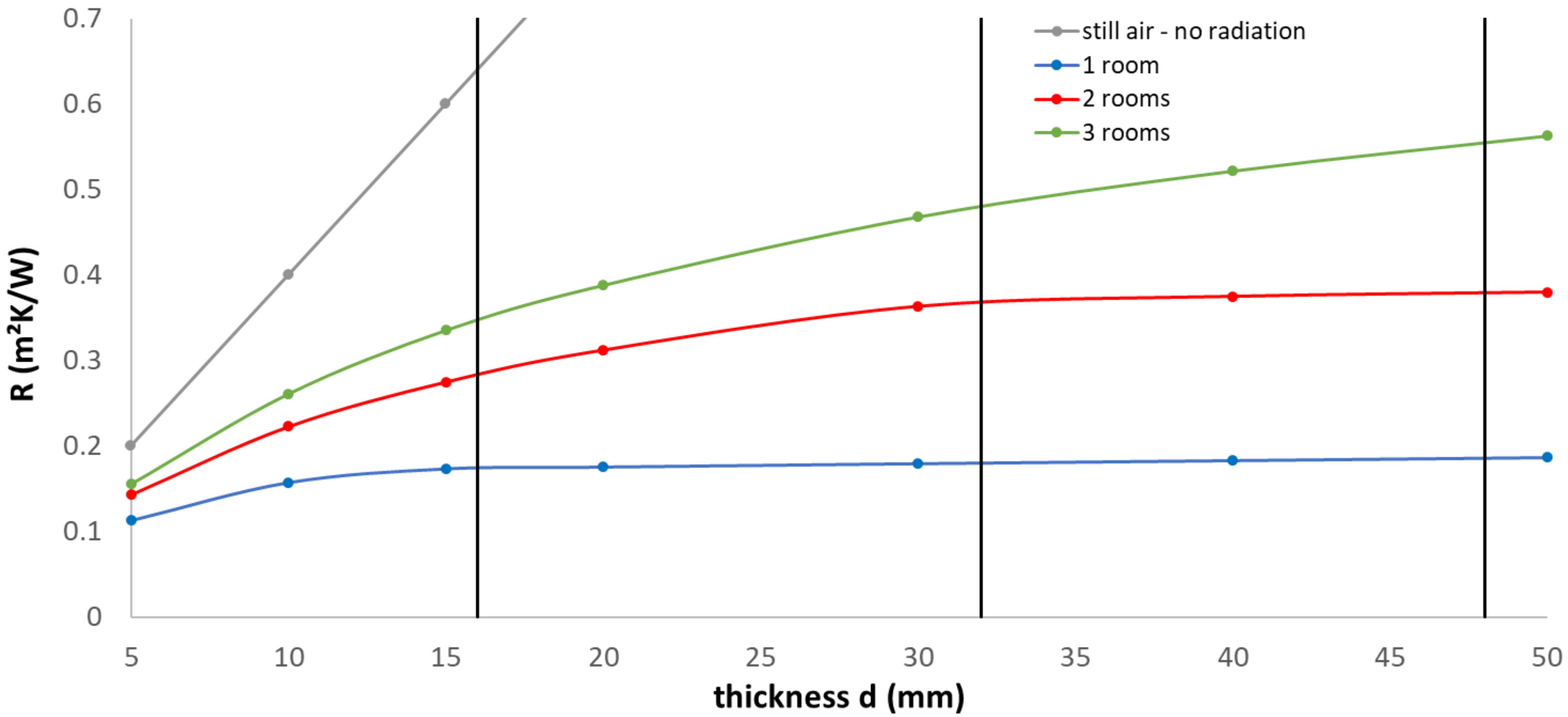
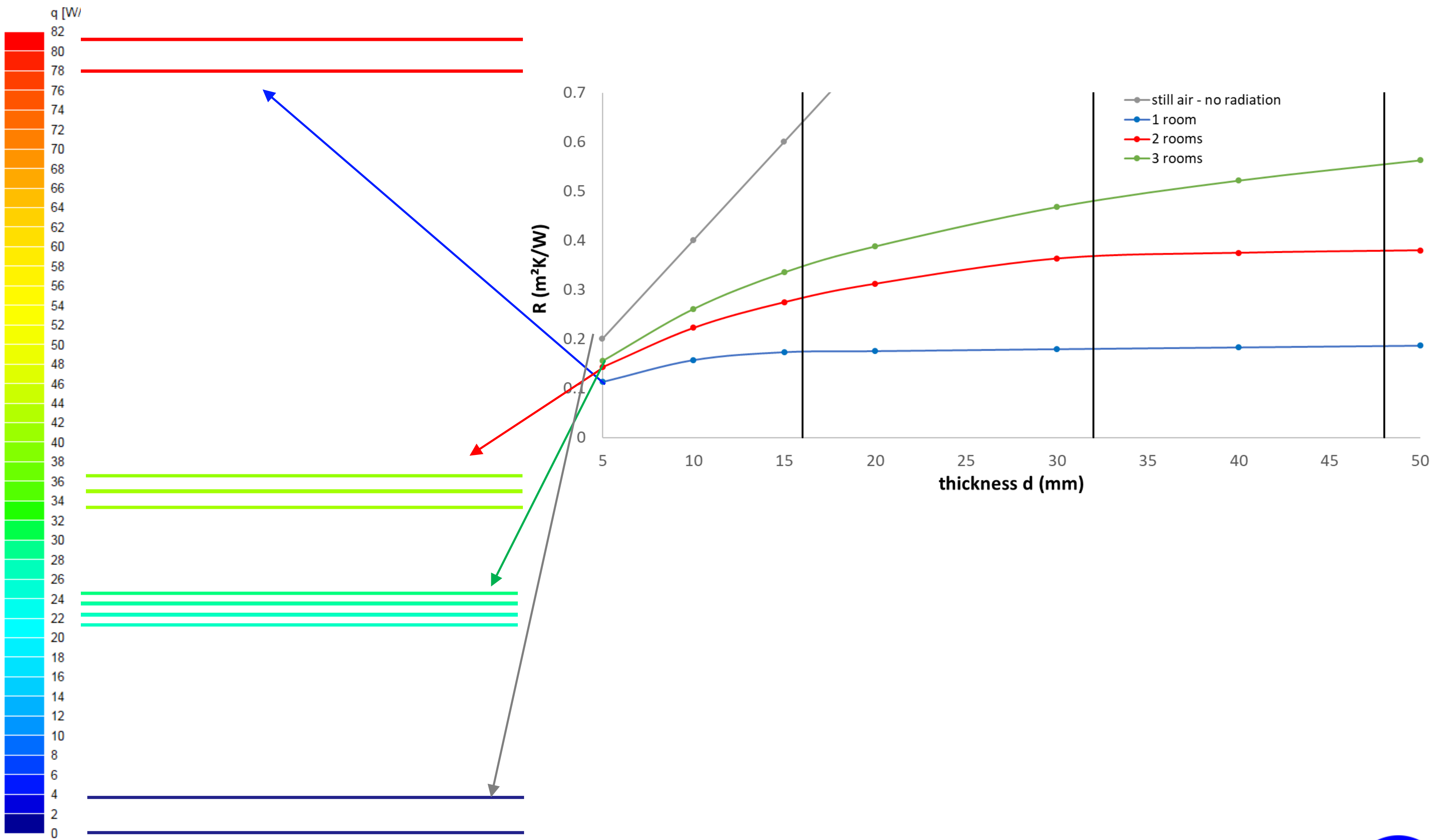
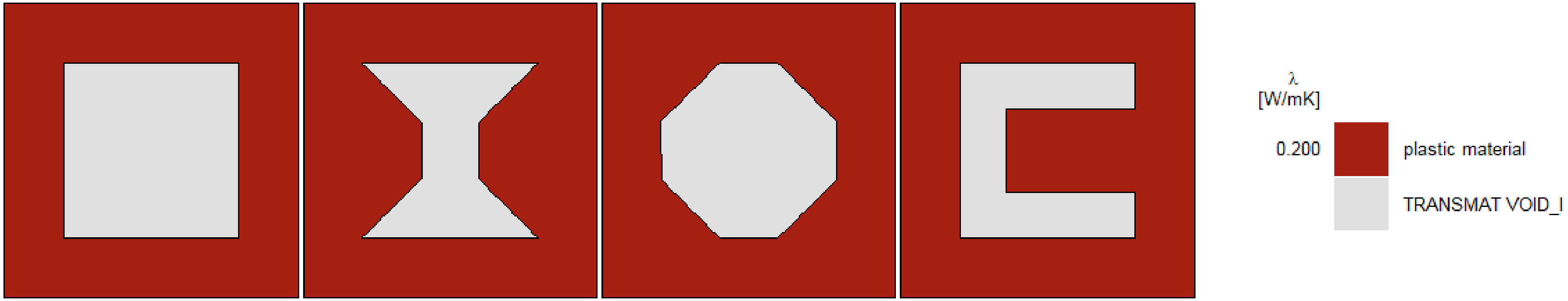


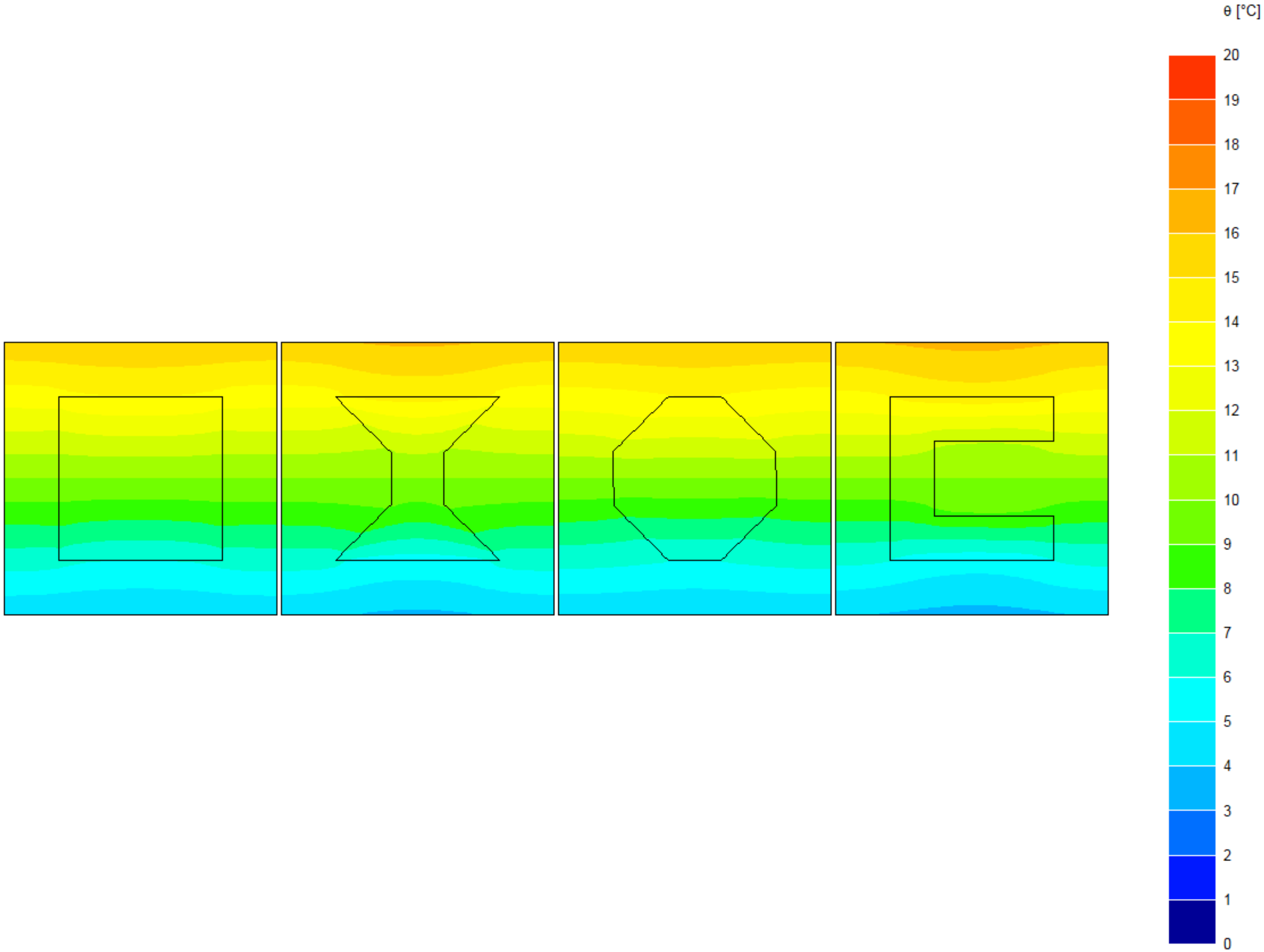
Straling en convectie



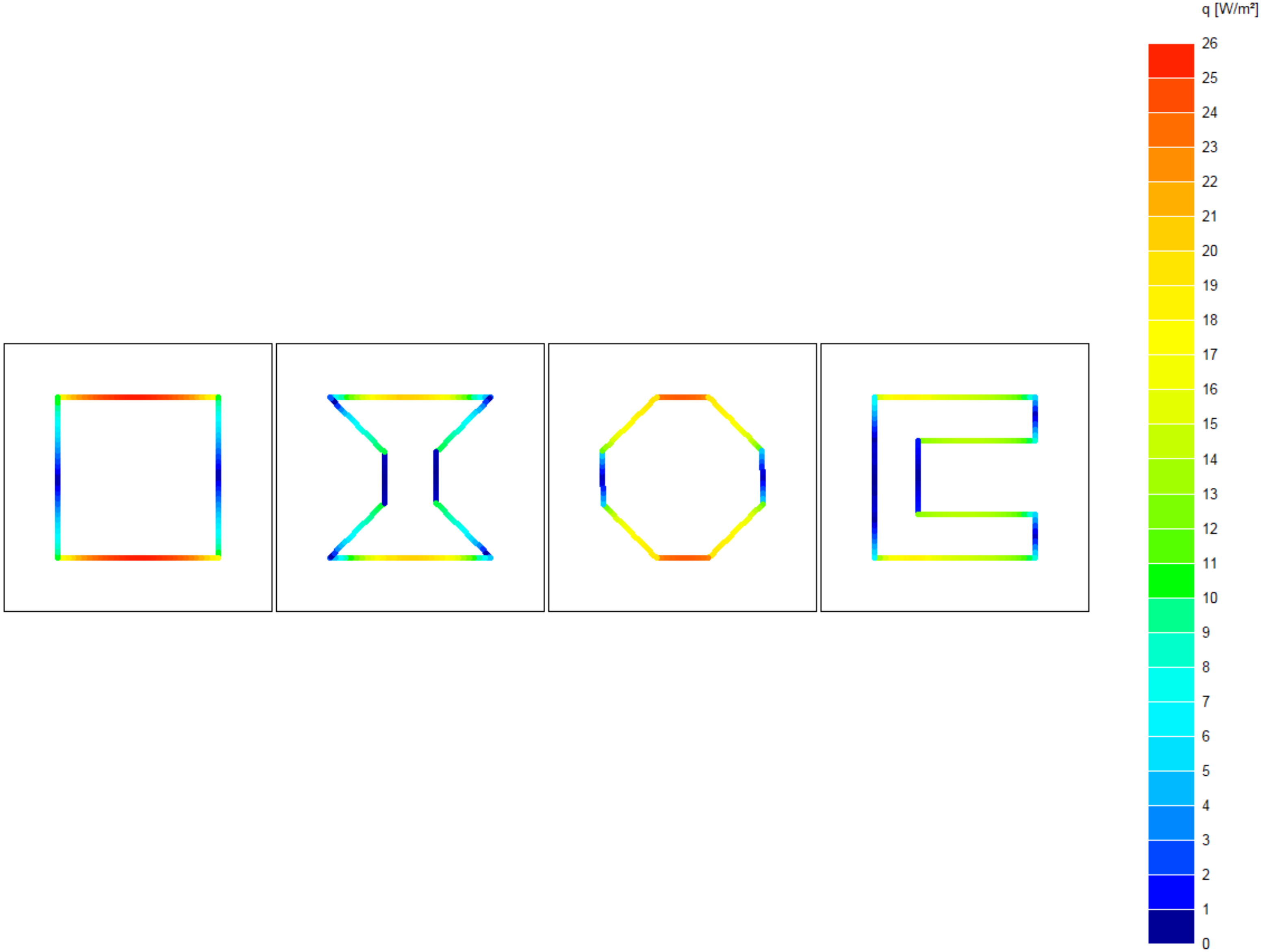
Vorm van holte



Straling en convectie

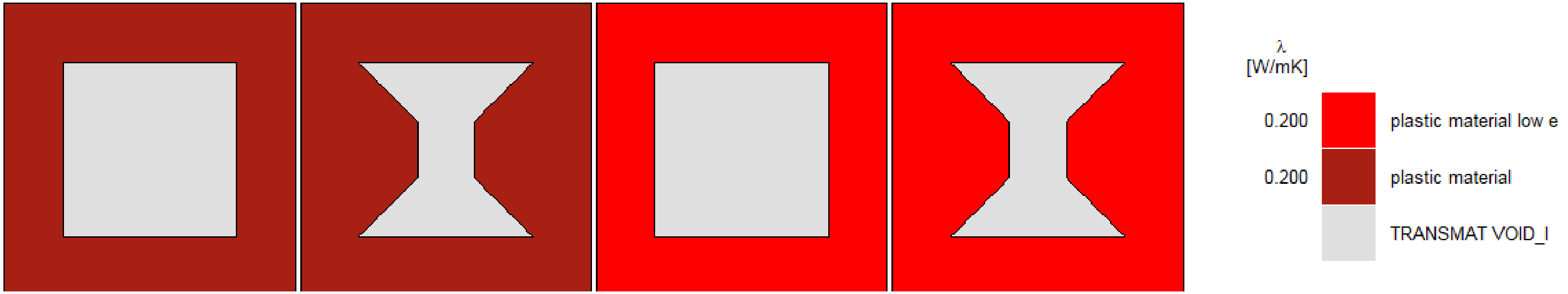


Straling en convectie



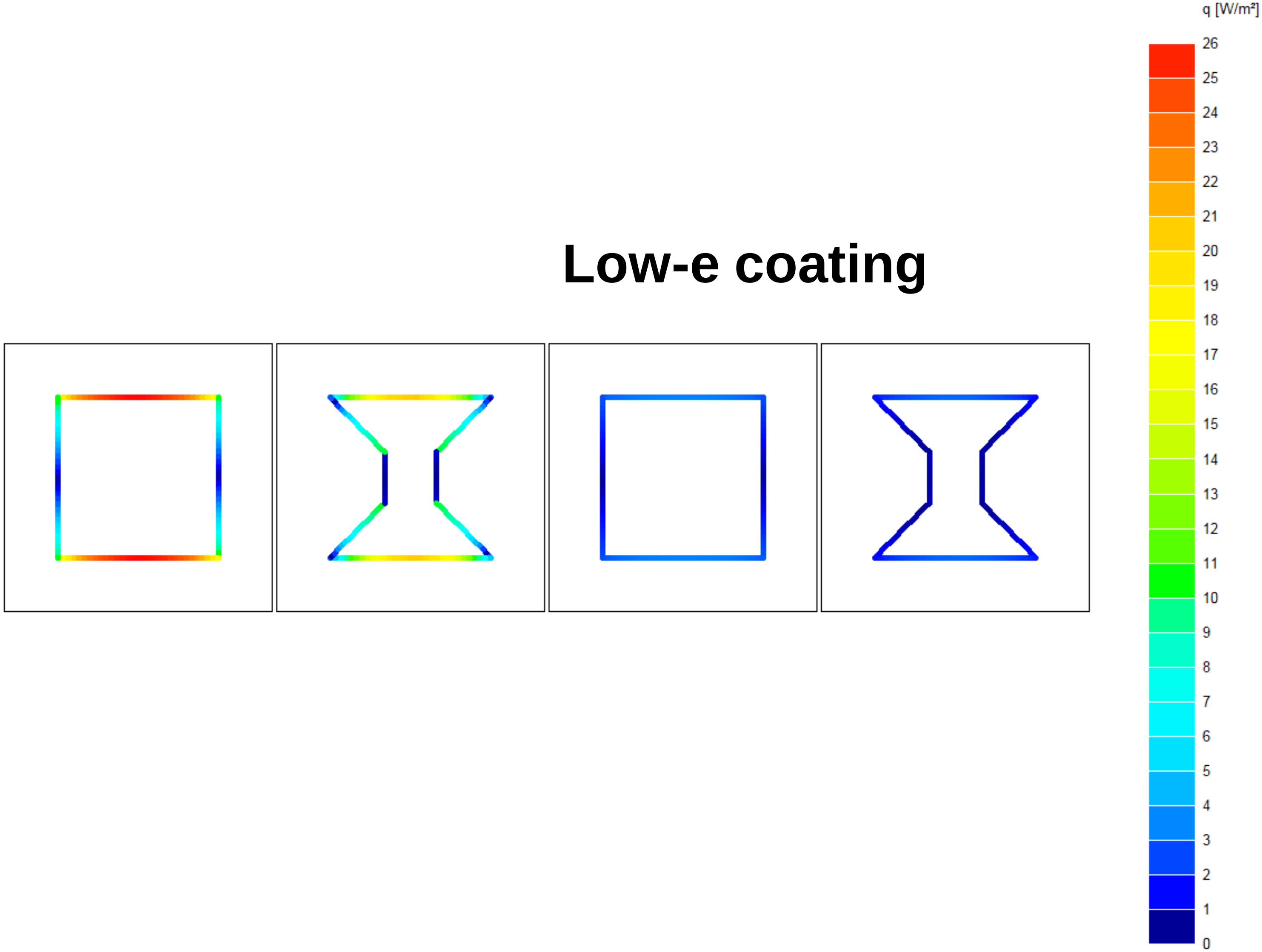
Straling en convectie

Low-e coating

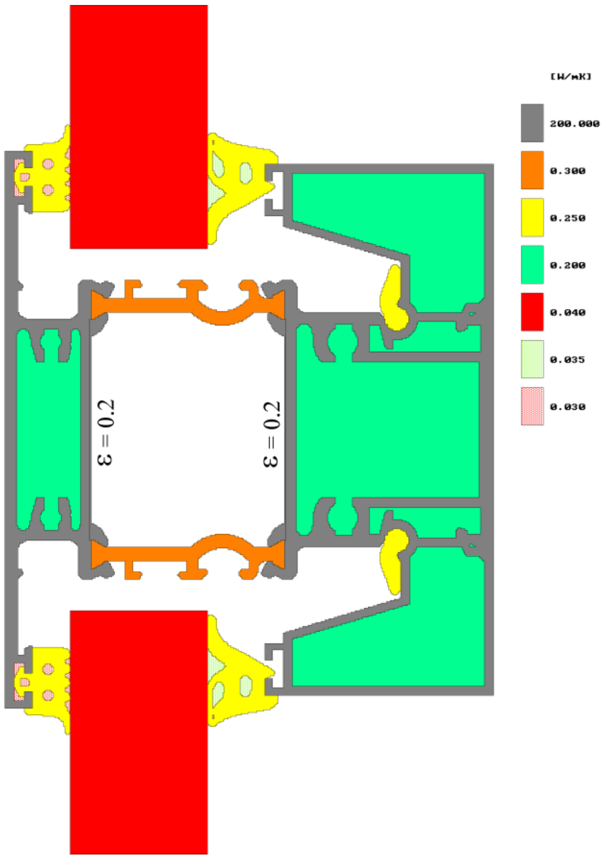


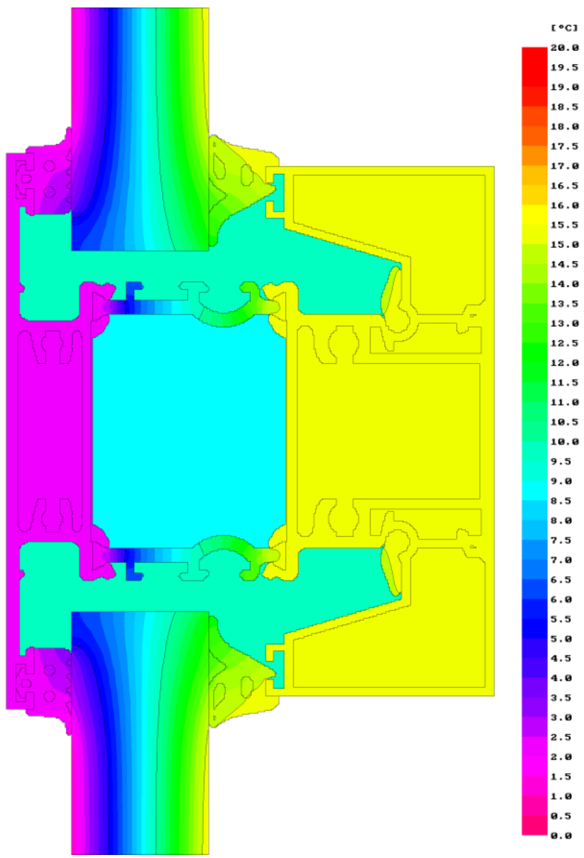
Straling en convectie

Low-e coating

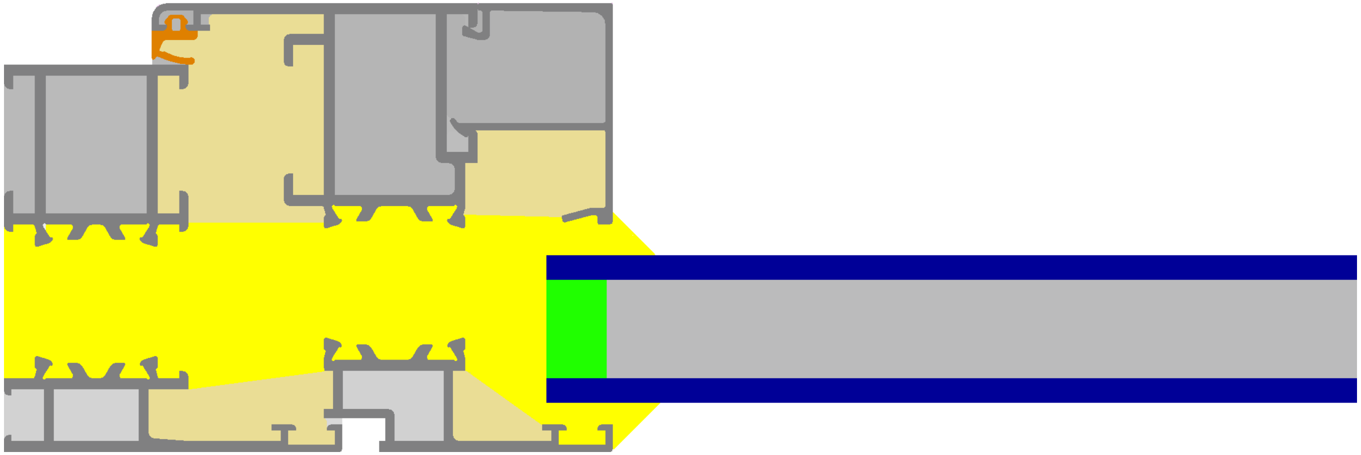


Low-e coating



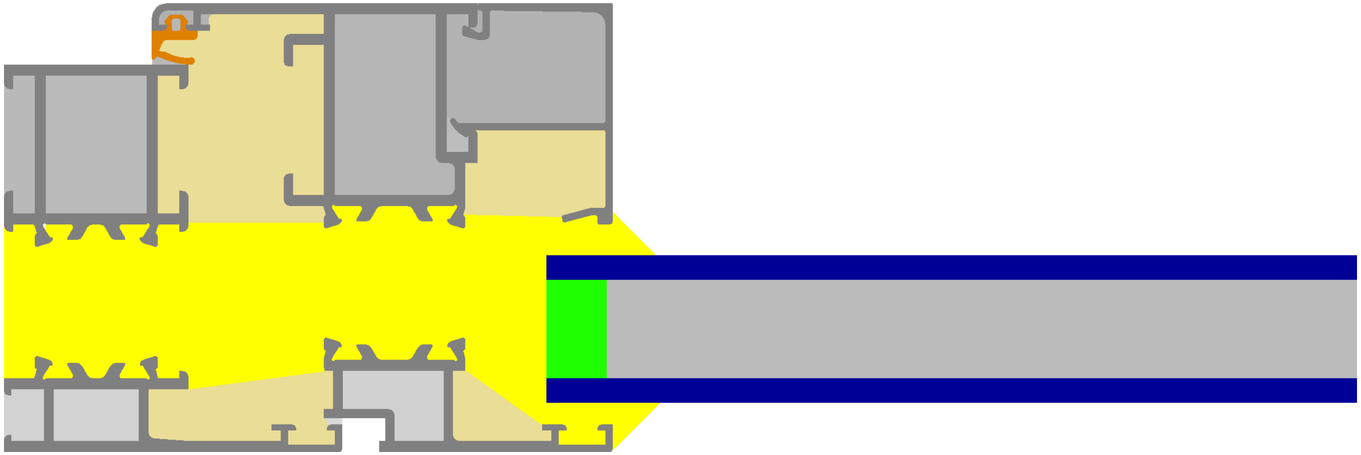


Optimaliseren Uf



Uit het vorige volgt dat het optimaliseren van de U_f-waarde moet gebeuren via het verminderen van de warmteoverdracht door geleiding, convectie en straling in de centrale gele zone, in de groene glasrandzone en in mindere mate in de beige randzones.

Optimaliseren Uf



Geleiding verminderen betekent: lage λ-waarde en hoge dikte.
Straling verminderen kan via een lagere emissiviteit en via compartimentering.
Convectie verminderen kan via compartimentering: in luchtholtes dunner dan ca. 16 mm is er geen convectie meer, maar geleiding.

Optimaliseren Uf

Aandachtspunten

Geleiding

Kunststoffen (polyamide e.a.) hebben een hogere λ-waarde dan de luchtspouwen; ze dienen m.a.w. om de thermische onderbreking te creëren eerder dan ze zelf de isolerende functie vervullen.

Straling en **convectie**

Voor luchtholtes dunner dan 16 mm staat de lucht stil; dit wil niet zeggen dat de equivalente λ-waarde van de luchtspouw dan 0.025 W/mK (λ-waarde van lucht) bedraagt. Er immers ook nog stralingswarmteoverdracht.

Zo is voor een holte van 10 mm x 10 mm $\lambda_{equivalent}$ = 0.055 W/mK.

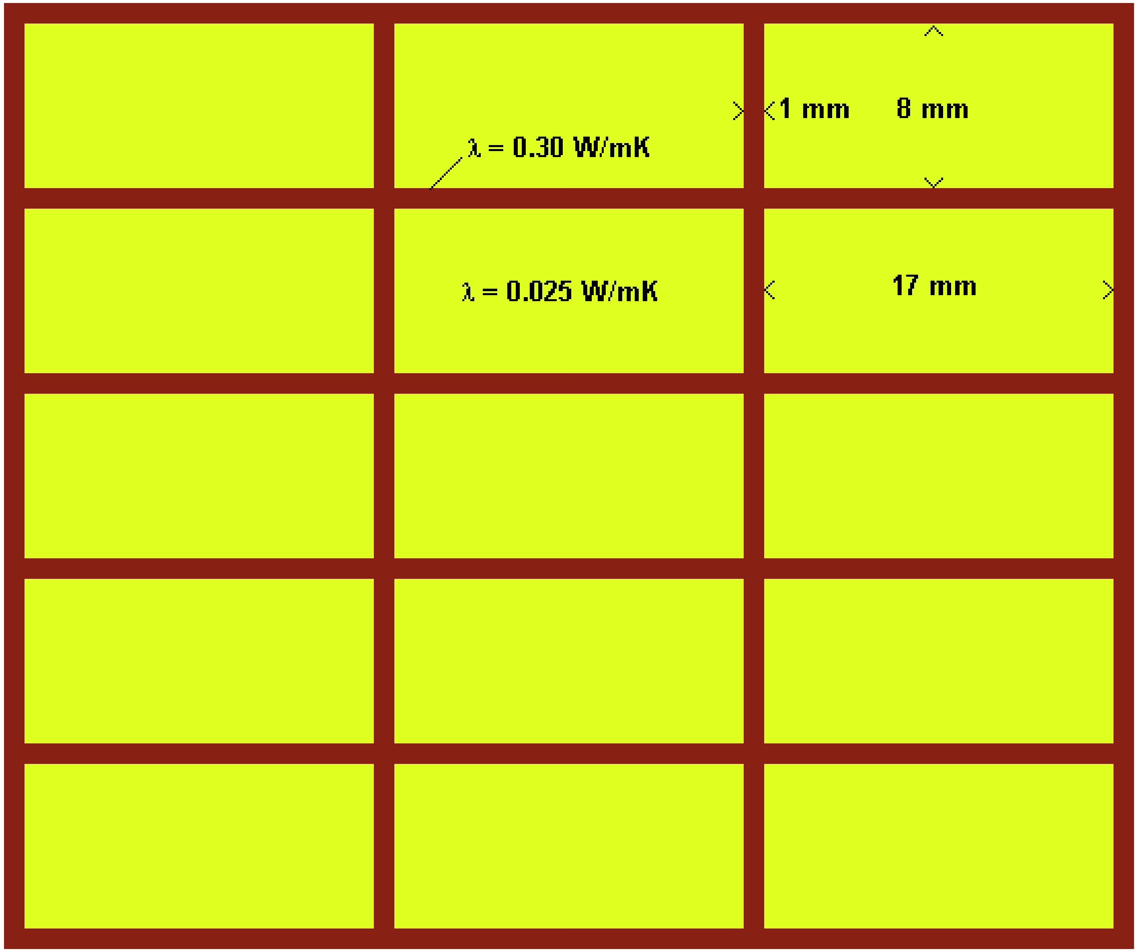
Naarmate de holte kleiner wordt vermindert de stralingsbijdrage in $\lambda_{equivalent}$.

Zo is voor een holte van 5 mm x 5 mm $\lambda_{equivalent}$ = 0.040 W/mK.

Het is derhalve zinvol luchtholtes <16 mm toe te passen.

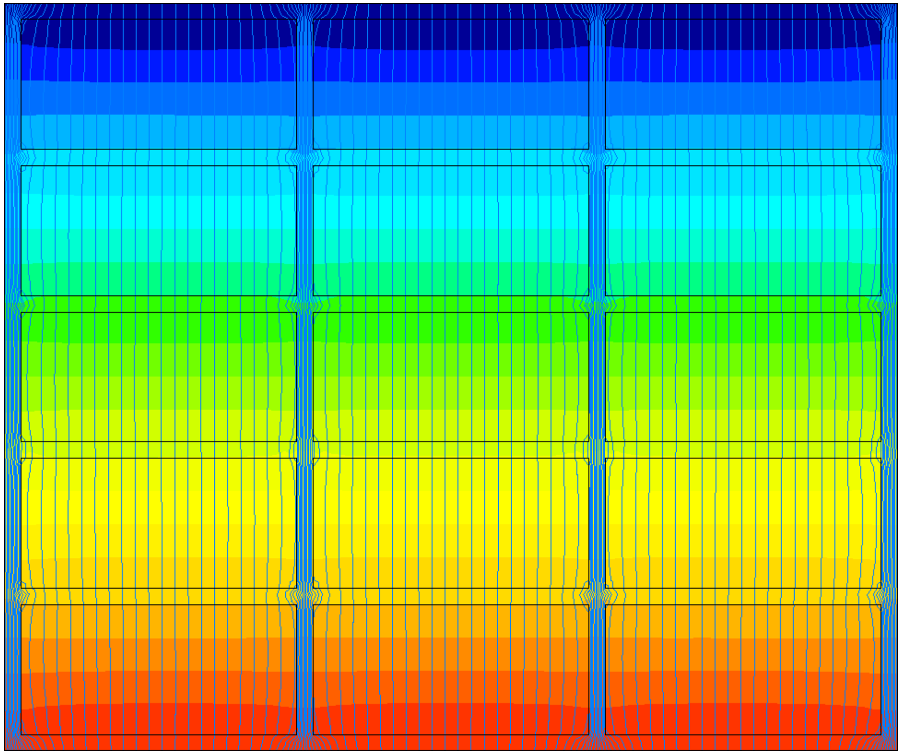
Optimaliseren Uf

koude zijde

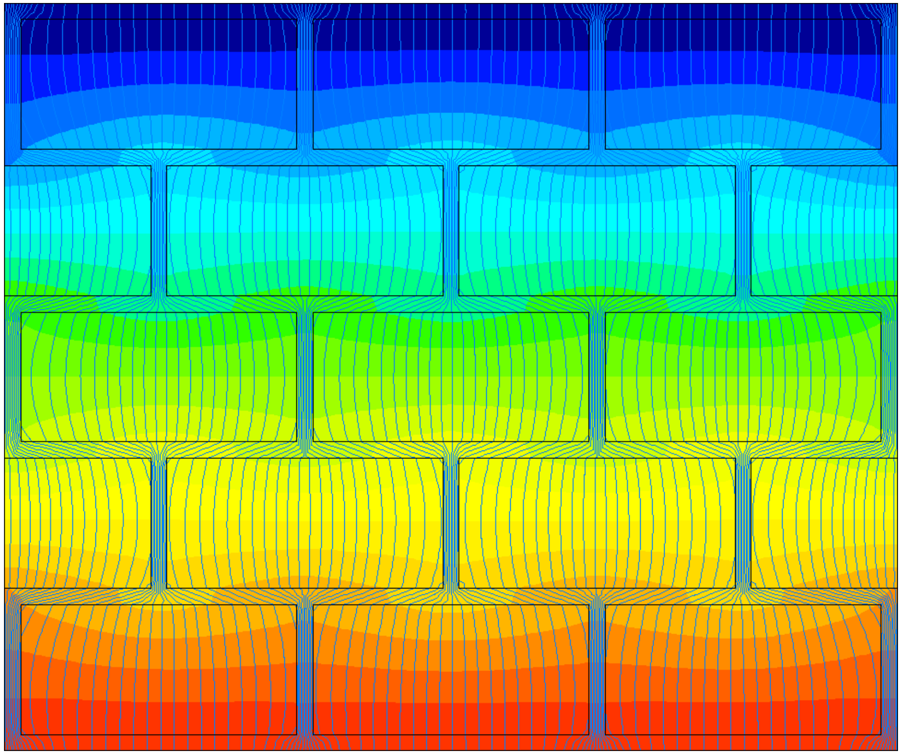


warme zijde

Optimaliseren Uf



Q = 1.17 W/m



Q = 1.03 W/m

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