CASCADIA
WINDOWS & DOORS

PASSIVE HOUSE MODELLING DATA

TECHNICAL DATA SHEET

Supplemental modelling data to be used in conjunction with official certifications, in support of user's PH project certification, when selecting composite and combination window and door configurations.

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PHOTO: Cheko'nien Passive House, University of Victoria

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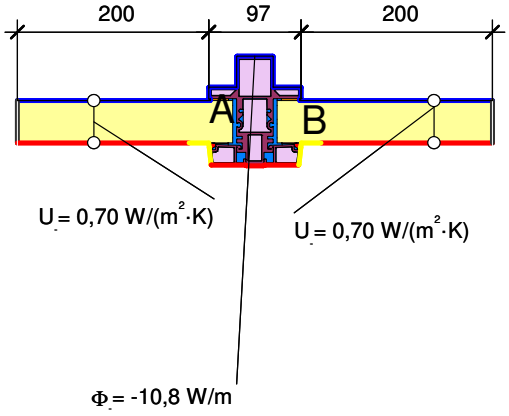


Report - Nr.:	15034407

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	fixed mullion
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

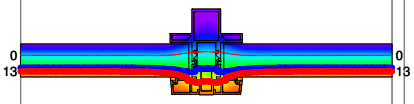
Profile	
Profiltype	mullion
Profilname	vertical mullion
Profile width	97 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

U_{fAB} = 0,841 W/(m²·K)

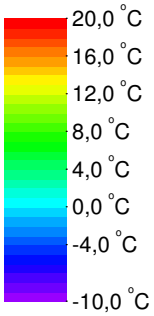
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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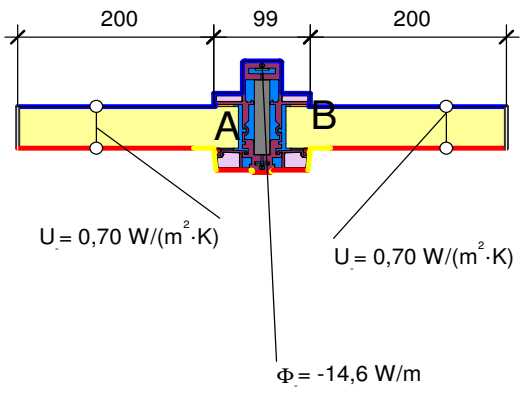
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034408

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	reinforced coupler mullion
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

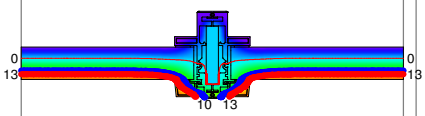
Profile	
Profiltype	mullion with reinforcement
Profilname	vertical coupler
Profile width	99 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f A,B}$ = 2,094 W/(m²·K)

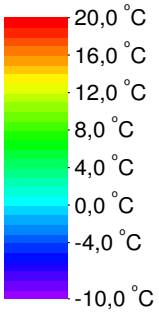
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
Unbelüftete Hohlräume, Eps=0.9	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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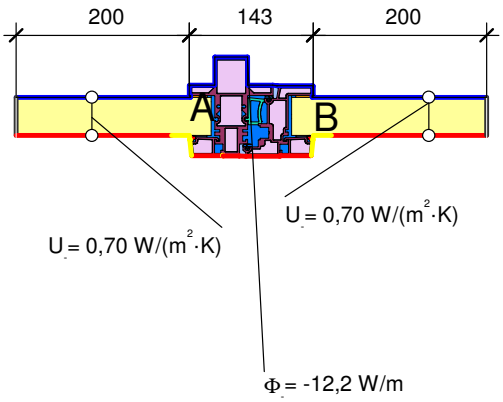
Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034408

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	inswing window
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

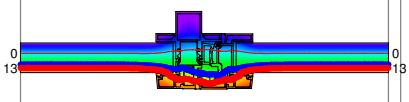
Profile	
Profiltype	window sash & mullion
Profilname	vertical mullion
Profile width	143 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{fA,B}$ = 0,884 W/(m²·K)

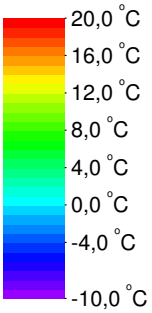
additioanal Informations:

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
EPDM (Ethylen Propylen Dien Monomer)	0,25
Glastape according PHI	0,060
Insulation WLG023	0,023
Nicht definiertes Material	0,010
Norm Paneel ISO 10077	0,035
Silicone	0,35
Unbelüftete Hohlräume	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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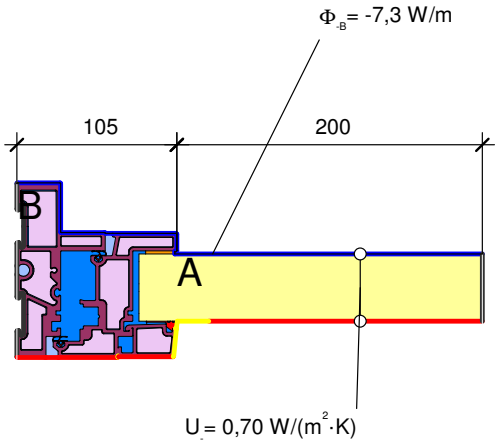
18.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034406

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	outswing window
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

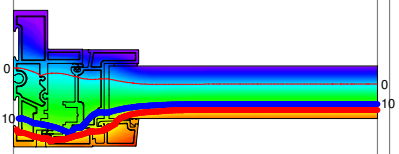
Profile	
Profiltype	window sash
Profilname	openable sash
Profile width	105 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f,A,B}$ = 0,971 W/(m²·K)

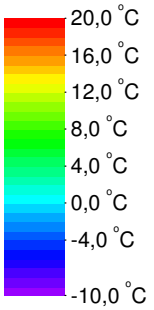
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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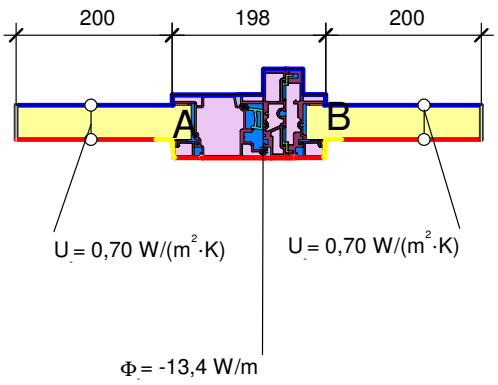
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034412

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General

Type	outswing universal Door
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile

Profiltype	Door to window coupler
Profilname	vertical coupler
Profile width	198 mm
Profilnumber	-
Main Material	Fiberglass

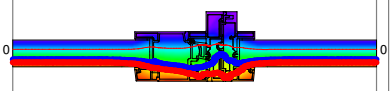
Filling

Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f A,B}$ = 0,839 W/(m²·K)

additioanal Informations:

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
EPDM (Ethylen Propylen Dien Monomer)	0,25
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9

20,0 °C
16,0 °C
12,0 °C
8,0 °C
4,0 °C
0,0 °C
-4,0 °C
-10,0 °C

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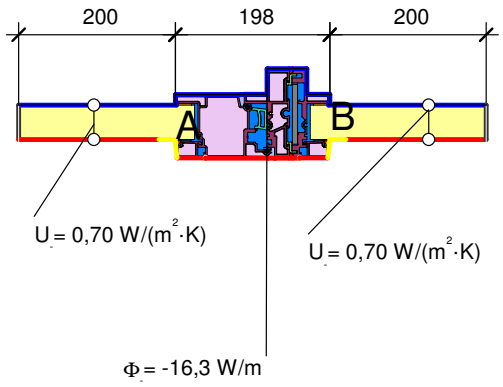
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034413

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General

Type	outswing universal Door
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile

Profiltype	Door sash
Profilname	vertical coupler
Profile width	198 mm
Profilnumber	-
Main Material	Fiberglass

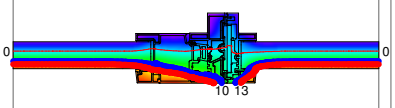
Filling

Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

U_{fAB} = 1,337 W/(m²·K)

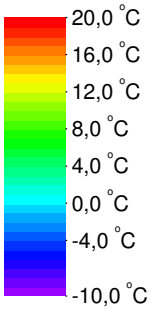
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
EPDM (Ethylen Propylen Dien Monomer)	0,25
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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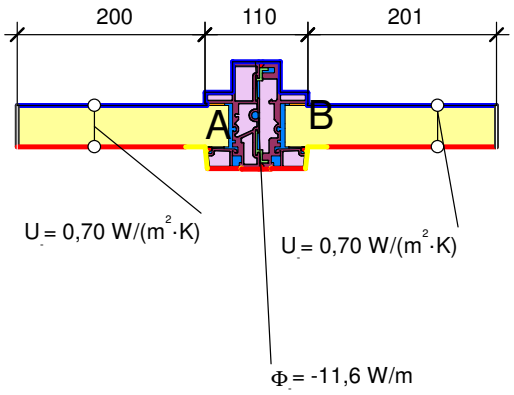
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034410

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General

Type	window frame to coupler
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile

Profiltype	window frame & coupler
Profilname	vertical coupler
Profile width	110 mm
Profilnumber	-
Main Material	Fiberglass

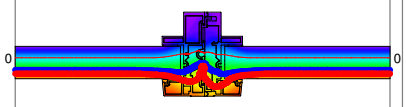
Filling

Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f,A,B}$ = 0,975 W/(m²·K)

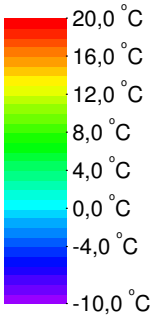
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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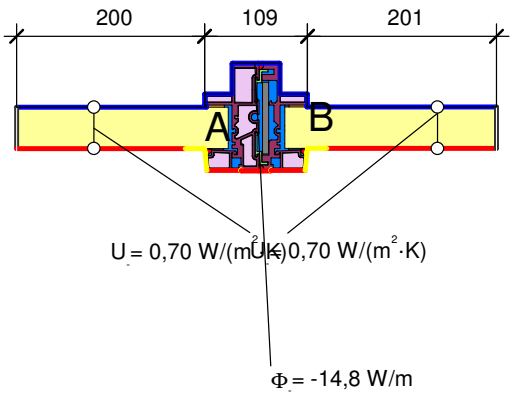
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.:	15034411

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	window frame to coupler
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

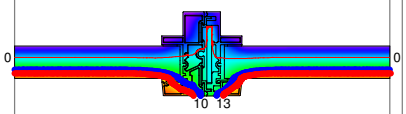
Profile	
Profiltype	window frame & coupler
Profilname	vertical coupler
Profile width	109 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f A,B}$ = 1,929 W/(m²·K)

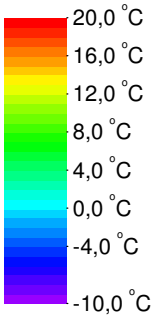
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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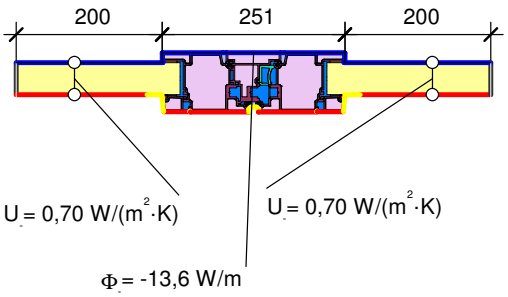
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034405

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	outswing universal Door
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile	
Profiltype	Door sash & astragal
Profilname	Door Astragal
Profile width	251 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

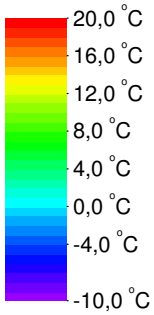
U_f = 0,694 W/(m²·K)

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:

Randbedingung	q[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
EPDM (Ethylen Propylen Dien Monomer)	0,25
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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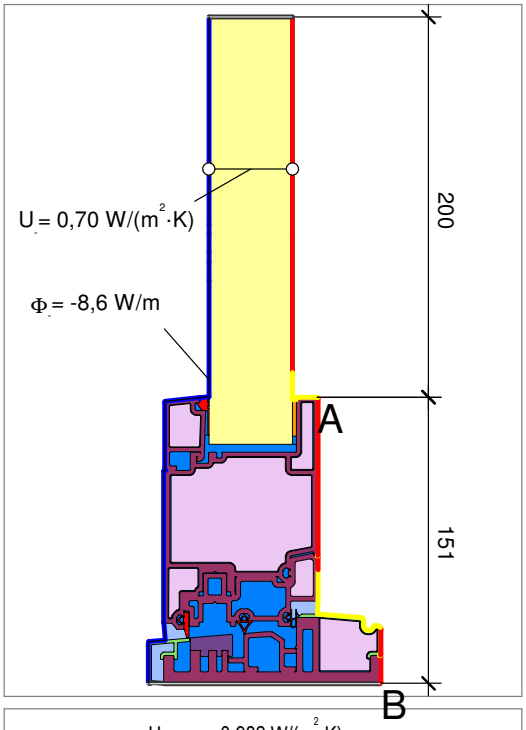
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



U_{fAB} = 0,982 W/(m²·K)

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

Report - Nr.: 15034404

Producer:

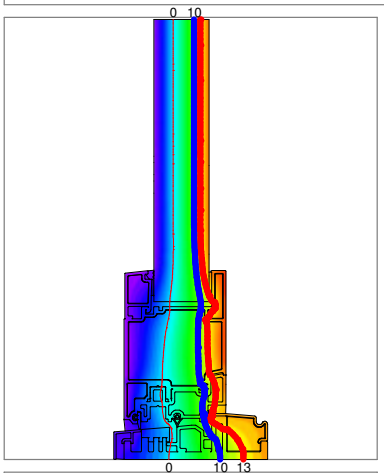
Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	outswing universal Door
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile	
Profiltype	Door bottom
Profilname	Door Sill
Profile width	151 mm
Profilnumber	-
Main Material	Fiberglass

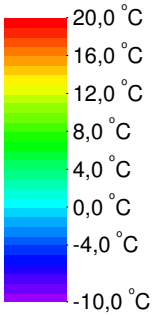
Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
HD-Polyethylen	0,50
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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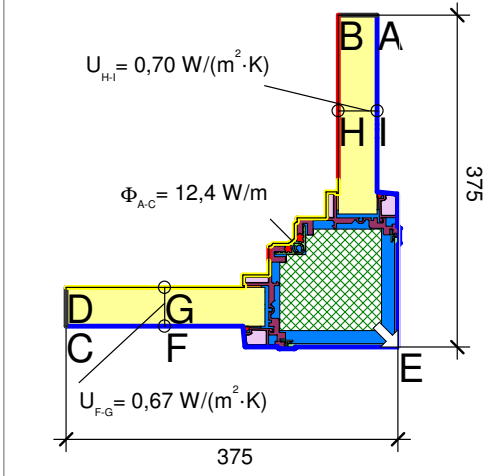
17.07.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



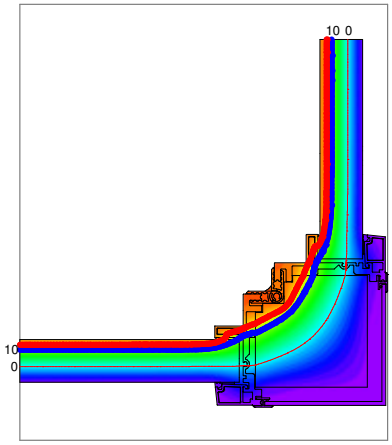
Report - Nr.: 15034414

Producer:	
Cascadia Windows Ltd. #101 - 5350B 275 Street Langley, BC, Canada	
General	
Type	outside corner
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing
Profile	
Profiltype	window coupler
Profilname	corner post
Profile width	...
Profilnumber	-
Main Material	Fiberglass
Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$\Psi_{A-E-C,*}$ = **-0,100 W/(m·K)**

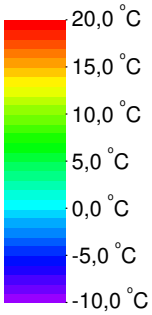
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Mineral wool	0,040
Norm Paneel ISO 10077	0,035
Silicone	0,35
Unbelüftete Hohlräume	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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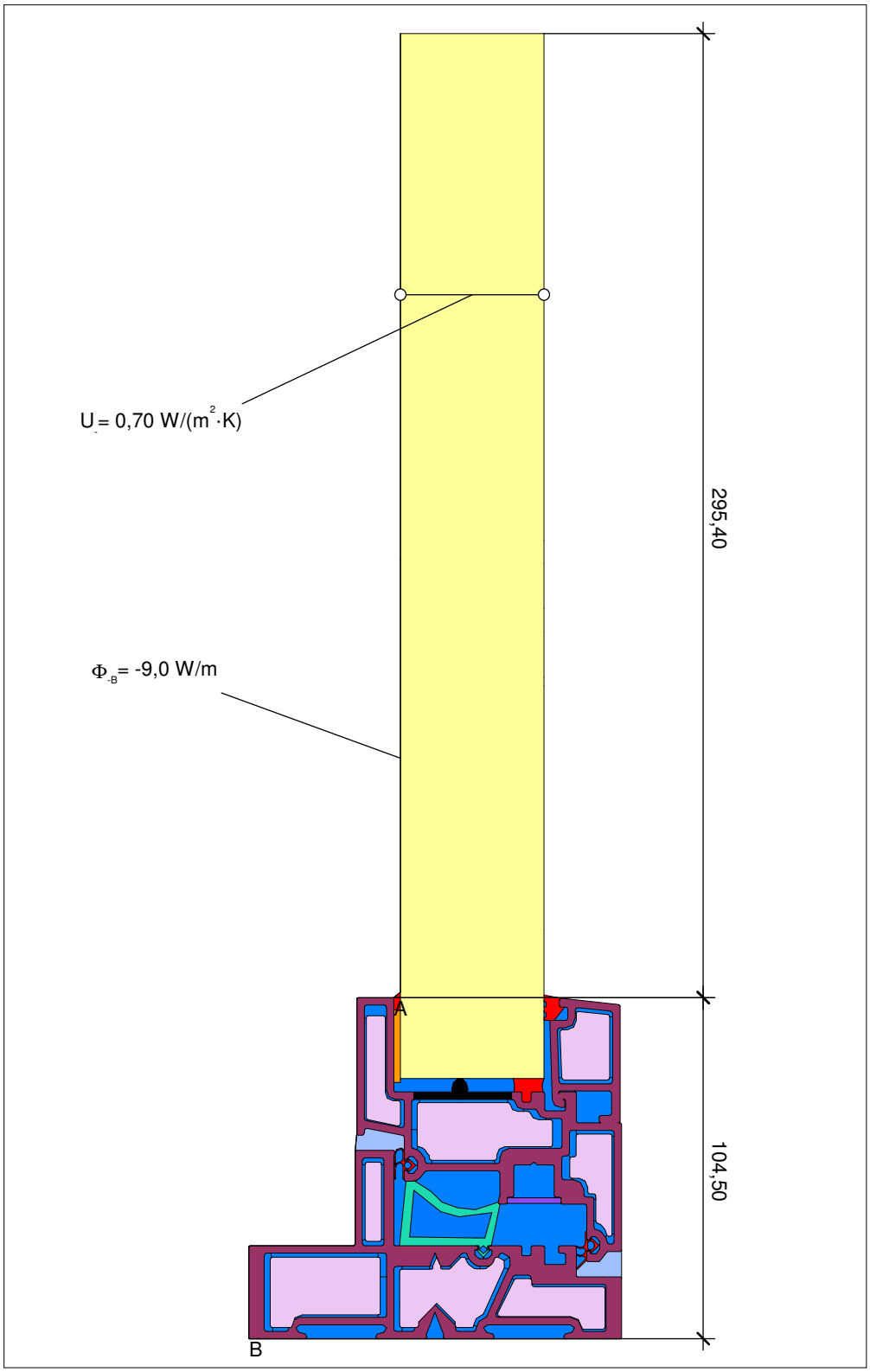
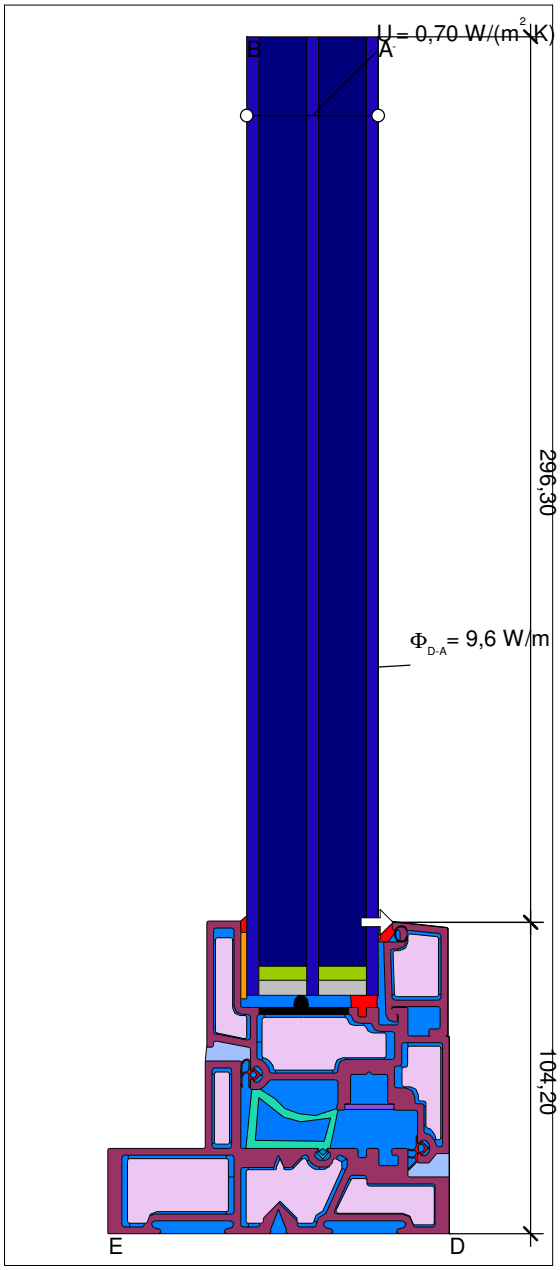
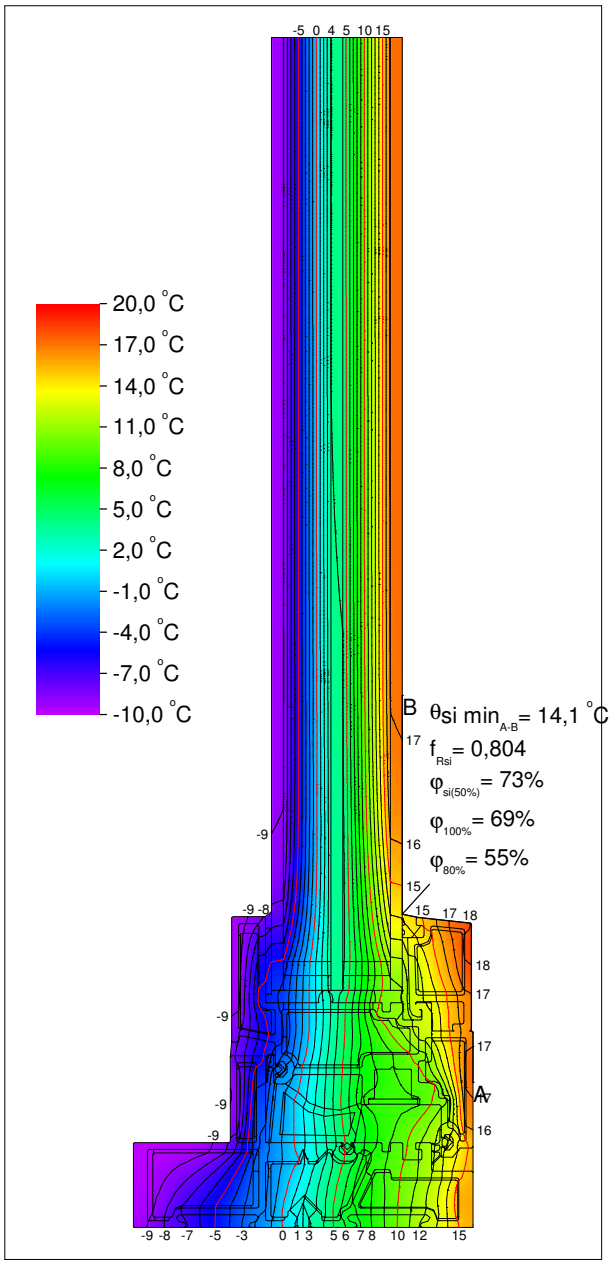
18.07.2019



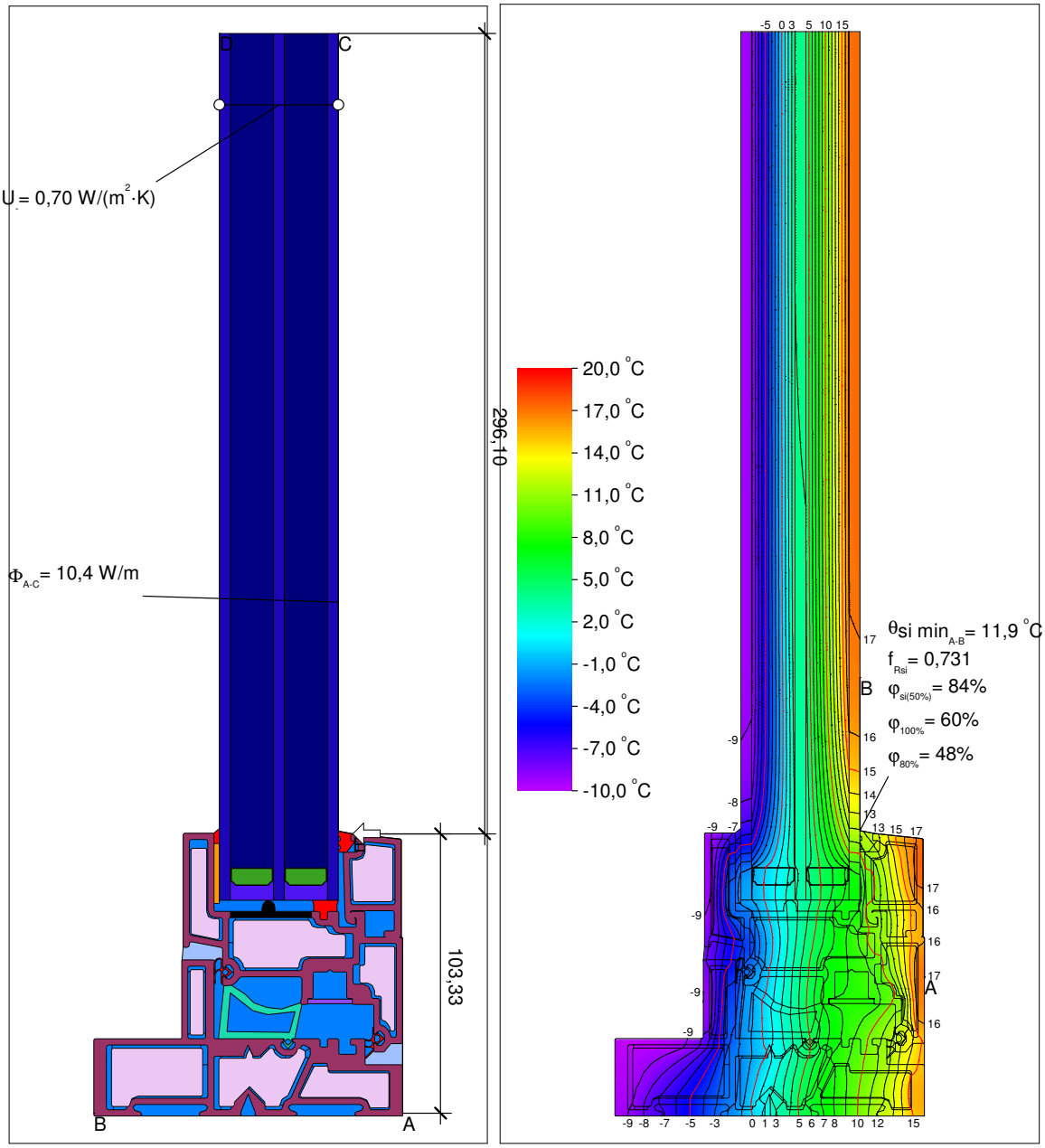
$$U_{f\,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{8,965}{30,000} - 0,701 \cdot 0,295}{0,105} = 0,879\ W/(m^2 \cdot K)$$





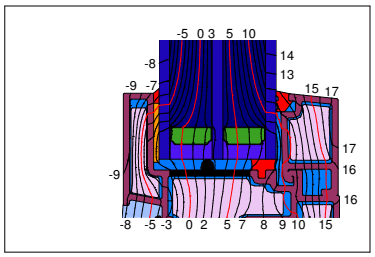
$$\Psi_{D\text{-}C\text{-}A,\cdot} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{9{,}597}{30{,}000} - 0{,}879 \cdot 0{,}104 - 0{,}700 \cdot 0{,}296 = 0{,}021 \text{ W/(m·K)}$$

Superspacer Tri Seal - Edgetec

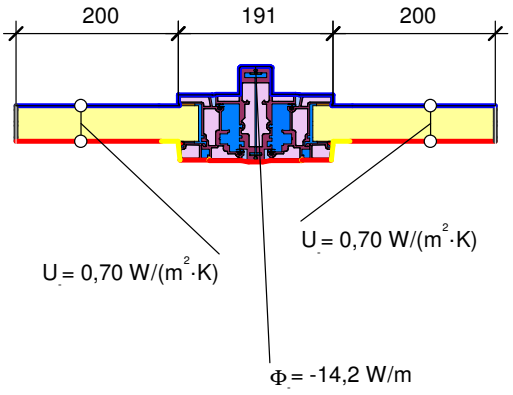


$$\psi_{A\text{-}E\text{-}C,\,\cdot} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{10{,}379}{30{,}000} - 0{,}879 \cdot 0{,}103 - 0{,}700 \cdot 0{,}296 = 0{,}048 \text{ W/(m·K)}$$

Stainless Steel Spacer



Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.: 15034415

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General

Type	outswing window
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

Profile

Profiltype	sash-coupler-sash
Profilname	vertical coupler
Profile width	191mm
Profilnumber	-
Main Material	Fiberglass

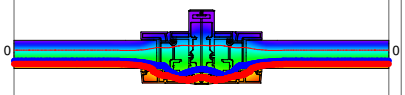
Filling

Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

U_f = 1,013 W/(m²·K)

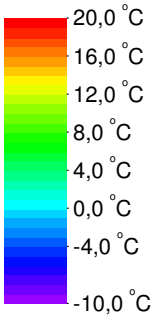
Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Unbelüftete Hohlräume, Eps=0.9	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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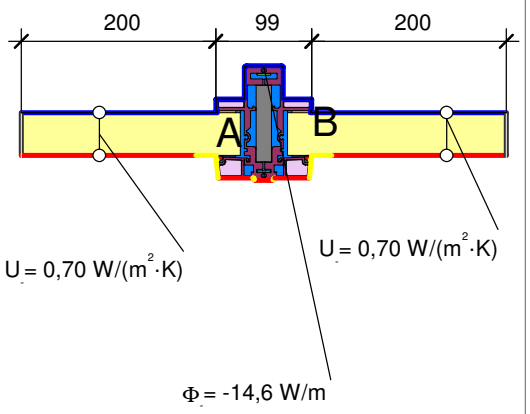
22.03.2020

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.:	15034408- Var

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	reinforced coupler mullion - Var
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

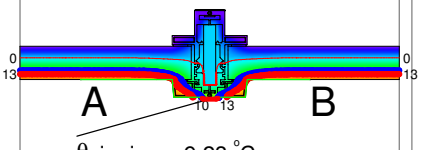
Profile	
Profiltype	mullion with reinforcement
Profilname	vertical coupler
Profile width	99 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

$U_{f A,B}$ = 2,094 W/(m²·K)

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

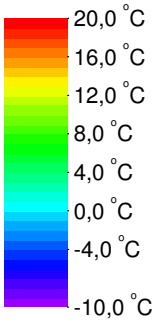
additioanal Informations:



$\theta si\ min_{A-B}$ = 9,23 °C
f_{Rsi} = 0,641
$\varphi_{si(50\%)}$ = 100%

Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
Unbelüftete Hohlräume, Eps=0.9	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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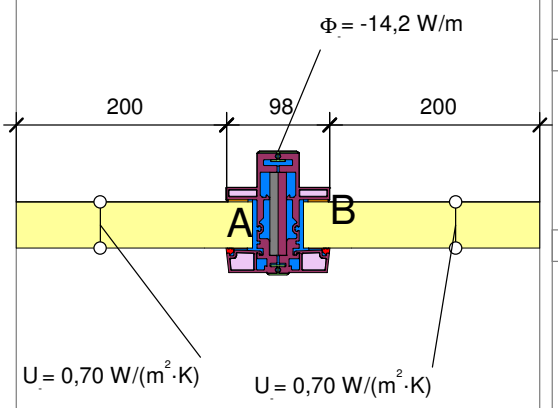
01.12.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



Report - Nr.:	15034408- Var

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General	
Type	reinforced coupler mullion - Var
Systemtype	Fiberglass
System	Development 01
Subsystem I	Version 2019
Subsystem II	44 mm glaczing

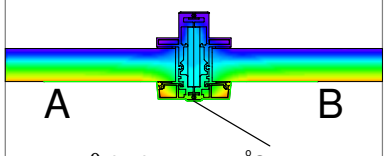
Profile	
Profiltype	mullion with reinforcement
Profilname	vertical coupler
Profile width	99 mm
Profilnumber	-
Main Material	Fiberglass

Filling	
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

U_f = 1,977 W/(m²·K)

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

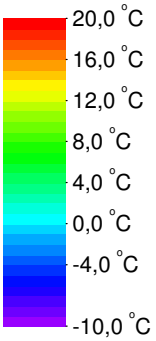
additioanal Informations:



$\theta si\ min_{A-B}$ = 9,92 °C
f_{Rsi} = 0,664
$\varphi_{si(50\%)}$ = 96%

Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
Aluminum	160
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Steel	60
Unbelüftete Hohlräume, Eps=0.9	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
unventilated cavity	Eps=0,9/0,9



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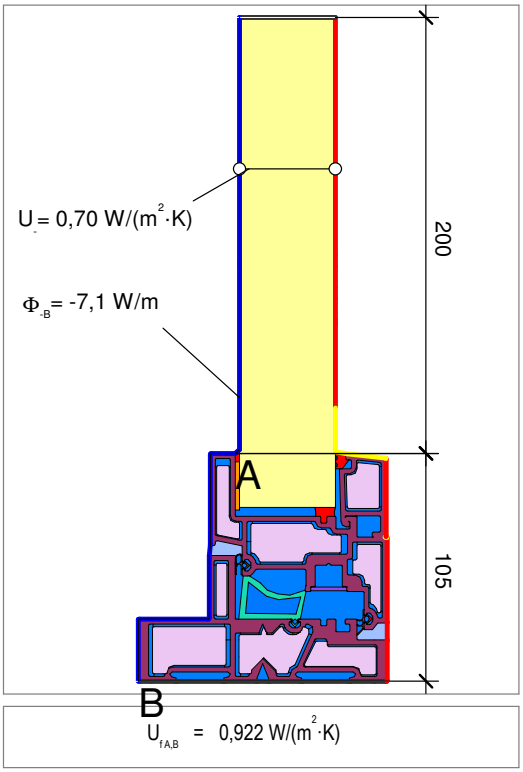
01.12.2019

Ermittlung des U_{frame} von Fensterprofilen nach DIN EN ISO 10077- Teil 2



$U_{f A,B}$ = 0,922 W/(m²·K)

Die Wärmeleitfähigkeiten der verwendeten Materialien entsprechend EN ISO 10077-2 bzw. EN ISO 10456. Andere Bemessungswerte der Wärmeleitfähigkeiten wurden vom Auftraggeber übermittelt.

Report - Nr.: 1503xxxx

Producer:

Cascadia Windows Ltd.
#101 - 5350B 275 Street
Langley, BC, Canada

General

Type	outswing universal Door
Systemtype	Fiberglass
System	Development 01
Subsystem I	Draft
Subsystem II	44 mm glaczing

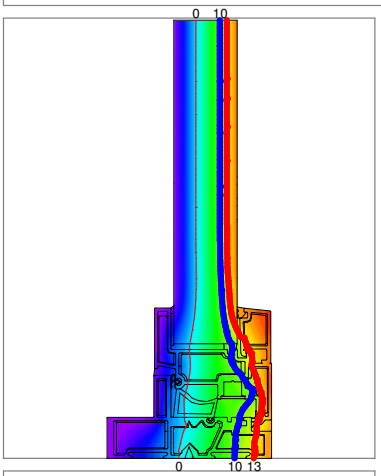
Profile

Profiltype	bottom window
Profilname	Window inswing
Profile width	105 mm
Profilnumber	-
Main Material	Fiberglass

Filling

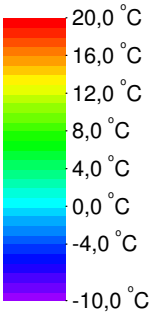
Thickness	44 mm
fitting depth	25 mm
Type od filling	Paneel WLG 035

additioanal Informations:



Randbedingung	g[W/m²]	θ[°C]	R[(m²·K)/W]
Aussen, Standard		-10	0,040
Innen Fensterrahmen Reduziert		20	0,20
Innen Fensterrahmen Standard		20	0,13
Symmetrie/Bauteilschnitt	0,0		

Material	λ[W/(m·K)]
EPDM (Ethylen Propylen Dien Monomer)	0,25
Glastape according PHI	0,060
Insulation WLG023	0,023
Norm Paneel ISO 10077	0,035
Silicone	0,35
Silikone WLG 5	0,50
Steel	60
Unbelüftete Hohlräume	Eps=0,9/0,9
X- Cascadia - Fibreglas WLG 33	0,33
slightly ventilated cavity	Eps=0,9/0,9
unventilated Space	Eps=0,9/0,9
unventilated cavity	Eps=0,9/0,9



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06.10.2020

CASCADIA WINDOWS & DOORS

RDH BUILDING SCIENCE

RDH Building Science Inc.
4333 Still Creek Drive #400
Burnaby, BC V5C 6S6

Making Buildings Better™

TO **Michael Bousfield**
EMAIL **mbousfield@cascadiawindows.com**
Cascadia Windows Ltd.
101 - 5350B 275th Street
Langley, BC V4W 0C1

R-03565.314
Cascadia Windows Ltd.
Thermal Simulation

DATE October 25, 2023

REGARDING **Cascadia Window Wall Passive House Thermal Bridging Analysis**

Dear Mr. Bousfield,

As requested by Cascadia Windows Ltd. (Cascadia), RDH Building Science (RDH) is pleased to provide you with this report for a thermal performance assessment of the Cascadia window wall details in support of the Coal Harbour Project in Vancouver, BC.

1 Introduction

The Cascadia window wall system, shown in Figure 1, has been proposed for the ongoing Coal Harbour project in Vancouver, BC. As this project aims to achieve Passive House certification, the different thermal implications of all significant details must be known for use in the Passive House Planning Package (PHPP) energy modeling tool and for reporting to the Passive House certifier. Cascadia retained RDH to conduct a thermal assessment of the Cascadia window wall system, to determine the impact of the linear thermal bridging related to the site specific installation detailing of the system. This analysis was performed on seven window wall system interface details, as shown in Appendix A.

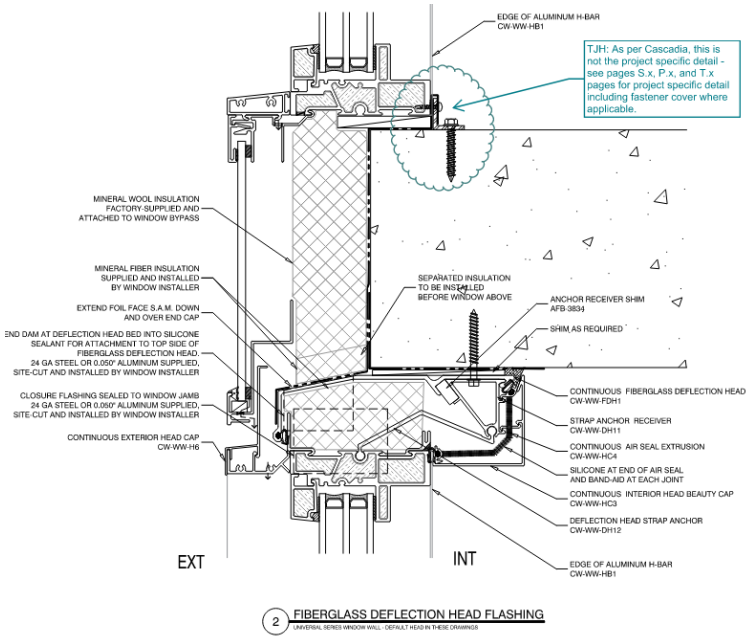

Figure 1: General Cascadia Window Wall Configuration

RDH BUILDING SCIENCE

RDH Building Science Inc.
4333 Still Creek Drive #400
Burnaby, BC V5C 6S6

2 Analysis Methodology

This thermal analysis was primarily conducted to determine the associated Psi-Values of the seven noted project details. The analysis was performed using 2-D thermal simulations using the Flixo software package, and following *ISO 10211* and Passive House conventions for all boundary conditions and modelling procedures within *THERMAL BRIDGES TO AMBIENT AIR Calculation documentation for Passive House Building Certification*.

The model geometry and materials were based on the project shop drawing submittal #08 43 00-1.2, dated 06/6/2023, CAD drawings and other information provided by Cascadia. The locations of these details on the building are noted in the provided shop drawings. Material thermophysical properties, design parameters and boundary conditions for each detail can be found in Appendix A.

The PH standard also requires accounting for minimum interior surface temperatures (f_{Rsi}), at installation interfaces. For these additional simulations, an interior air film resistance of 0.25 m²·K/W was used, as per Passive House conventions.

3 Simulated Results

The thermal bridging values Psi-Values and f_{Rsi} values were determined for the evaluated installation detail interfaces and are summarized below in Table 3.1. Adjacent construction U-values used in the analysis are noted with each detail result in Appendix A.

TABLE 3.1 THERMAL PERFORMANCE SUMMARY

Component	Psi-value W/m·k (BTU/hr·ft·°F)	f_{Rsi}	T_{min} [1] °C (°F)	$T_{min\ design}$ [2] °C (°F)
Typical Inside corner	0.080 (0.046)	0.74	12.0 (53.6)	14.2 (57.6)
Typical outside corner	0.072 (0.042)	0.72	11.7 (53.2)	13.8 (56.8)
Typical outside slab bypass corner	-0.077 (-0.044)	0.80	14.1 (57.4)	15.9 (60.6)
Typical vertical backpan coupler	0.070 (0.040)	0.85	15.5 (59.9)	17.1 (62.8)
Typical horizontal backpan coupler	0.068 (0.039)	0.85	15.5 (59.9)	17.1 (62.8)
Typical slab by-pass	0.327 (0.189)	0.91	17.2 (63.0)	18.6 (65.5)
Typical head at parapet	0.065 (0.038)	0.74	12.2 (54.0)	14.2 (57.6)

[1] *Calculated for PHI standard boundary condition temperatures of -10°C exterior and 20°C interior.*
[2] *Calculated for the 99% winter design temperature for the project locations of Vancouver, BC of -5°C exterior and 21°C interior.*

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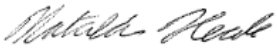
4 Closure

We trust this report meets your needs currently for the key thermal bridging values of the Cascadia window wall system for the Coal Harbour project. Please do not hesitate to contact us with any questions you might have.

Yours truly,



Natasha Neale
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Reviewed by
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RDH Building Science Inc.

encl.

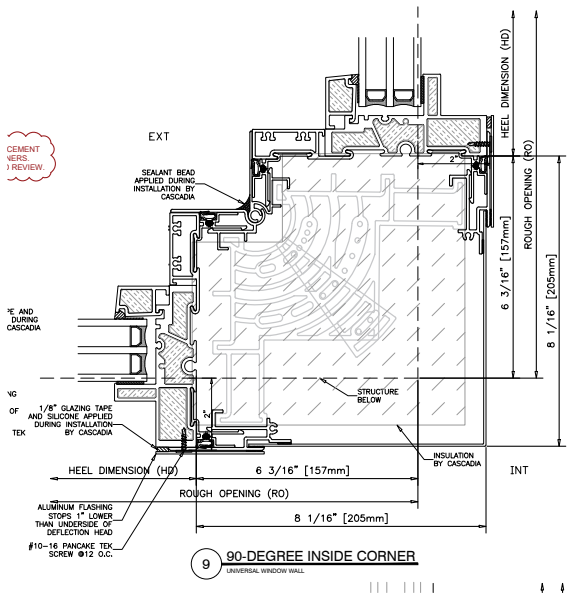
Appendix A – Simulated Details & Model Outputs

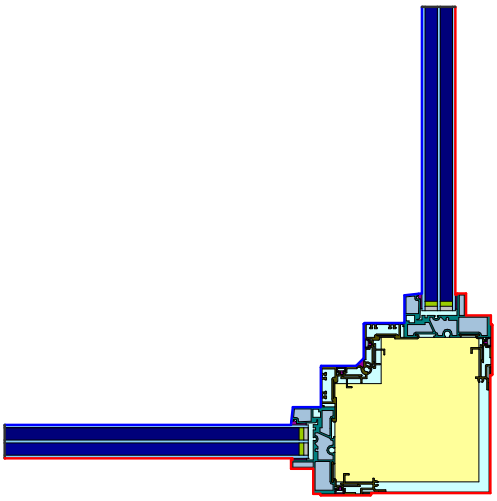
CASCADIA WINDOWS & DOORS

Appendix A

Simulated Details & Model Outputs

TYPICAL INSIDE CORNER MODEL INFORMATION





Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
BASF Neopor F5300 Plus	0.029
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Gasfillin(1)	0.022
Gasfillin(1)	0.022
Gasfillin(1)	0.022
Gasfillin(1)	0.022
PU (polyurethane) foam	0.050
Silicone (1)	0.350
Soda lime (1)	1.000
TwoBox1	0.400
TwoBox2 Super Spacer TriSeal T Spacer Premium	0.150
Unventilated air cavity (1) *	

* Simplified approach

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Drawing is not to be scaled. Details are assessed for thermal transmittance only and not with respect to other building enclosure functions such as moisture control, air leakage, and durability

PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.3

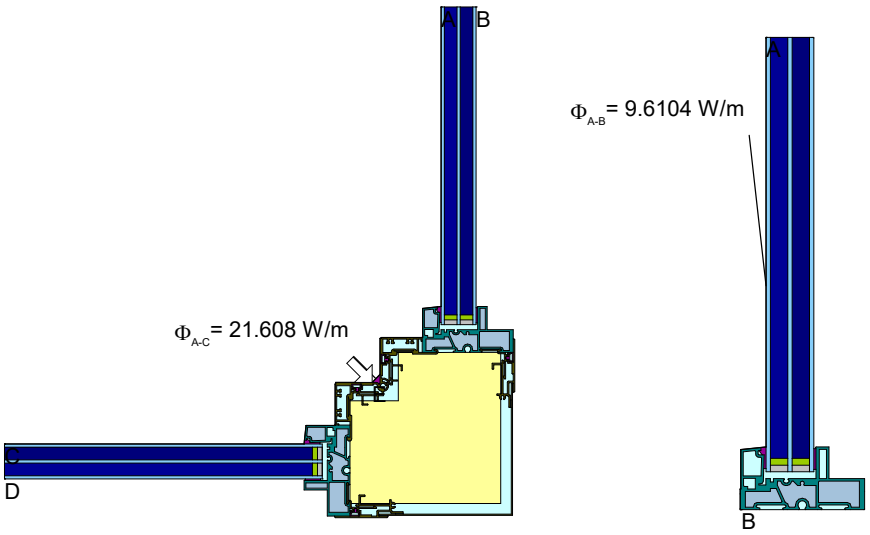
DRAWING TITLE: TYPICAL INSIDE CORNER MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

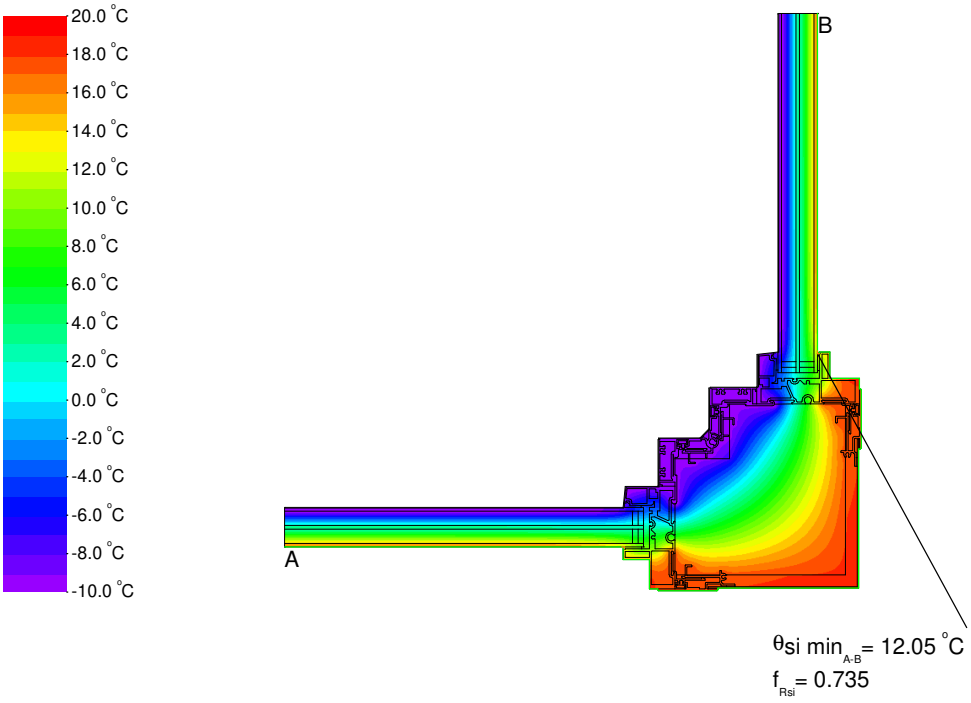
TYPICAL INSIDE CORNER PSI-VALUE CALCULATION



$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - \frac{\Phi_2}{\Delta T} = \frac{21.608}{30.0} - \frac{9.61}{30.0} - \frac{9.61}{30.0} = 0.080\ \text{W/(m·K)}$$

RDH Making Buildings Better™	PROJECT: CASCADIA THERMAL SIMULATION		DRAWING NO.: P.3
	DRAWING TITLE: TYPICAL INSIDE CORNER PSI-VALUE CALCULATION		PROJECT NO.: 3565.314
224 WEST 8th AVENUE VANCOUVER BC V5Y 1N5 www.RDH.com TEL 604 873 1181	ISSUE: 1	DESCRIPTION: SCHEMATIC DESIGN	DATE: MMM.DD.201Y
			SCALE: NTS
			DATE: 2023-10-19
Drawing is not to be scaled. Details are assessed for thermal transmittance only and not with respect to other building enclosure functions such as moisture control, air leakage, and durability			MODELLED BY: BGUO
			CHECKED BY: DHAALAND
			VERSION: 8.2.1169.1

TYPICAL INSIDE CORNER FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.3

DRAWING TITLE: TYPICAL INSIDE CORNER FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
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DATE: 2023-10-19
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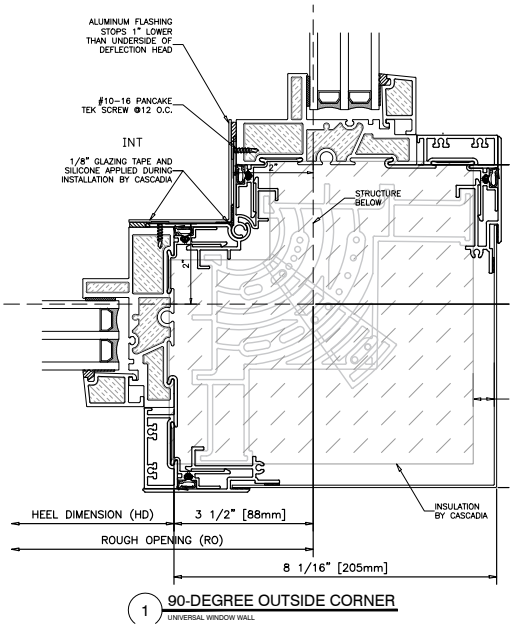
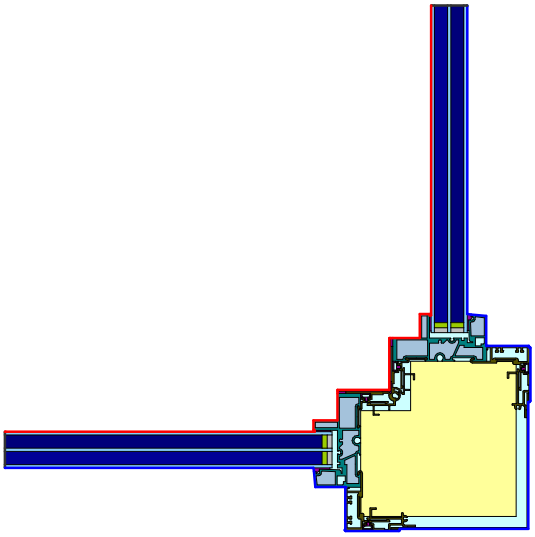
TYPICAL OUTSIDE CORNER MODEL INFORMATION





Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
BASF Neopor F5300 Plus	0.029
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Gasfillin(1)	0.022
Gasfillin(1)	0.022
Gasfillin(1)	0.022
Gasfillin(1)	0.022
PU (polyurethane) foam	0.050
Silicone (1)	0.350
Soda lime (1)	1.000
TwoBox1	0.400
TwoBox2 Super Spacer TriSeal T Spacer Premium	0.150
Unventilated air cavity (1) *	

* Simplified approach

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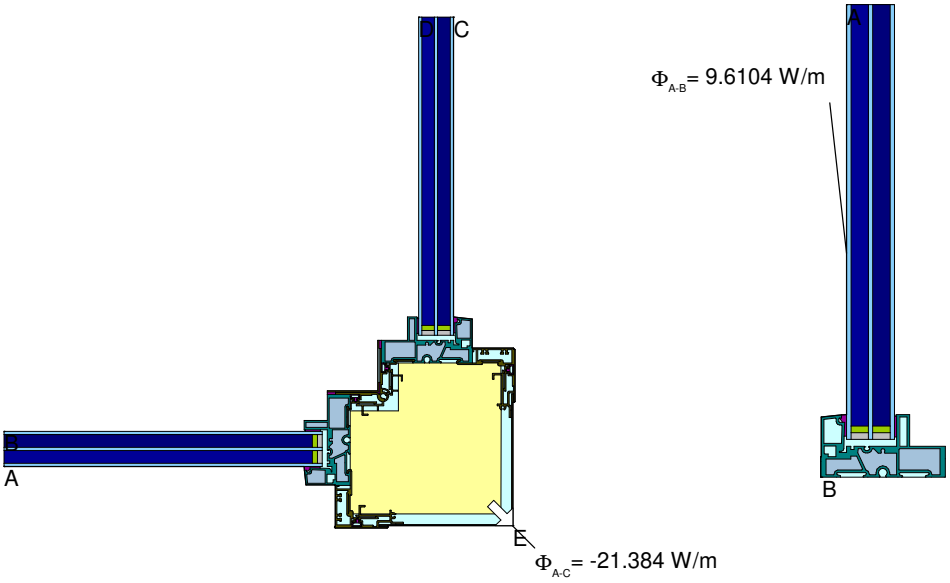
TYPICAL OUTSIDE CORNER PSI-VALUE CALCULATION



$$\psi_{A\text{-}E\text{-}C,\,\cdot} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - \frac{\Phi_2}{\Delta T} = \frac{21.384}{30.0} - \frac{9.61}{30.0} - \frac{9.61}{30.0} = 0.072\ \text{W/(m·K)}$$

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DRAWING NO.: P.1

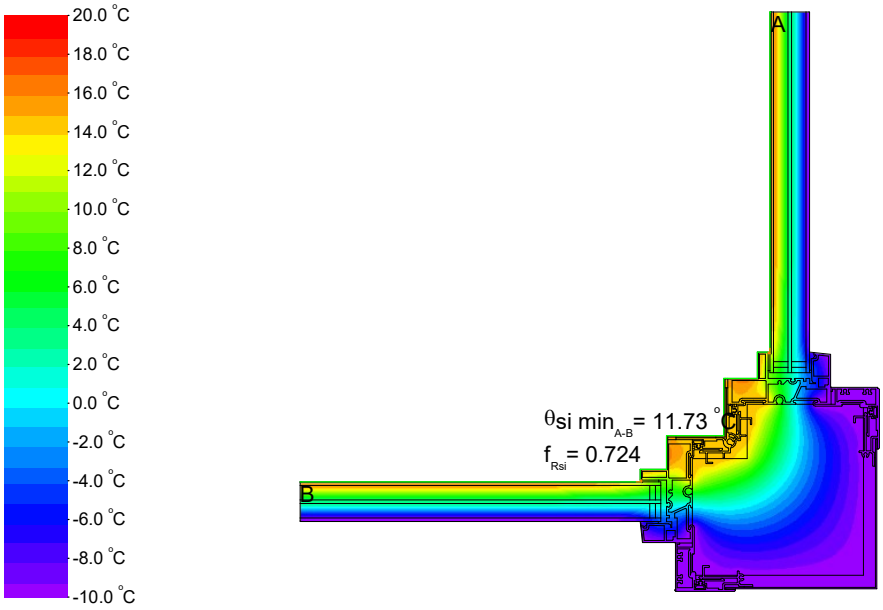
DRAWING TITLE: TYPICAL OUTSIDE CORNER PSI-VALUE CALCULATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL OUTSIDE CORNER FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.1

DRAWING TITLE: TYPICAL OUTSIDE CORNER FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
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SCALE: NTS
DATE: 2023-10-19
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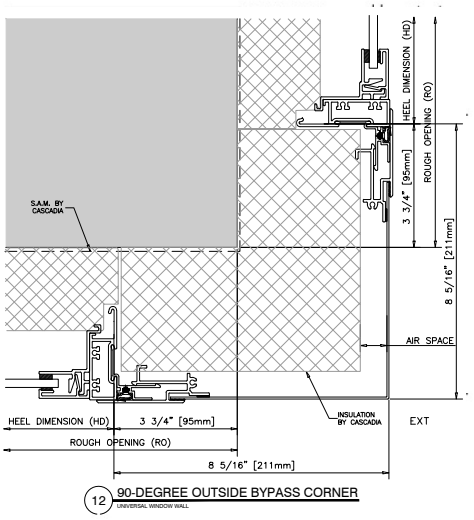
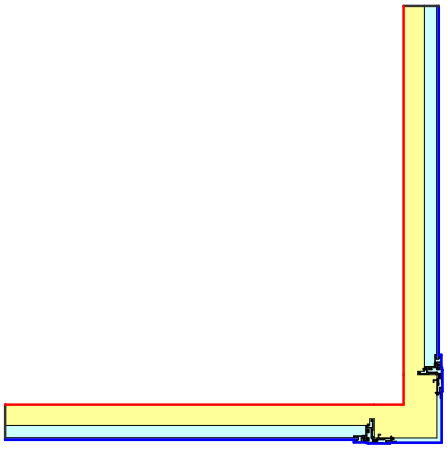
TYPICAL OUTSIDE SLAB BY-PASS CORNER MODEL INFORMATION



12 90-DEGREE OUTSIDE BYPASS CORNER
UNIVERSAL WINDOW WALL



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
Curtainrok	0.034
PU (polyurethane) foam	0.050
Silicone (1)	0.350
Soda lime (2)	1.000
Unventilated air cavity (1) *	

* Simplified approach

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.4

DRAWING TITLE: TYPICAL OUTSIDE SLAB BY-PASS CORNER MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
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SCALE: NTS
DATE: 2023-10-19
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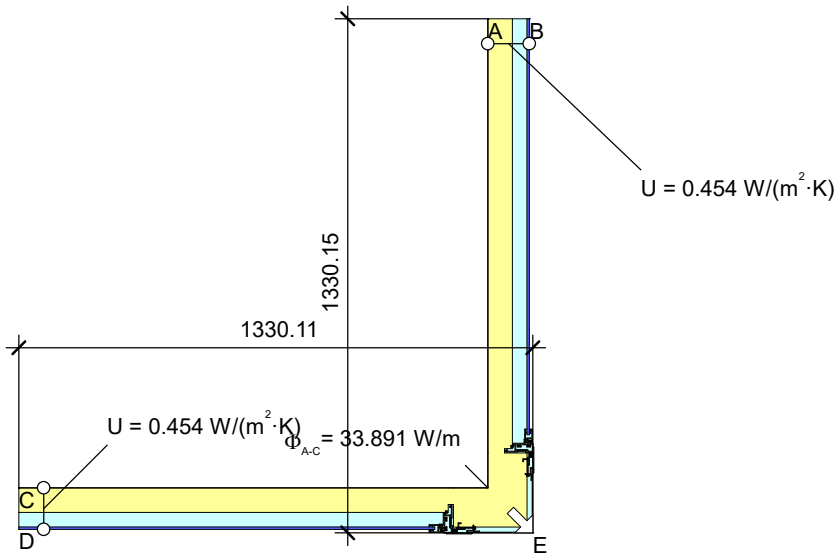
VERSION: 8.2.1169.1

TYPICAL OUTSIDE SLAB BY-PASS CORNER PSI-VALUE CALCULATION



$$\psi_{A\text{-}E\text{-}C} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - U_2 \cdot b_2 = \frac{33.891}{30.0} - 0.454 \cdot 1.33 - 0.454 \cdot 1.33 = -0.077 \text{ W/(m·K)}$$

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.4

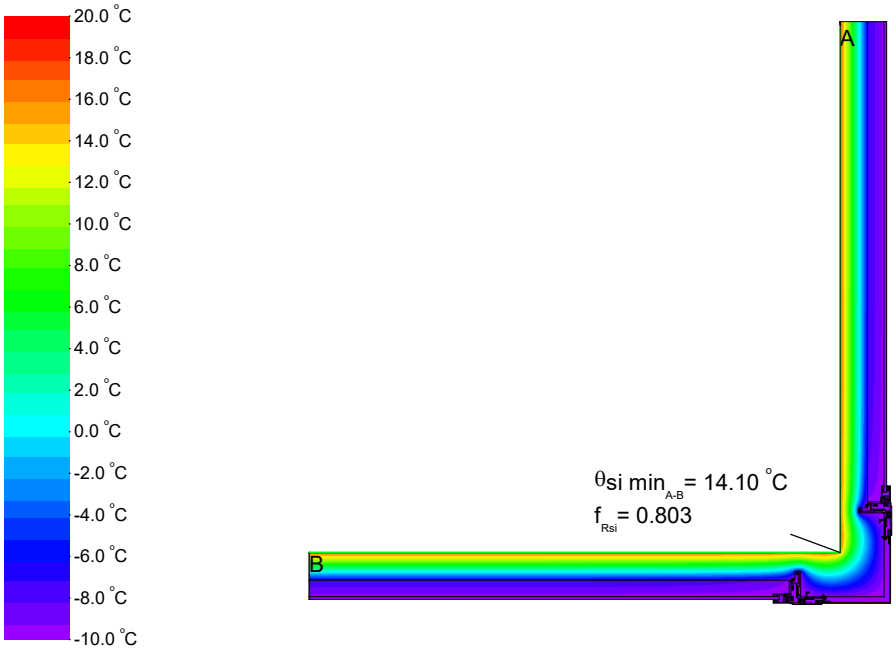
DRAWING TITLE: TYPICAL OUTSIDE SLAB BY-PASS CORNER PSI-VAUE CALCULATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL OUTSIDE SLAB BY-PASS CORNER FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: P.4

DRAWING TITLE: TYPICAL OUTSIDE SLAB BY-PASS CORNER FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
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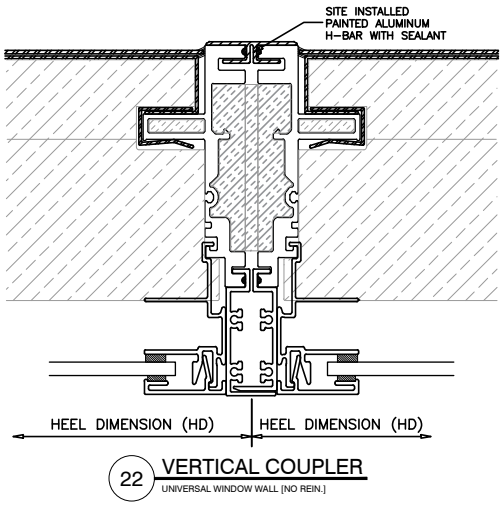
VERSION: 8.2.1169.1

TYPICAL VERTICAL BACKPAN COUPLER MODEL INFORMATION



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
BASF Neopor F5300 Plus	0.029
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Galvanized Steel	52.000
PU (polyurethane) foam	0.050
Silicone (1)	0.350
Soda lime (2)	1.000
Unventilated air cavity (1) *	

* Simplified approach

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: T.3

DRAWING TITLE: TYPICAL VERTICAL BACKPAN COUPLER MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
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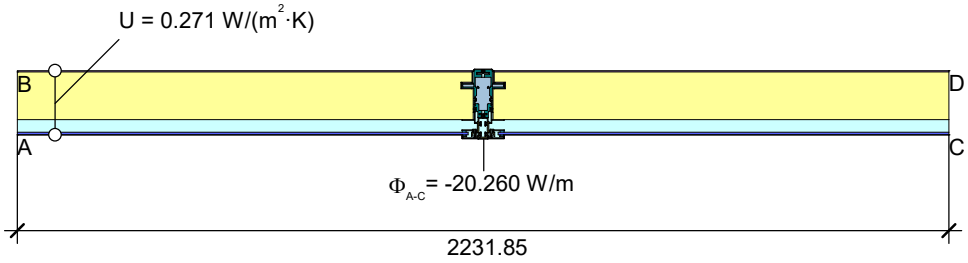
VERSION: 8.2.1169.1

TYPICAL VERTICAL BACKPAN COUPLER PSI-VALUE CALCULATION



$$\psi_{A-C} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 = \frac{20.26}{30.0} - 0.271 \cdot 2.232 = 0.070 \text{ W/(m·K)}$$

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: T.3

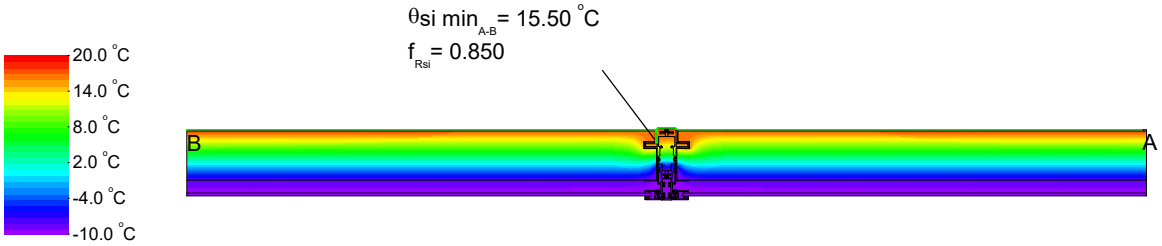
DRAWING TITLE: TYPICAL VERTICAL BACKPAN COUPLER PSI-VALUE CALCULATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL VERTICAL BACKPAN COUPLER FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: T.3

DRAWING TITLE: TYPICAL VERTICAL BACKPAN COUPLER FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
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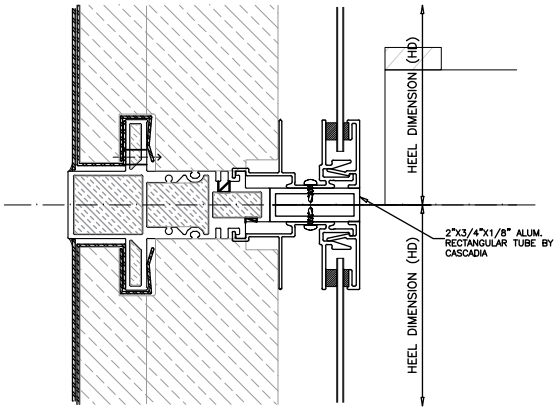
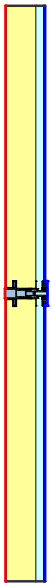
VERSION: 8.2.1169.1

TYPICAL HORIZONTAL BACKPAN COUPLER MODEL INFORMATION



10 HORIZONTAL MULLION @ SCHOOL ENTRANCE CANOPY
UNIVERSAL WINDOW WALL (1/A6.51)



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
BASF Neopor F5300 Plus	0.029
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Galvanized Steel	52.000
PU (polyurethane) foam	0.050
Soda lime (2)	1.000
Unventilated air cavity (1) *	

* Simplified approach

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.3

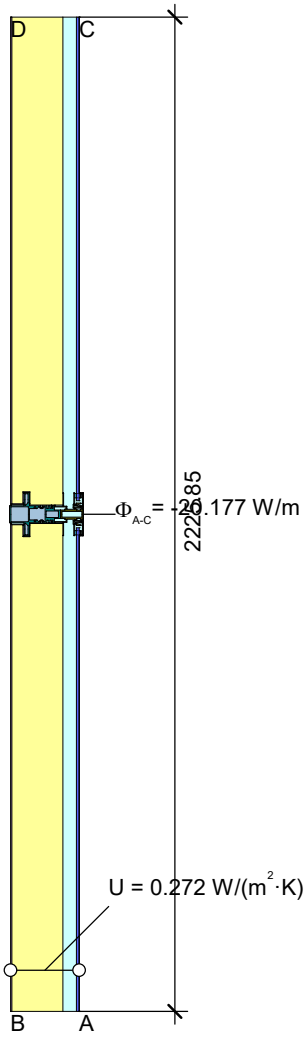
DRAWING TITLE: TYPICAL HORIZONTAL BACKPAN COUPLER MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

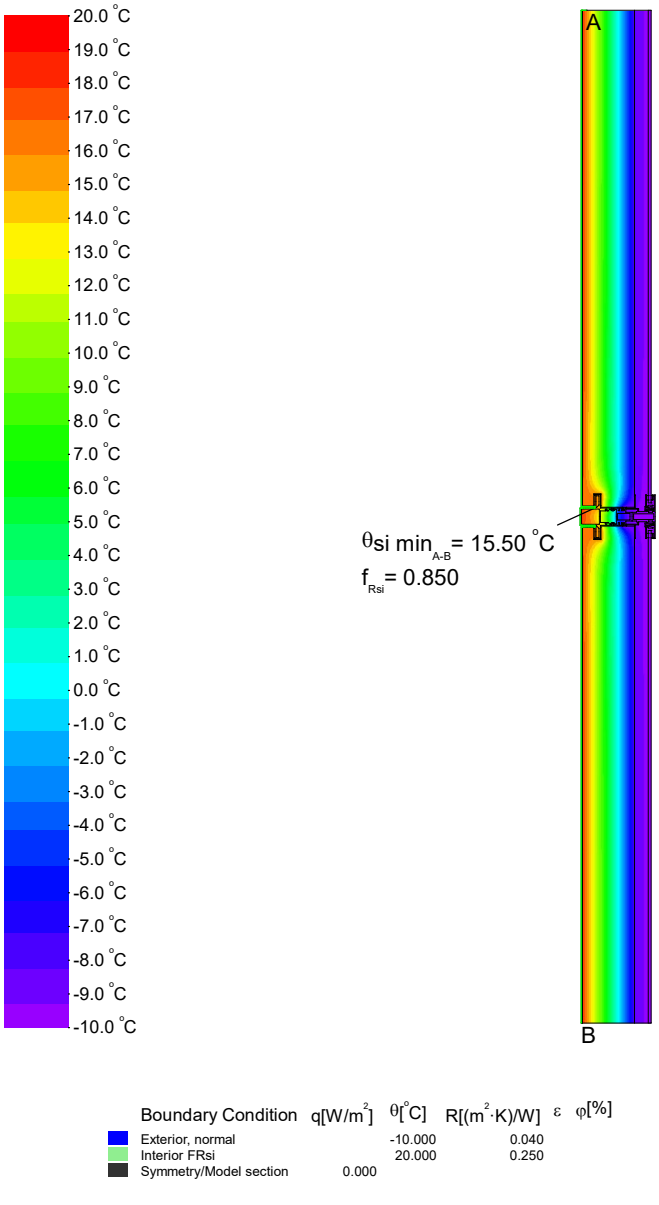
TYPICAL HORIZONTAL BACKPAN COUPLER PSI-VALUE CALCULATION



$$\psi_{A-C} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 = \frac{20.177}{30.0} - 0.272 \cdot 2.226 = 0.068 \text{ W/(m·K)}$$

RDH Making Buildings Better™	PROJECT: CASCADIA THERMAL SIMULATION		DRAWING NO.: S.3
	DRAWING TITLE: TYPICAL HORIZONTAL BACKPAN COUPLER PSI-VALUE CALCULATION		PROJECT NO.: 3565.314
224 WEST 8th AVENUE VANCOUVER BC V5Y 1N5 www.RDH.com TEL 604 873 1181	ISSUE: 1	DESCRIPTION: SCHEMATIC DESIGN	DATE: MMM.DD.201Y
			SCALE: NTS
			DATE: 2023-10-19
Drawing is not to be scaled. Details are assessed for thermal transmittance only and not with respect to other building enclosure functions such as moisture control, air leakage, and durability			MODELLED BY: BGUO
			CHECKED BY: DHAALAND
			VERSION: 8.2.1169.1

TYPICAL HORIZONTAL BACKPAN COUPLER FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.3

DRAWING TITLE: TYPICAL HORIZONTAL BACKPAN COUPLER FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

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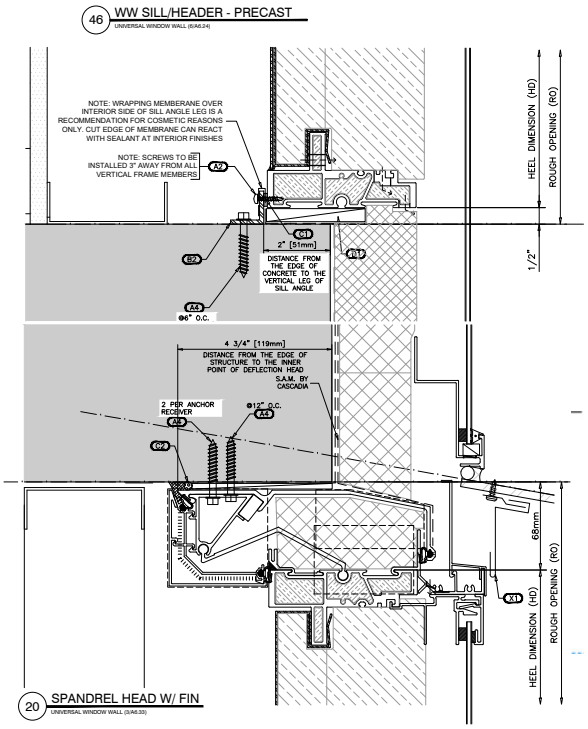
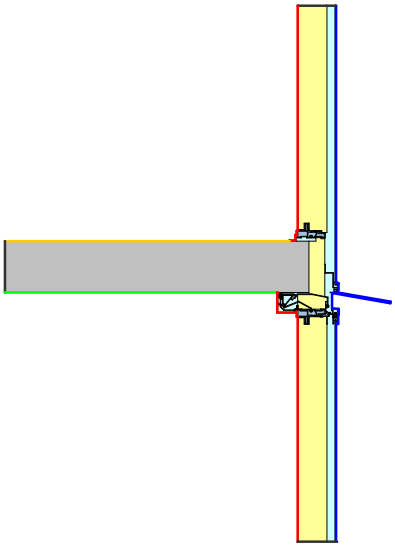
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL SLAB BY-PASS MODEL INFORMATION





Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, heat flux, downwards		20.000	0.170		
Interior, heat flux, upwards		20.000	0.100		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R1 254-500	81.488
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R2 254-500	81.488
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R3 254-500	81.488
BASF Neopor F5300 Plus	0.029
Concrete Reinforced (2% steel)	2.500
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Galvanized Steel	52.000
PU (polyurethane) foam	0.050
Polyvinylchloride (PVC) / Polyvinylchloride (PVC) (1), 3D equivalent R 152-500	0.170
Silicone (1)	0.350
Soda lime (2)	1.000
Steel (1)	50.000
Unventilated air cavity (1) *	

* Simplified approach

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.5 & S.10

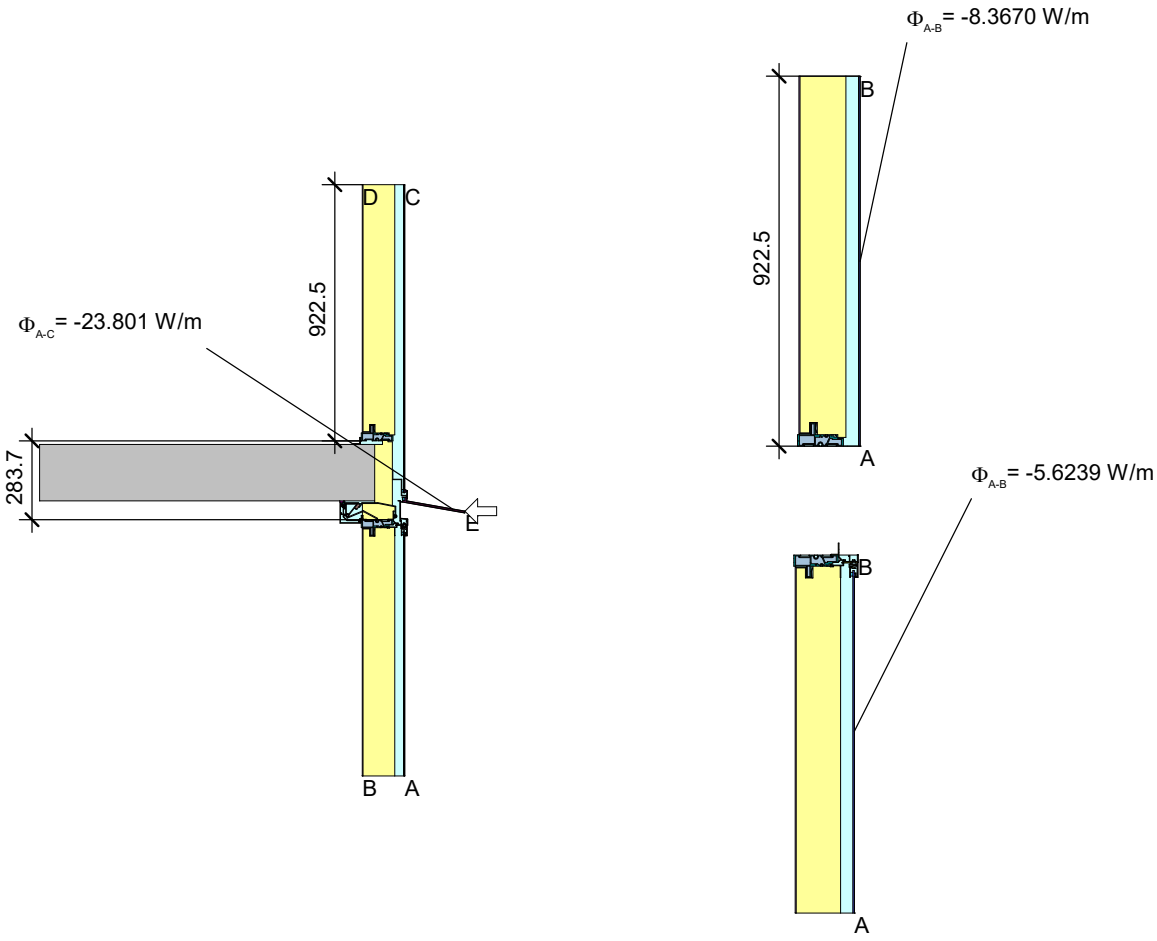
DRAWING TITLE: TYPICAL SLAB BY-PASS MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
1	SCHEMATIC DESIGN	MMM.DD.201Y

SCALE: NTS
DATE: 2023-10-19
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL SLAB BY-PASS PSI-VALUE CALCULATION



$$\psi_{A\text{-}E\text{-}C,\,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - \frac{\Phi_2}{\Delta T} = \frac{23.801}{30.0} - \frac{8.367}{30.0} - \frac{5.624}{30.0} = 0.327\ \text{W/(m·K)}$$

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.5 & S.10

DRAWING TITLE: TYPICAL SLAB BY-PASS PSI-VALUE CALCULATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
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SCALE: NTS
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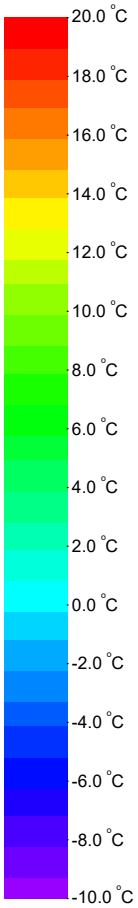
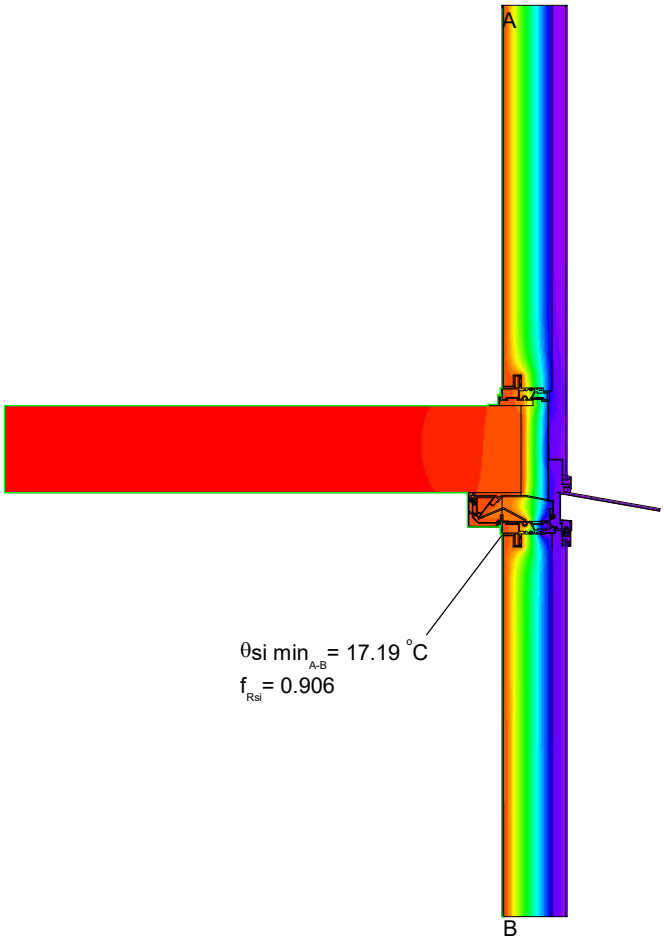
TYPICAL SLAB BY-PASS FRSI





Boundary Condition	q[W/m²]	[°C]	R[(m²·K)/W]	Ω [%]
Exterior, normal		-10.000	0.040	
Interior FRsi		20.000	0.250	
Symmetry/Model section	0.000			

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.5 & S.10

DRAWING TITLE: TYPICAL SLAB BY-PASS FRSI

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE
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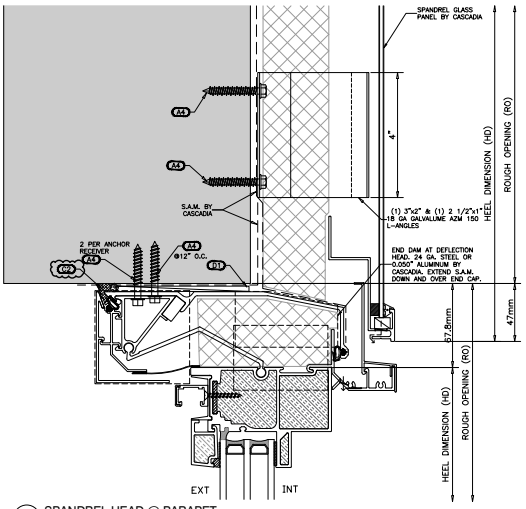
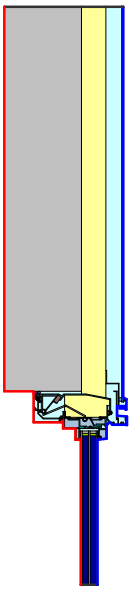
TYPICAL HEAD AT PARAPET MODEL INFORMATION



73 SPANDREL HEAD @ PARAPET
UNIVERSAL WINDOW WALL (2/A6.09)



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior, normal, horizontal		20.000	0.130		
Symmetry/Model section	0.000				
Symmetry/Model section (1)	0.000				

Material	λ[W/(m·K)]
Aluminium alloy (1)	160.000
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R1 254-500	81.488
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R2 254-500	81.488
Aluminium alloy / Frame Cavity NFRC 100, 3D equivalent R3 254-500	81.488
BASF Neopor F5300 Plus	0.029
Concrete Reinforced (2% steel)	2.500
Curtainrok	0.034
Fiberglass (PE Resin)	0.300
Gasfillin(1)	0.022
Gasfillin(1)	0.022
PU (polyurethane) foam	0.050
Polyvinylchloride (PVC) / Polyvinylchloride (PVC) (1), 3D equivalent R 152-500(1)	0.170
Silicone (1)	0.350
Soda lime (1)	1.000
Soda lime (2)	1.000
TwoBox1	0.400
TwoBox2 Super Spacer TriSeal T Spacer Premium	0.150
Unventilated air cavity (1) *	

* Simplified approach

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.16

DRAWING TITLE: TYPICAL HEAD AT PARAPET MODEL INFORMATION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE

SCALE: NTS
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MODELLED BY: BGUO
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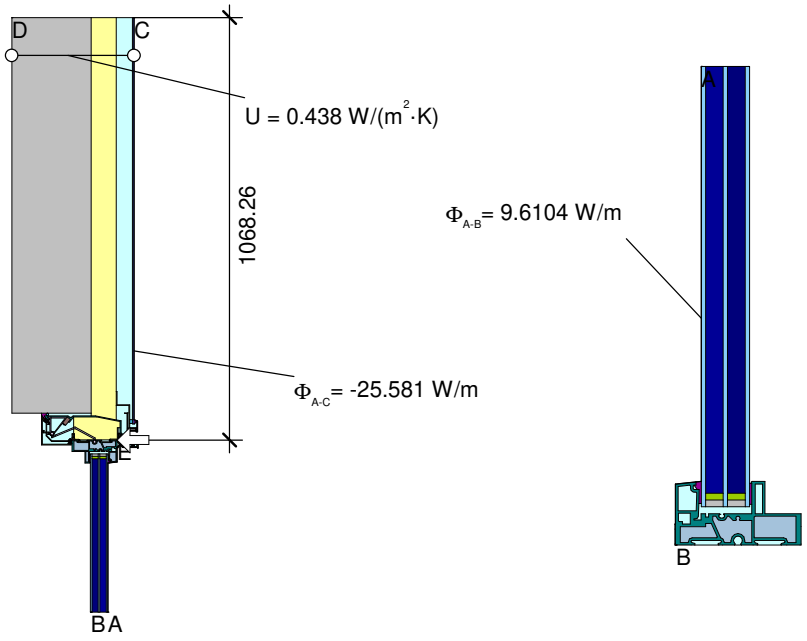
VERSION: 8.2.1169.1

TYPICAL HEAD AT PARAPET PSI-VALUE CALCUALTION



$$\psi_{A\text{-}E\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - U_2 \cdot b_2 = \frac{25.581}{30.0} - \frac{9.61}{30.0} - 0.438 \cdot 1.068 = 0.065 \text{ W/(m·K)}$$

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING NO.: S.16

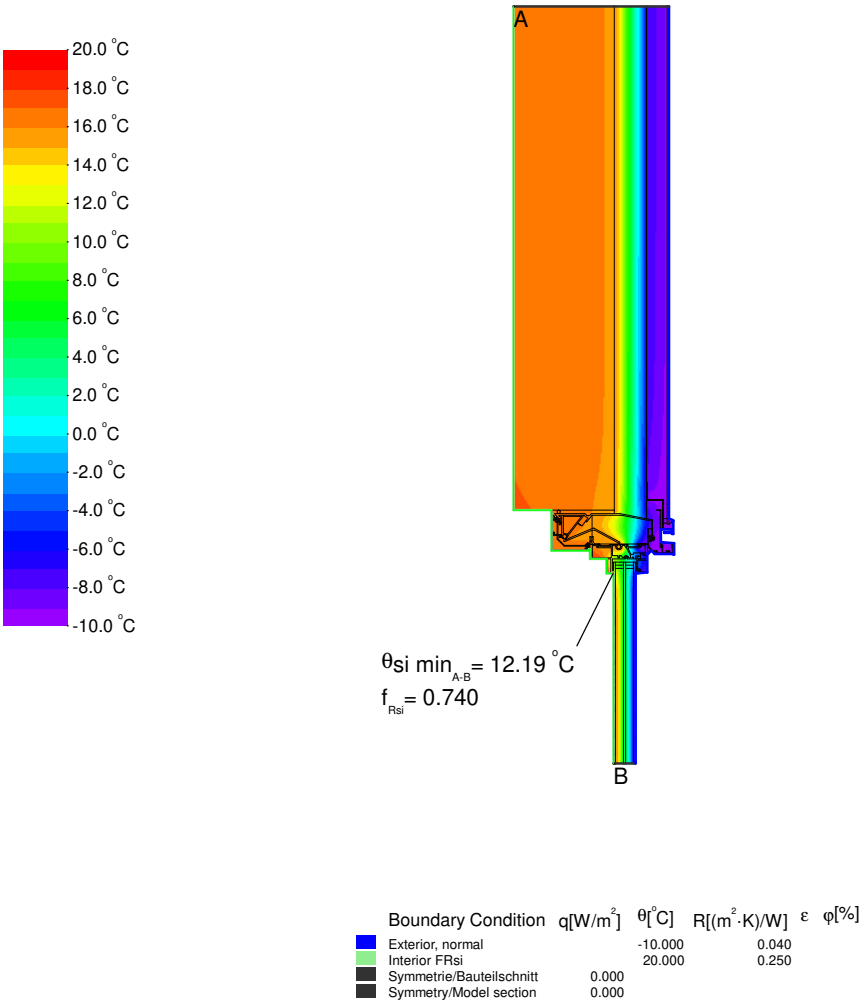
DRAWING TITLE: TYPICAL HEAD AT PARAPET PSI-VALUE CALCUALTION

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE

SCALE: NTS
DATE: 2023-10-18
MODELLED BY: BGUO
CHECKED BY: DHAALAND
VERSION: 8.2.1169.1

TYPICAL HEAD AT PARAPET FRSI



Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε	φ[%]
Exterior, normal		-10.000	0.040		
Interior FRsi		20.000	0.250		
Symmetrie/Bauteilschnitt	0.000				
Symmetry/Model section	0.000				

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PROJECT: CASCADIA THERMAL SIMULATION

DRAWING TITLE: TYPICAL HEAD AT PARAPET FRSI

DRAWING NO.: S.16

PROJECT NO.: 3565.314

ISSUE	DESCRIPTION	DATE

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