

Evidence of Performance

thermal transmittance

Test report 421 41402e

This test report is a translation of test report 410 41402 dated 02 September 2009



Client **GUARDIAN EUROPE S.A.**
Zone Industrielle Wolser

3452 Dudelange
Luxembourg

Basis

EN 673 : 1997-11
+A1 : 2000-10 + A2 : 2002-12
Glass in building – Determination of thermal transmittance (U value) – Calculation method

Product	Insulating glass unit
System designation	Guardian ClimaGuard® 1.0
the following construction varies, see type sheet	
Construction	see type sheet
Gas filling	see type sheet
Type of coating	IR-Coating Guardian ClimaGuard® 1.0 coated surface: see type sheet, $\epsilon_n=0.01^*$ *source: as specified by the manufacturer
Specifics	-/-

Instructions for use

This test report may be used to classify the thermal transmittance U_g .

Validity

The data and results given relate solely to the described, tested object.

Testing the thermal transmittance does not allow any statement to be made on further characteristics of the present structure which could define performance and quality.

Thermal transmittance



$$U_g = 0.4 - 1.6 \text{ W}/(\text{m}^2 \cdot \text{K})^*$$

*exact value depends on the construction (see type sheet)

Notes on publication

The ift Guideline "Conditions and Guideline on the Use of ift Test Reports" applies.

The cover sheet can be used together with the type sheet as an abstract.



ift Rosenheim
09 September 2009

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Contents

The report contains 8 pages in total

Type sheet

- 1 Object
- 2 Procedure
- 3 Detailed results

Type sheet for the insulating glass units Guardian ClimaGuard® 1.0

	Type	parameters for the calculation					U_g calculated U_g - value according to EN 673 $\Delta T = 15 K$ in $W/(m^2 \cdot K)$
		Construction in mm	Gas filling in %	Gas type	E^{**}	ϵ_n^*	
1	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	100	air	3	0.01	1.6
2	Guardian ClimaGuard® 1.0	<u>4/14/4</u>	100	air	3	0.01	1.4
3	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	100	air	3	0.01	1.3
4	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	100	air	2	0.01	1.3
5	Guardian ClimaGuard® 1.0	<u>4/18/4</u>	100	air	3	0.01	1.3
6	Guardian ClimaGuard® 1.0	<u>4/20/4</u>	100	air	3	0.01	1.3
7	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	90	argon	3	0.01	1.2
8	Guardian ClimaGuard® 1.0	<u>4/14/4</u>	90	argon	3	0.01	1.1
9	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	90	argon	3	0.01	1.0
10	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	90	argon	2	0.01	1.0
11	Guardian ClimaGuard® 1.0	<u>4/18/4</u>	90	argon	3	0.01	1.1
12	Guardian ClimaGuard® 1.0	<u>4/18/4</u>	93	argon	3	0.01	1.0
13	Guardian ClimaGuard® 1.0	<u>4/20/4</u>	90	argon	3	0.01	1.1
14	Guardian ClimaGuard® 1.0	<u>6/16/4</u>	90	argon	3	0.01	1.0
15	Guardian ClimaGuard® 1.0	<u>8/16/4</u>	90	argon	3	0.01	1.0
16	Guardian ClimaGuard® 1.0	<u>10/16/4</u>	90	argon	3	0.01	1.0
17	Guardian ClimaGuard® 1.0	<u>4/10/4</u>	90	krypton	3	0.01	1.0
18	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	90	krypton	3	0.01	1.0
19	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	90	krypton	2	0.01	1.0
20	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	94	krypton	3	0.01	0.9
21	Guardian ClimaGuard® 1.0	<u>4/14/4</u>	90	krypton	3	0.01	1.0
22	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	90	krypton	3	0.01	1.0
23	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	90	argon	2+3	0.01	1.2
24	Guardian ClimaGuard® 1.0	<u>4/14/4</u>	91	argon	2+3	0.01	1.0
25	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	90	argon	2+3	0.01	1.0
26	Guardian ClimaGuard® 1.0	<u>4/18/4</u>	90	argon	2+3	0.01	1.0
27	Guardian ClimaGuard® 1.0	<u>4/20/4</u>	91	argon	2+3	0.01	1.0
28	Guardian ClimaGuard® 1.0	<u>4/10/4</u>	90	krypton	2+3	0.01	0.9
29	Guardian ClimaGuard® 1.0	<u>4/12/4</u>	92	krypton	2+3	0.01	0.9
30	Guardian ClimaGuard® 1.0	<u>4/14/4</u>	93	krypton	2+3	0.01	0.9
31	Guardian ClimaGuard® 1.0	<u>4/16/4</u>	94	krypton	2+3	0.01	0.9
32	Guardian ClimaGuard® 1.0	<u>4/8/4/8/4</u>	90	argon	2+5	0.01	0.9
33	Guardian ClimaGuard® 1.0	<u>4/10/4/10/4</u>	90	argon	2+5	0.01	0.8

	Type	parameters for the calculation					U_g calculated U_g - value according to EN 673 $\Delta T = 15 K$ in $W/(m^2 \cdot K)$
		Construction in mm	Gas filling in %	Gas type	E^{**}	ϵ_n^*	
34	Guardian ClimaGuard® 1.0	<u>4/12/4/12/4</u>	90	argon	2+5	0.01	0.7
35	Guardian ClimaGuard® 1.0	<u>4/14/4/14/4</u>	90	argon	2+5	0.01	0.6
36	Guardian ClimaGuard® 1.0	<u>4/16/4/16/4</u>	90	argon	2+5	0.01	0.5
37	Guardian ClimaGuard® 1.0	<u>4/8/4/8/4</u>	90	krypton	2+5	0.01	0.6
38	Guardian ClimaGuard® 1.0	<u>4/10/4/10/4</u>	90	krypton	2+5	0.01	0.5
39	Guardian ClimaGuard® 1.0	<u>4/12/4/12/4</u>	90	krypton	2+5	0.01	0.4
40	Guardian ClimaGuard® 1.0	<u>4/12/4/12/4</u>	90	krypton	5	0.01	0.8
41	Guardian ClimaGuard® 1.0	<u>8/12/4/12/6</u>	90	krypton	2+5	0.01	0.4
42	Guardian ClimaGuard® 1.0	<u>4/12/4/16/4</u>	100	air	5	0.01	1.0
43	Guardian ClimaGuard® 1.0	<u>33.4 VSG/16/4</u>	90	argon	3	0.01	1.0
44	Guardian ClimaGuard® 1.0	<u>44.2 VSG SC/16/6</u>	90	argon	3	0.01	1.0
45	Guardian ClimaGuard® 1.0	<u>44.2 VSG SC/16/4</u>	90	argon	3	0.01	1.0
46	Guardian ClimaGuard® 1.0	<u>44.2 VSG/12/4</u>	90	argon	3	0.01	1.2
47	Guardian ClimaGuard® 1.0	<u>8/16/44.2 VSG</u>	90	argon	3	0.01	1.0
48	Guardian ClimaGuard® 1.0	<u>8/16/44.4 VSG</u>	90	argon	3	0.01	1.0

ϵ_n^* normal emissivity; source: as specified by the manufacturer

E^{**} coated surface

1 Object

1.1 Description of test specimen (All dimensions in mm)

Product	Insulating glass unit
System designation	Guardian ClimaGuard® 1.0
Construction	see type sheet
Coating	
Type / Manufacturer	Guardian ClimaGuard® 1.0 / Guardian
Coating level	see type sheet
Normal emissivity ϵ_n	0.01*
	source: as specified by the manufacturer
Gas filling in cavity	as specified by the client
Gas type	see type sheet
Nominal volume in %	see type sheet

The description is based on the documentation of **ift**. Numbers and names of material were given by the client. (Further data provided by the client are marked with *).

1.2 Representation of insulating glass construction

The illustration was produced by the **ift** as a schematic representation of the cross section.

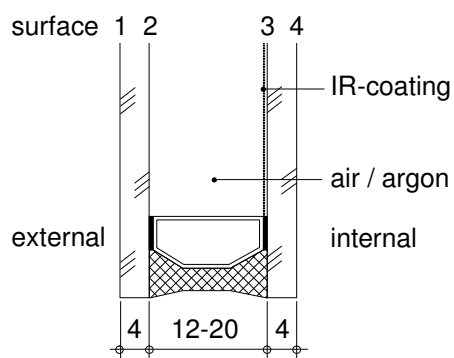


Figure 1 Representation
Guardian ClimaGuard® 1.0

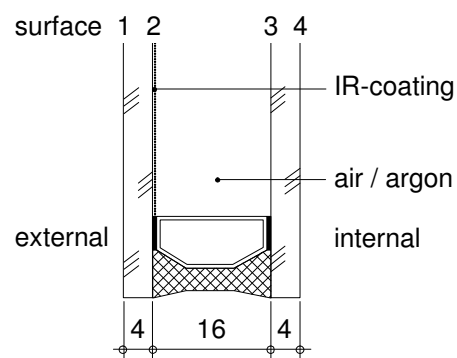


Figure 2 Representation
Guardian ClimaGuard® 1.0

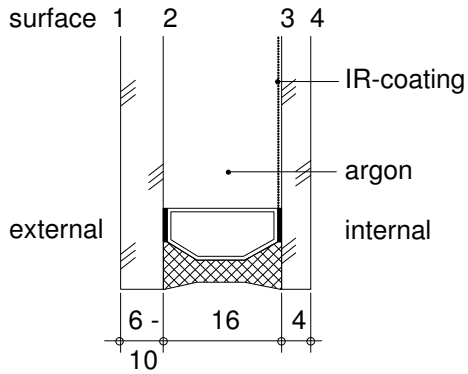


Figure 3 Representation Guardian ClimaGuard® 1.0

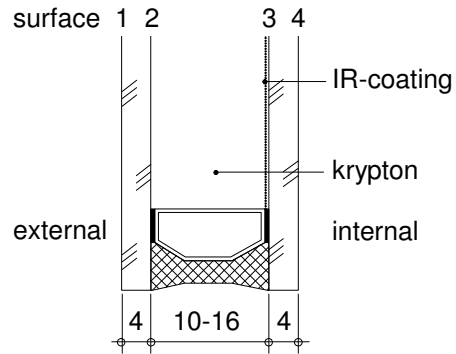


Figure 4 Representation Guardian ClimaGuard® 1.0

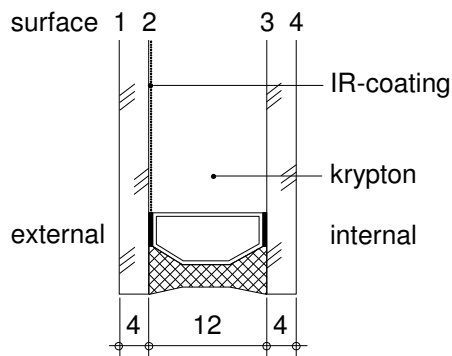


Figure 5 Representation Guardian ClimaGuard® 1.0

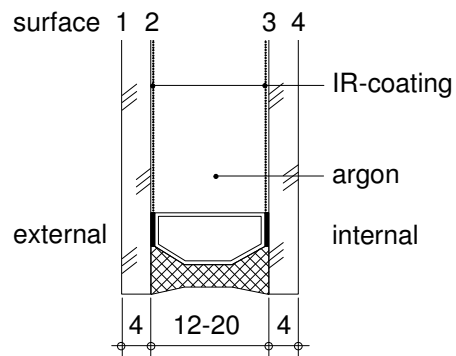


Figure 6 Representation Guardian ClimaGuard® 1.0

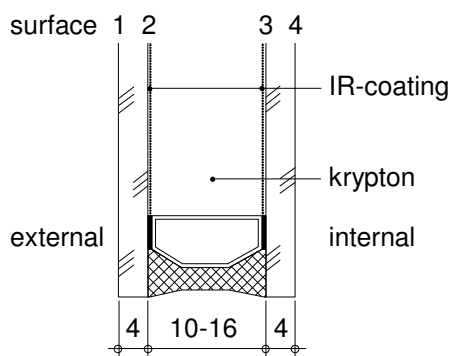


Figure 7 Representation Guardian ClimaGuard® 1.0

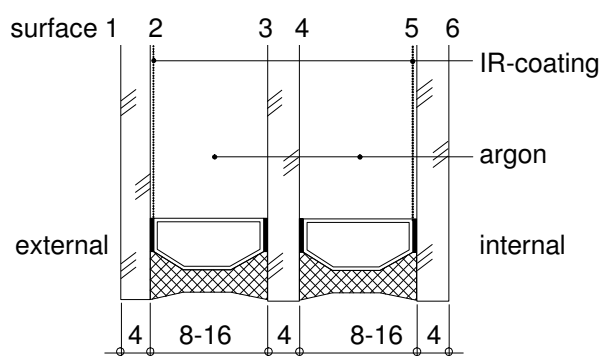


Figure 8 Representation Guardian ClimaGuard® 1.0

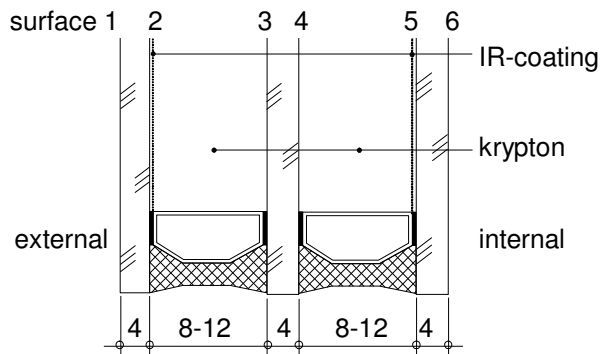


Figure 9 Representation
Guardian ClimaGuard® 1.0

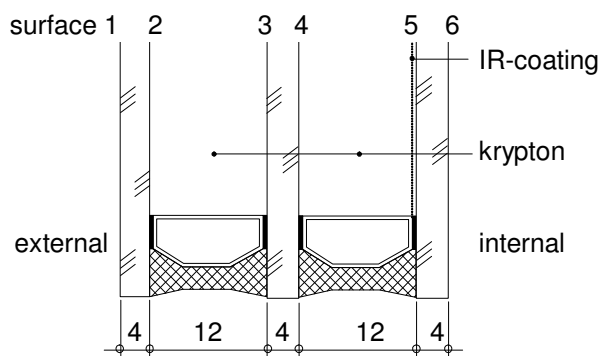


Figure 10 Representation
Guardian ClimaGuard® 1.0

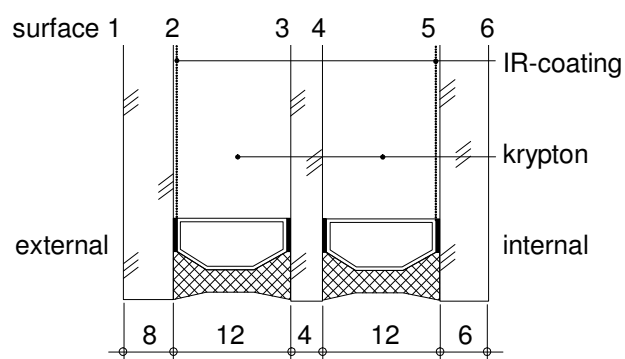


Figure 11 Representation
Guardian ClimaGuard® 1.0

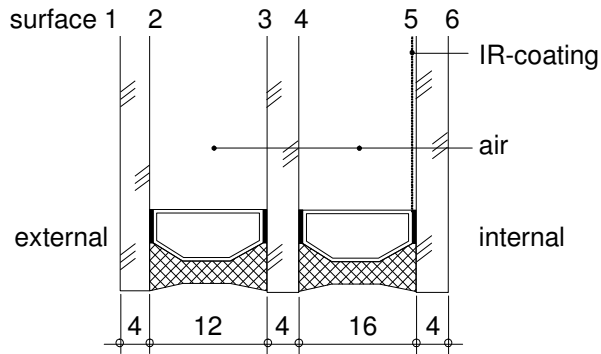


Figure 12 Representation
Guardian ClimaGuard® 1.0

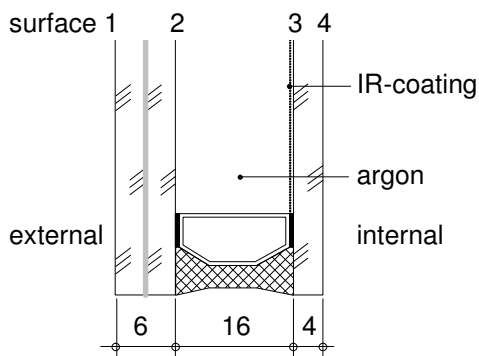


Figure 13 Representation
Guardian ClimaGuard® 1.0

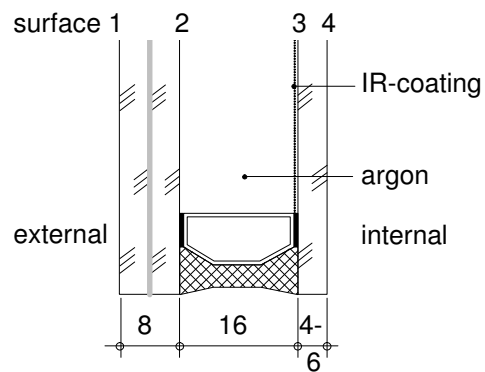


Figure 14 Representation
Guardian ClimaGuard® 1.0

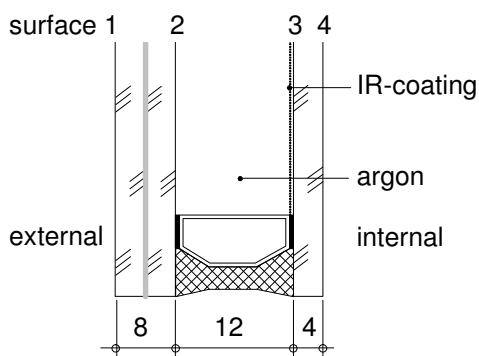


Figure 15 Representation
Guardian ClimaGuard® 1.0

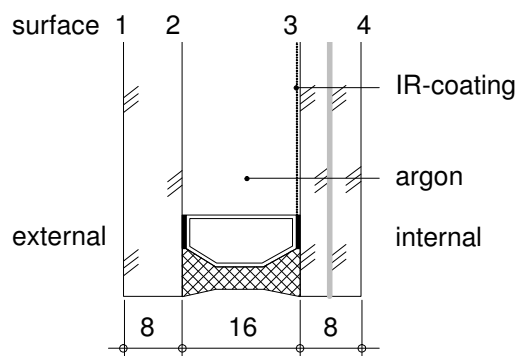


Figure 16 Representation
Guardian ClimaGuard® 1.0



2 Procedure

2.1 Process

Technical basis

EN 673 : 1997-11

+A1 : 2000-10

+A2 : 2002-12

Determination of thermal transmittance (U value) –
Calculation method

Boundary conditions

as required in the standard

Inclination of glazing

vertical

$\epsilon_n = 0.89$

normal emissivity of the room sided surface

$\epsilon = 0.837$

corrected emissivity of the room sided surface

$h_i = 8 \text{ W}/(\text{m}^2 \cdot \text{K})$

external heat transfer coefficient

$h_e = 23 \text{ W}/(\text{m}^2 \cdot \text{K})$

internal heat transfer coefficient

Deviations

There are no deviations from the test procedure or test conditions.

2.2 Testing

Date/Period

31 August 2009

Testing personnel

Christine Lux, Dipl.-Phys.

3 Detailed results

see type sheet

ift Rosenheim

09 September 2009