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### **TEST REPORT No. 357684/11981/CPR**

issued by Istituto Giordano in the capacity of notified test laboratory (No. 0407) pursuant to Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011

Place and date of issue: Bellaria-Igea Marina - Italia, 31/12/2018

Customer: GLASSCON GmbH - Mergenthalerallee, 77 - 65760 ESCHBORN - Germany

Date test requested: 31/08/2018

Order number and date: 77721, 31/08/2018

Date sample received: 16/10/2018

**Testing date:** 29/11/2018

Purpose of testing: testing a curtain walling to determine air permeability according to standard UNI EN 12153:2002, watertightness under static pressure according to standard ard UNI EN 12155:2002 and resistance to wind load according to standard UNI EN 12179:2002, and related classification in accordance with standards UNI EN 12152:2003, UNI EN 12154:2001 and UNI EN 13116:2002, watertightness under dynamic pressure according to standard UNI EN 13050:2011, impact resistance according to standard UNI EN 13830:2005

Testing site: Istituto Giordano S.p.A. - Strada Erbosa Uno, 72 - 47043 Gatteo (FC) - Italia

Sample origin: sampled and supplied by the Customer

Identification of sample received: No. 2018/2414

#### Name of sample\*

The test sample is called "Boutique Hotel Rothschild 48 - Tel Aviv





LAB N° 0021

This test report consists of 17 sheets and 1 annex

Sheet 1 of 17





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### **Description of sample\***

The test sample is a section of curtain walling representative of the curtain wall external windows for project "R-48 Tel Aviv".

The sample is U-shaped and composed of 6 units.

The overall dimensions for each side of the "U" are:

- right = 1000 mm × 7105 mm;
- center = 4758 mm × 7105 mm;
- left = 1000 mm × 7105 mm.

Units are fastened to a grid made of aluminum profiles that in turn are fixed to a steel sub-frame.





Sample photographs

(\*) according to that stated by the Customer; the description of the sample also includes Customer-supplied drawings as shown in annex "A" to this test report.





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#### Data obtained from the sample

Overall dimensions	width	4910 mm
Overall dimensions	height	7220 mm
Overall area	35,45 m <sup>2</sup>	

### Manufacturing site\*

GLASSCON GmbH - Mergenthalerallee, 77 - 65760 ESCHBORN - Germany.

#### Normative references

The test was carried out in accordance with the requirements of the following documents:

- standard UNI EN 13830:2005 dated 01/04/2005 "Curtain walling Product standard";
- standard UNI EN 12153:2000 dated 01/02/2002 "Curtain walling Air permeability Test method" with test parameters and classification of results according to standard UNI EN 12152:2003 dated 01/03/2003
   "Curtain walling - Air permeability - Performance requirements and classification";
- standard UNI EN 12155:2002 dated 01/02/2002 "Curtain walling Watertightness Laboratory test under static pressure" with test parameters and classification of results according to standard UNI EN 12154:2001 dated 30/09/2001 "Curtain walling - Watertightness - Performance requirements and classification";
- standard UNI EN 12179:2002 dated 01/02/2002 "Curtain walling Resistance to windload Test method" with test parameters and classification of results according to standard UNI EN 13116:2002 dated 01/08/2002 "Curtain walling Resistance to wind load Performance requirements";
- standard UNI EN 13050:2011 dated 08/09/2011 "Curtain walling Watertightness Laboratory test under dynamic condition of air pressure and water spray";
- standard UNI EN 14019:2016 dated 21/07/2016 "Curtain walling Impact resistance Performance requirements".
- specification "PMU EWS-1" revision 1 dated 28-09-2018 issued by GLASSCON GmbH;
- drawing n. GL-R48-SHD PMU revision 0 dated 28/11/2018 "PMU Performance Mock Up West Facade
   EWS-1 Check List" issued by GLASSCON GmbH.



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#### Test apparatus

The test was carried out using a computerised semiautomatic control and measurement system capable of performing all tests with the parameters requested by the normative references and fitted with the following equipment:

- for the measurement of air flow: pressure differential devices (orifice plates, nozzles and Venturi tubes) compliant with standards ASME MFC-14M:2003 "Measurement of fluid flow using small bore precision orifice meters", UNI EN ISO 5167-1:2004 dated 01/10/2004 "Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full Part 1: General principles and requirements" and UNI EN ISO 5167-2:2004 dated 01/10/2004 "Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full Part 2: Orifice plates";
- for measurement of pressure inside the test chamber: differential pressure transducers;
- for the measurement of water flow rate: flow meters with flow rate suitable for size of sample;
- for deflection measurement: 6 calibrated electronic displacement transducers;
- for locating the position of leakage points: portable smoke generator;
- dynamic fan complying with clause 5.8 of standard UNI EN 13050:2011;
- for impact resistance in accordance with standard UNI EN 14019:2016: impactor conforming to standard UNI EN 12600:2004 dated 01/09/2004 "Vetro per edilizia Prova del pendolo Metodo della prova di impatto e classificazione per il vetro piano" ("Glass in building Pendulum test Impact test method and classification for flat glass").

#### Conditioning of sample prior to test

The sample was conditioned for four hours immediately prior to testing under the ambient conditions specified in the following table.

Temperature	(17 ± 3) °C
Relative humidity	(46 ± 10) %



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### **Environmental conditions during test**

Atmospheric pressure	(1022 ± 10) hPa		
Ambient temperature	(17 ± 1) °C		
Relative humidity	(46 ± 5) %		

### Test method

The test was carried out using detailed internal procedure PP050 in its current edition at the date of testing.

The sample was fitted to the test apparatus and subjected in sequence to:

- measurement of air permeability under positive pressure;
- measurement of air permeability under negative pressure;
- measurement of watertightness;
- resistance to design wind load with measurement of deflection;
- measurement of air permeability under positive pressure (carried out at classification pressure);
- measurement of air permeability under negative pressure (carried out at classification pressure);
- watertightness test;
- watertightness test with turbulent airflow applied;
- resistance to safety wind load with measurement of deflection;
- internal and external impact resistance.





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### Test results

### Air permeability through fixed parts under positive pressure

Positive	pressure	Air flow*			
nominal	test	total	related to the overall area and relative uncertainty**		
[Pa]	[Pa]	[m <sup>3</sup> /h]	[m³/h·m²]		
50	50	4,084	0,115 ± 0,004		
100	100	6,699	0,189 ± 0,004		
150	150	8,759	0,247 ± 0,005		
200	200	10,531	0,297 ± 0,006		
250	249	12,082	0,341 ± 0,007		
300	300	13,509	0,381 ± 0,007		
450	450	17,440	0,492 ± 0,009		
600	601	20,817	0,587 ± 0,011		

(\*) figures refer to pressure of 101,3 kPa and temperature of 293 K.

(\*\*) uncertainty considers contributions caused by measurement of the following quantities: air flow, test chamber pressure and size of sample; expanded uncertainty has been calculated using a coverage factor "k" of 2, corresponding to a confidence level of 95,45 %.

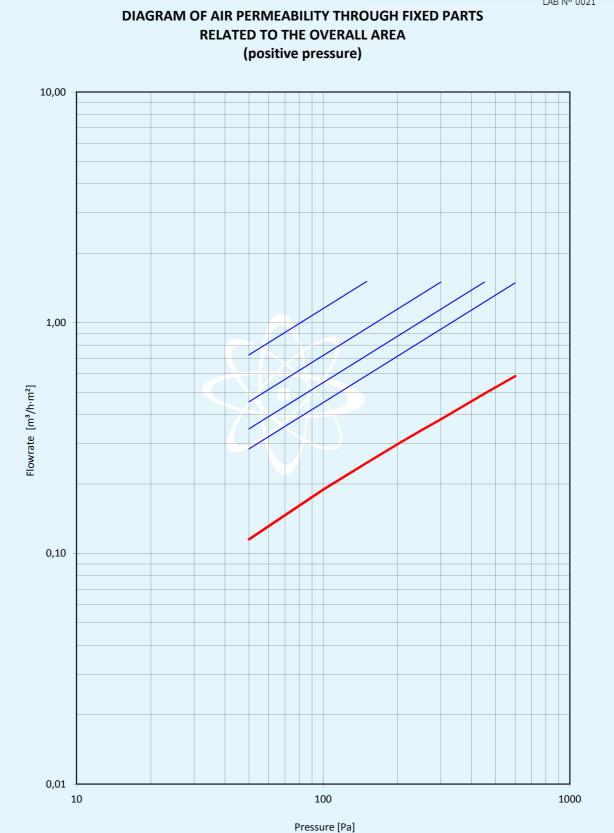
### **Observations:** //





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### Air permeability through fixed parts under negative pressure

Negative	pressure	Air flow*				
nominal	test	total	related to the overall area and rela- tive uncertainty**			
[Pa]	[Pa]	[m³/h]	[m³/h·m²]			
50	50	4,881	0,138 ± 0,004			
100	100	7,472	0,211 ± 0,005			
150	150	9,291	0,262 ± 0,005			
200	200	11,214	0,316 ± 0,006			
250	248	12,762	0,360 ± 0,007			
300	302	14,149	0,399 ± 0,008			
450	449	17,357	0,490 ± 0,009			
600	599	21,177	0,597 ± 0,011			

(\*) figures refer to pressure of 101,3 kPa and temperature of 293 K.

(\*\*) uncertainty considers contributions caused by measurement of the following quantities: air flow, test chamber pressure and size of sample; expanded uncertainty has been calculated using a coverage factor "k" of 2, corresponding to a confidence level of 95,45 %.

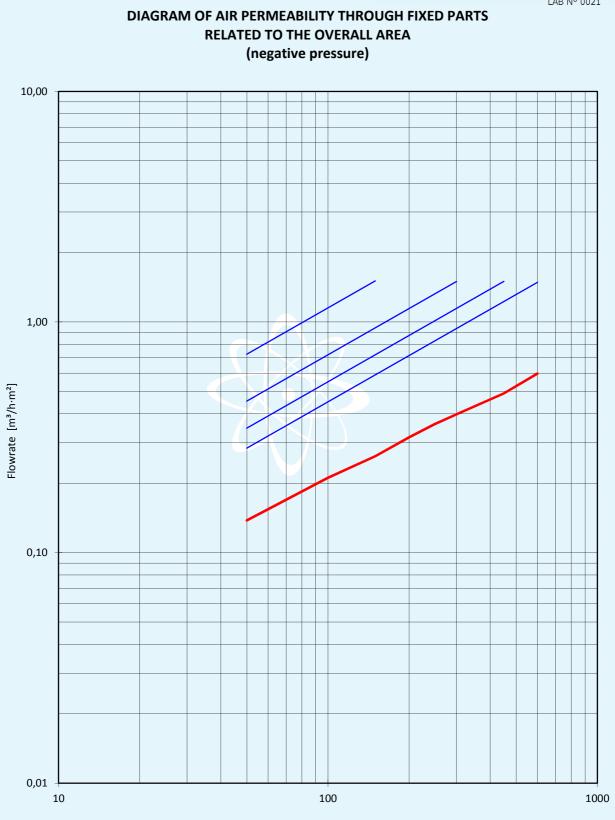
**Observations:** //



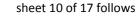


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Pressure [Pa]





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### Watertightness

Water spraying system utilised	as per figure 3 of standard EN 12155		
Water flow rate per unit area*	2 l/(h · m²)		
Water flow rate	4254 l/h		

Pres	sure	Spraying time	Observations
nominal	test		
[Pa]	[Pa]	[min]	
0	0	15	no leakage
50	50	5	no leakage
100	100	5	no leakage
150	150	5	no leakage
200	200	5	no leakage
300	300	5	no leakage
450	450	5	no leakage
600	600	5	no leakage

sheet 11 of 17 follows





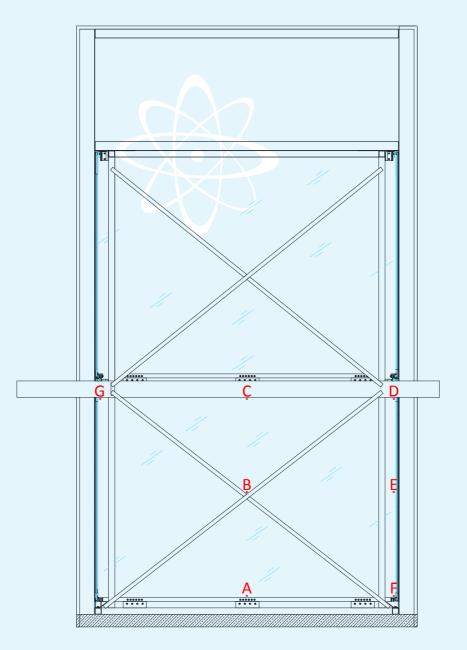
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Resistance to design wind load

Design load under positive pressure	+1300 Pa
Design load under negative pressure	-1650 Pa
Clear span of section A <b>C</b>	3220 mm
Clear span of section D <e>F</e>	3220 mm
Clear span of section G <c>D</c>	4600 mm



Sample elevation showing measuring points

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### Measurement of deflection under design wind load

Pres	sure	Frontal displacement at measuring points						Frontal d	leflection	Relative frontal de relative un	flection noted and certainty**	Permissible relative
nominal	test	Α	В	с	D	E	F	A <b>C</b>	D <e>F</e>	A <b>C</b>	D <e>F</e>	frontal de- flection
[Pa]	[Pa]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[1/xxx]	[1/xxx]	[1/xxx]
0	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	//	//	//
325	325	0,72	2,21	0,45	0,25	0,45	0,00	1,62	0,32	1/1984	1/10106	//
650	650	1,40	4,44	0,93	0,57	1,14	0,01	3,27	0,86	1/984	1/3765	//
975	975	2,22	6,49	1,45	1,19	2,07	0,04	4,65	1,45	1/692	1/2219	//
1300	1308	3,08	8,58	2,10	2,11	3,19	0,12	5,99	2,07	1/(540 ± 100)	1/(1550 ± 300)	1/200
0	0	0,30	0,04	0,21	0,70	0,47	0,12	-0,21	0,06	//	//	//
0	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	//	//	//
-413	-413	-1,69	-3,17	-0,68	-0,32	-0,53	0,05	-1,98	-0,39	1/1622	1/8198	//
-825	-829	-2,95	-6,28	-1,38	-0,83	-1,46	0,04	-4,11	-1,07	1/783	1/3022	//
-1237	-1238	-4,33	-9,35	-2,20	-1,89	-2,78	-0,09	-6,08	-1,40	1/530	1/2308	//
-1650	-1653	-6,03	-12,58	-2,99	-2,76	-4,06	-0,22	-8,07	-2,57	1/(399 ± 75)	1/(1250 ± 240)	1/200
0	0	-0,45	-0,32	-0,23	-0,82	-0,54	-0,06	0,02	-0,11	//	//	//

(\*) residual deformation after 5 min.

(\*\*) uncertainty considers contributions caused by measurement of the following quantities: test chamber pressure, net span of elements verified, frontal displacement; expanded uncertainty has been calculated using a coverage factor "k" of 2, corresponding to a confidence level of 95,45 %.

Pres	sure	Frontal displacement at measuring points			Frontal deflection	Relative frontal deflection noted and relative uncertainty**	Permissible relative	
nominal	test	G	С	D	G <c>D</c>	G <c>D</c>	frontal de- flection	
[Pa]	[Pa]	[mm]	[mm]	[mm]	[mm]	[1/xxx]	[1/xxx]	
0	0	0,00	0,00	0,00	0,00	//	//	
325	325	0,19	0,45	0,25	0,23	1/13984	//	
650	650	0,52	0,93	0,57	0,38	1/8435	//	
975	975	1,16	1,45	1,19	0,27	1/11809	//	
1300	1308	2,09	2,10	2,11	0,00	1/(1750000 ± 880000)	1/200	
0	0	0,53	0,21	0,70	-0,40	//	//	
0	0	0,00	0,00	0,00	0,00	//	//	
-413	-413	-0,33	-0,68	-0,32	-0,36	1/8949	//	
-825	-829	-0,85	-1,38	-0,83	-0,54	1/5912	//	
-1237	-1238	-1,92	-2,20	-1,89	-0,30	1/10790	//	
-1650	-1653	-2,81	-2,99	-2,76	-0,20	1/(15700 ± 6200)	1/200	
0	0	-0,45	-0,23	-0,82	0,40	//	//	

(\*) residual deformation after 5 min.

(\*\*) uncertainty considers contributions caused by measurement of the following quantities: test chamber pressure, net span of elements verified, frontal displacement; expanded uncertainty has been calculated using a coverage factor "k" of 2, corresponding to a confidence level of 95,45 %.





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### Air permeability test

Air permeability through fixed parts of the sample before and after the resistance to wind test								
Classification pressure	Initial air flow	Initial air flow and relative	-	Measured flow rate	End air flow per unit area and relative uncertainty		Difference	
[Pa]	[m³/h]	[m <sup>3</sup> /m <sup>2</sup> ·h]	[m³/m·h]	[m³/h]	[m³/m²·h]	[m³/m·h]	[m <sup>3</sup> /m <sup>2</sup> ·h]	[m³/m·h]
600	20,81	0,587 ± 0,011	0,728 ± 0,047	23,70	0,669 ± 0,013	0,830 ± 0,053	0,082	0,101
600	21,19	0,598 ± 0,006	0,742 ± 0,025	21,58	0,609 ± 0,012	0,756 ± 0,048	0,011	0,014

(\*) figures refer to pressure of 101,3 kPa and temperature of 293 K. If measured values are less than measurement uncertainty, air flow is expressed as: "< sum of measurement uncertainties and measured value".

### Watertightness test

Water spraying system utilized	as per figure 3 of standard EN 12155		
Water flow rate per unit area*	3,4 l/(h·m²)		
Water flow rate	4254 l/h		

Pressure		Spraying time	Observations
nominal	test		
[Pa]	[Pa]	[min]	
0	0	15	no leakage
50	50	5	no leakage
100	100	5	no leakage
150	150	5	no leakage
200	200	5	no leakage
300	300	5	no leakage
450	450	5	no leakage
600	600	5	no leakage





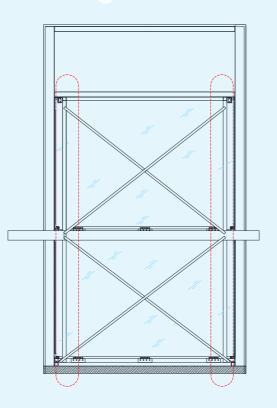


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### Watertightness under dynamic pressure test

Water spra	ying system utilised	as per figure 3 of standard EN 12155		
Water flow	/ rate	4254 l/h		
Maximum	design load	1650 Pa		
Variable test pressure		206-619 Pa		
	along the central horizontal axis	≥30 m/s		
Turbulent airflow	over 75 % of the measurement area	≥20 m/s		
velocity	at any point within the measurement area	≥8 m/s		

Variable test pressure		Spraying time	Observations
minimum "P <sub>min</sub> "	maximum "P <sub>max</sub> "		
[Pa]	[Pa]	[min]	
0	0	15	no leakage
206	619	34	no leakage



Elevation of sample showing the areas through which the dynamic fan passes





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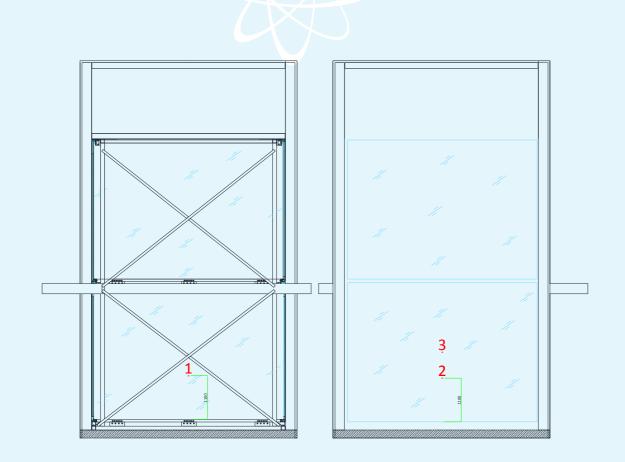
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### Resistance to safety wind load

Pres	sure	Observations
nominal test		
[Pa]	[Pa]	
1950	1955	no breakage, detachment of parts
-2475	-2478	or apparent malfunction

### Impact resistance

Impact point	Impact side	Class	Drop height	Result
			[mm]	
1	inner	15	950	no damage
2	outer	E5	950	no damage
3	outer	E5	950	no damage



Elevation of sample showing impact points



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### Classification

In accordance with the tests performed, the results obtained and the provisions of standards UNI EN 12152:2003, UNI EN 12154:2001, UNI EN 13116:2002, UNI EN 13050:2011 and UNI EN 14019:2016:

- total air permeability through the fixed part is less than 1,5 m<sup>3</sup>/m<sup>2</sup>·h at a positive and negative test pressure of 600 Pa;
- overall air permeability of the test sample after being subjected to the wind load does not increase by more than  $0.3 \text{ m}^3/\text{m}^2\cdot\text{h}$  at the classification pressure of 600 Pa;
- frontal deflection under the design load of 1300 Pa and -1650 Pa does not exceed 1/200 of the span of each framing member or 15 mm;
- residual frontal deflection 1 h after removal of load is less than 5 % of deflection under load;
- residual frontal displacement of fixings of framing members at their connections to structural components is less than 1 mm;
- due to safety test pressure of 1950 Pa and -2475 Pa, no parts become detached and the test sample remains closed; the test sample did not break during testing;
- no water leakage detected up to a pressure of 600 Pa;
- no water leakage detected up to a pressure of 600 Pa after testing the resistance to windload;
- no water leakage detected during testing of watertightness with turbulent airflow applied at the design windload of 1650 Pa.



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Therefore, the test sample, comprising a section of curtain walling, called "Boutique Hotel Rothschild 48 - Tel Aviv" and submitted by the company GLASSCON GmbH - Mergenthalerallee, 77 - 65760 ESCHBORN - Germany, is awarded the performance classes listed in the following table.

Test type	Test standard	Classification standard	Class*
Air permeability through fixed parts related to overall area	UNI EN 12153	UNI EN 12152	A4
Watertightness	UNI EN 12155	UNI EN 12154	R7
Watertightness with turbulent airflow applied	UNI EN 13050	UNI EN 13830	positive
Resistance to wind load under design load 1300 Pa and -1650 Pa	UNI EN 12179	UNI EN 13116	positive
Internal impact resistance	UNI EN 14019	UNI EN 14019	15
External impact resistance	UNI EN 14019	UNI EN 14019	E5

(\*) Classification has been determined on the basis of values obtained by measurement during testing in line with clause 2.6 of ILAC-G8:03/2009 "Guidelines on the reporting of compliance with specification".

The results given refer exclusively to the test sample itself and are only valid under the same conditions in which testing was carried out.

This test report alone shall not be considered a certificate of conformity.

**CPD** Department **Technical Manager** (Dott Ing Giuseppe Persano Adorno)

**Test Technician** (Rag. Giovanni Scollo)

Head of (Dott. Andrea Bruschi)

**Chief Executive Officer** Security and SafetyLaboratory (Dott. Arch. Sara Lorenza Giordano)

The original of this document consists of an electronic document with a digital signature affixed pursuant to DPR (Presidential Decree) 513/97.



### ANNEX "A" TO TEST REPORT No. 357684/11981/CPR

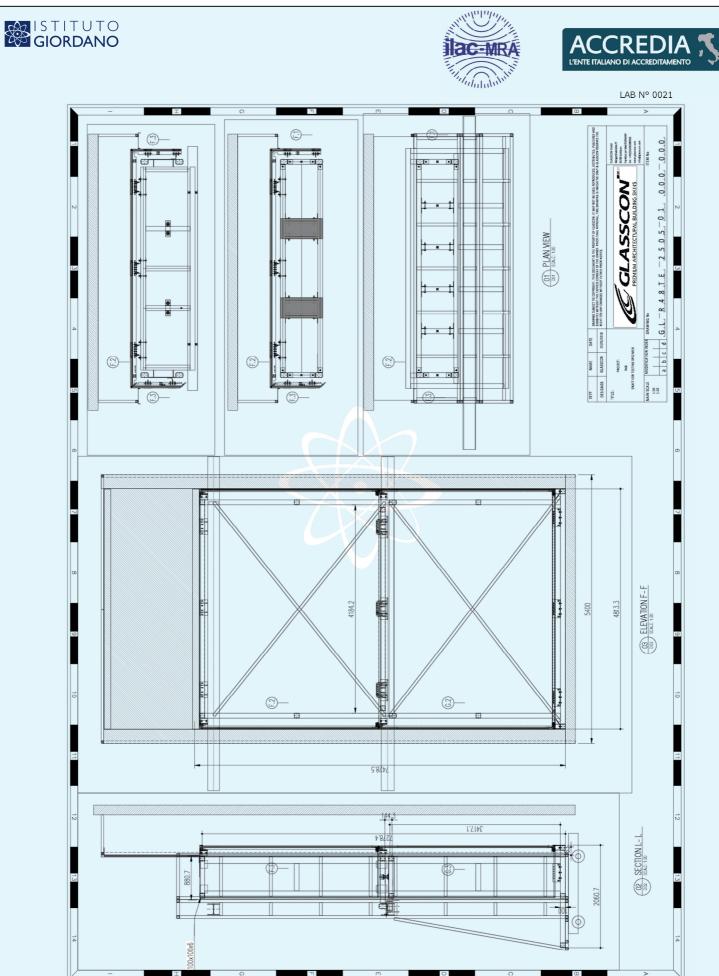
Place and date of issue: Bellaria-Igea Marina - Italia, 31/12/2018

Customer: GLASSCON GmbH - Mergenthalerallee, 77 - 65760 ESCHBORN - Germany

**Object:** Sample technical documentation

Customer-supplied schematic drawings related to the sample are shown in the following sheet





(Annex "A" to test report No. 357684/11981/CPR dated 31/12/2018)

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(Annex "A" to test report No. 357684/11981/CPR dated 31/12/2018)

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(Annex "A" to test report No. 357684/11981/CPR dated 31/12/2018)

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ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

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### **<u>1 PMU INFORMATION</u>**

Object	
Sample Name:	GLASSCON CUSTOM MADE OVERSIZED MULLIONLESS STRUCTURAL
	GLASS CW – STACK JOINT SYSTEM "glasscon O-ML/SJ CW"
Manufacturer:	Glasscon GmbH
	Mergenthalerallee 77, 65760 Eschborn, Frankfurt am Main (Germany)
System:	Glass wall supported on customized aluminium profiles on top and
	bottom and fixed with structural silicone at the sides.
Executed Tests:	<ul> <li>Air permeability (infiltration and exfiltration)</li> </ul>
	<ul> <li>Water penetration resistance - Static</li> </ul>
	<ul> <li>Water penetration resistance – Dynamic FAN Test</li> </ul>
	<ul> <li>Wind resistance – serviceability</li> </ul>
	<ul> <li>Vertical Interstory Movement</li> </ul>
	<ul> <li>Wind resistance – safety</li> </ul>
	Impact
Overall Dimensions:	7105m (height) x 4758mm (width) x 1000mm(depth)

### 2 BILL OF QUANTITIES (BOQ)

Code	Description	Drawing
1	Single glazing 10mm HS low iron/1.52SGP/10mm HS low iron/ 1.52SGP/ 10mm HS low iron	
3	Custom silicone gasket profile #01	D
4a	Sikasil SG-550 structural silicone	
4b	Sikasil SG-20 structural silicone	
5	Custom Aluminum profile part for glazing dead load support, "L- profile" Die nr.#6 EN-AW 6005A T6 with setting block PP Würth	
7	Custom Aluminum profile continuous, "Upper Gasket profile" Die nr.#4 EN-AW 6063 (T6)	- Cray
8	Custom Pressure equalized rainscreen silicone gasket profile mould nr.#1	57
9	Custom Pressure equalized rainscreen silicone gasket profile mould nr.#2	-CL

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GLASSCON GmbH Mergenthalerallee 77 65760 Eschborn (Frankfu Deutschland	urt am Main)			Bank: IBAN: BIC/SWIFT: BLZ:	Deutsche I DE827007 DEUTDEDE 70070024	00240161565700 BMUC	Email: s Web:	49 (0) 61967889560 sales@glasscon.com www.glasscon.com JSt-IdNr.: DE295381	
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10	Custom Aluminum profile continuous, upper Transom Die nr.#3 EN- AW 6063 (T6)	[]
10b	Custom Aluminum profile, chicken head continuous, Die nr.#02 EN- AW 6063 (T6)	
14	Mounting bracket, custom welded part type 03_4, S235	
16	Mounting bracket, custom welded part type 05_6, \$235	19 1 L
22	Custom Aluminum profile continuous, lower transom Die nr.#01 EN- AW 6063 (T6)	
23	Hexagon bolt DIN 931 M12x50	
23a	Hexagon bolt DIN 933 M12x50	
23b	AISI 304 Hexagon bolt DIN 933 M12x50	
24	AISI 304 steel transom insert plate 40x6	
30	PU expanded foam – closed cell	
34	Mounting bracket, custom welded part type, S235	
36	Membrane Butyl 1,5mm	
39	Aluminum profile continious, RHS 50x40x2, EN-AW 6063(T6)	
40	Butyl rubber weatherproofing membrane 1,5mm	0.0
44	Weather seal gasket PVC	
45	Weather seal gasket PVC	





ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

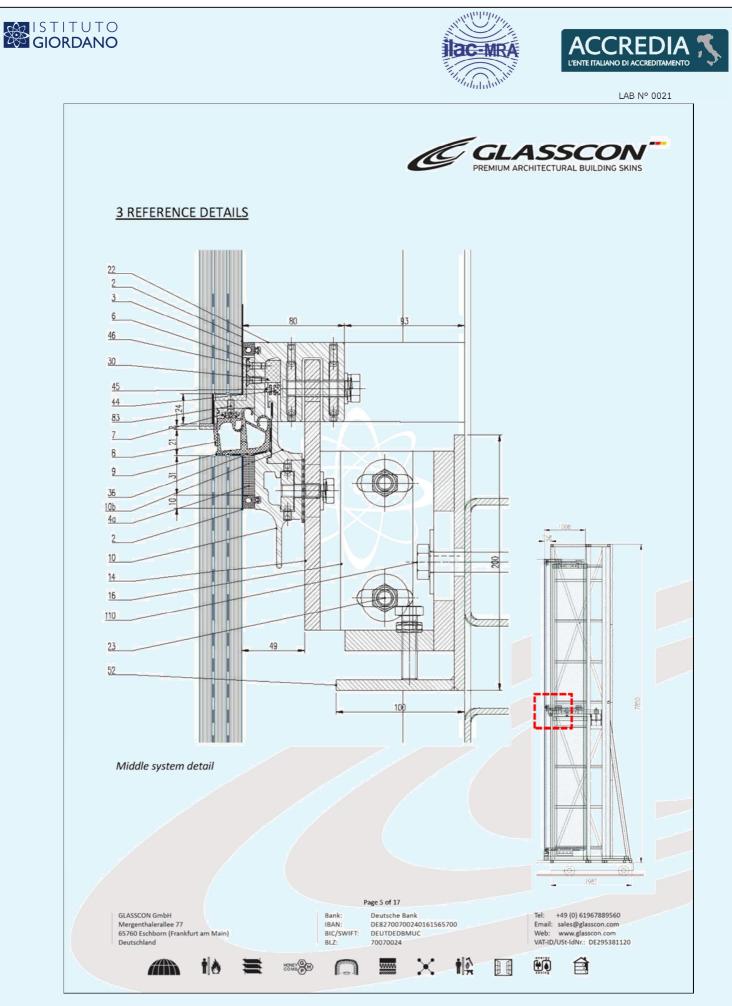
LAB N° 0021



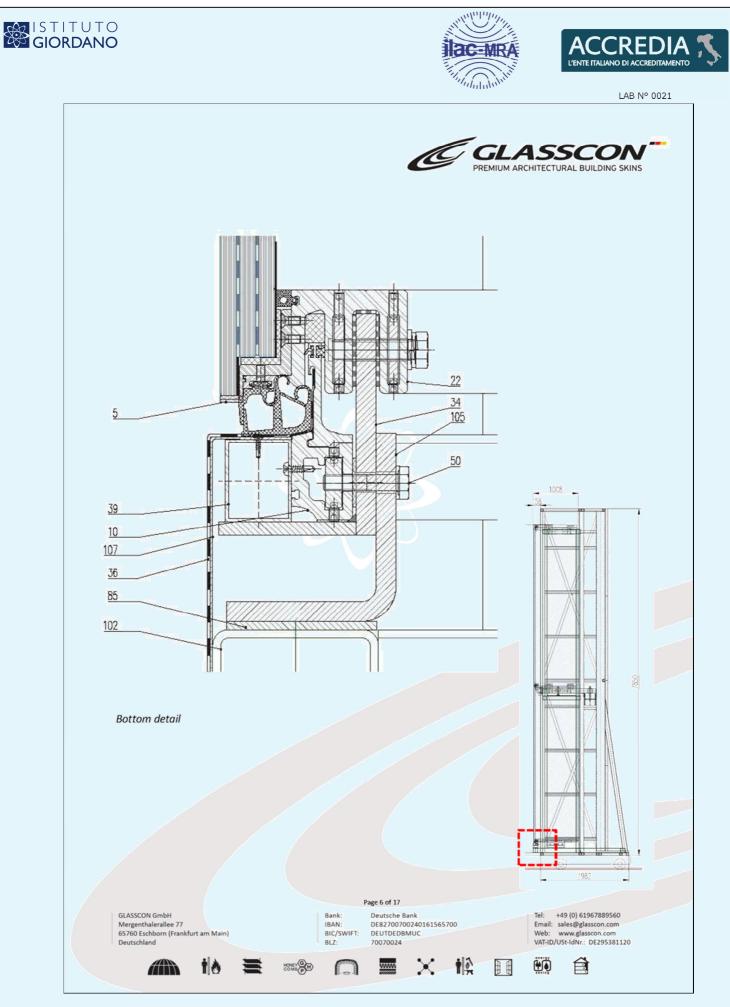
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46	AISI 304 Countersunk screw DIN7991 M5x12						
49	AISI 304 Hegaxon bolt DIN 933 M10x35						
50	AISI 304 Hegaxon bolt DIN 933 M10x45						
52	Mounting bracket custom welded steel part type 07 "L" 200x100x8 S235						
64	AISI 304 Hexalobular socket head cap screw DIN 14579 M8x25						
70	Plastic shims						
70a	Plastic ring (Igus)						
83	AISI 304 Cheese head screw DIN7984 M5x10						
85	Steel spacer						
86	AISI 304 Cheese head screw DIN7984 M6x25						
201	custom ACETAL						
202	custom part, foam closed cell #1						
203	custom part, foam closed cell #2						
204	custom part, foam closed cell #3						
205	custom part, foam closed cell #4						
206	custom part, foam closed cell #5						
207	custom part, foam closed cell #6						
208	custom part, foam closed cell #7						
209	custom part, foam closed cell #8						
211	custom part, foam closed cell #9						
212	Drainage holes						

		1	Page 4 of 17			
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sheet 8 of 11 follows



sheet 9 of 11 follows



sheet 10 of 11 follows



sheet 11 of 11 follows

