Evidence of Performance

Air permeability, Watertightness, Resistance to wind load

Test Report
No 16-000911-PR01

(PB-A01-02-en-01)

Client	Uniform S.p.A. Via dell Agricoltura 36 37046 Minerbe VR Italy
Product	Double combined side-hung / tilt & turn window of overlapping design
Designation	System designation: uni_one COMPLANARE
Performance-relevant product details	Material: Timber with aluminium face layer
Overall dimensions (W x H)	1,500 mm x 1,500 mm
Special features	- / -

Results

Air permeability according to EN 12207:1999-11

Class 4

Watertightness according to EN 12208:1999-11

Class E1350

Resistance to wind load
according to EN 12210:1999-11/AC:2002-08

Class C5 / B5

ift Rosenheim
16.11.2016

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Construction Product Testing

Basis

EN 14351-1:2006+A1:2010

Test standard/s:
EN 1026:2000-06
EN 1027:2000-06
EN 12211:2000-06
Correspond/s to the national standard/s (e.g. DIN EN)

Representation

Instructions for use

The manufacturer is allowed to use the results obtained for preparing a Declaration of Performance in accordance with the Construction Products Regulation 305/2011/EC. Observe the specifications set out by the applicable product standard.

Validity

The data and results refer solely to the tested and described specimen. Classification remains valid as long as the product and the above basis remain unchanged. The results can be extrapolated under the manufacturer's own liability subject to observance of the relevant specifications set out by the applicable product standard. This test/evaluation does not allow any statement to be made on any further characteristics regarding performance and quality of the construction presented; in particular the effects of weathering and ageing were not taken into account.

Notes on publication

The **ift**-Guidance Sheet "Advertising with ift test documents" applies. The cover sheet can be used as an abstract.

The report contains a total of 24 pages.

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Prüfung und Kalibrierung – EN ISO/IEC 17025
Inspektion – EN ISO/IEC 17020
Zertifizierung Produkte – EN ISO/IEC 17065
Zertifizierung Managementsysteme – EN ISO/IEC 17021

Notified Body 0757
PÜZ-Stelle: BAY 18

ilac-MRA
DAkkS Deutsche Akkreditierungsstelle D-PL-11349-01-00

1. Object

1.1 Description of test specimen

Product	double combined side-hung / tilt & turn window of overlapping design
Manufacturer, manufacturing plant	Uniform S.p.A.
Date of manufacture	28.06.2016
Profile system	uni_one COMPLANARE
Type of opening / opening direction	turn-only / tilt & turn active sash DIN right, inward opening inactive sash DIN left, inward opening
Frame material	timber with aluminium face layer
Overall frame dimensions (W x H)	1,500 mm x 1,500 mm
Overall sash dimensions (W x H)	active sash: 712 mm x 1,427 mm inactive sash: 712 mm x 1,427 mm
Frame member	further details are given in drawings
Designation / Type / Item No.	three-layer pine elements FD101/50
Frame joints	mortice and tenon joints with Hoffmann dovetail key
Supplementary profiles	aluminium profile LA791 on three sides, lateral and at top, mitred and welded, Nylon spacers LC62, fixed using screws 3.4 mm x 34 mm; aluminium profile LA791c – lower horizontal, mitred and welded, Nylon spacers LC62, fixed using screws 3.4 mm x 34 mm; aluminium profile LA786, butt-cut, with cover caps LC12a, fixed using screws 2.9 mm x 25 mm
Sash member	further details are given in drawings
Designation / Type / Item No.	three-layer pine elements FD128
Frame joints	mortice and tenon joints with Hoffmann dovetail key
Supplementary profiles	aluminium profile LA1028, mitred and welded, nylon spacers LC62, fixed using screws 3.4 mm x 34 mm; dummy mullion FD140, clipped and bolted using screws 4.0 mm x 50 mm; aluminium profile AL748, butt-cut, with cover caps LC748, Nylon spacers LC62, fixed using screws 3.4 mm x 34 mm
Rebate design	
Rebate drainage	6 slots 5 mm x 30 mm + 1 slot 5 mm x 26 mm inside aluminium profile La791c to outside front, distance between slots 165 mm, left end slot 165 mm from the internal edge of frame
Pressure equalisation	external rebate seal 100 mm notched at top, in front of centre of both sash
Rebate seal	
External – Frame / Aluminium profile	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE125

Corner design	butt-cut
External – Dummy mullion profile and connection sash – Dummy mullion profile	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE125
Corner design	butt-cut
Centre – Frame	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE100
Corner design	continuous, notched in corners, at top centre butt-jointed
Centre - Dummy mullion	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE30
Corner design	butt-cut
Internal rebate seal	
Material	Sealing material – TPE
Manufacturer	Uniform S.p.A.
Item No.	Triplex/D18
Corner design	continuous, notched in corners, at top centre butt-jointed
Corner design, inactive sash	on three sides, on lock side at top and bottom butt-cut
Infill panel	Insulating glass unit (IGU)
Type	Triple IGU
Total thickness	44 mm
Configuration	Float 4 / cavity 16 / float 4 / cavity 16 / float 4
Incorporation of infill panel	
Vapour pressure equalisation	3 mm gap between timber profile and aluminium face layer of sash
Glazing gasket, external	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE117
Corner design	continuous, at top centre butt-jointed
Glazing gasket, internal	
Material	Sealing material – EPDM
Manufacturer	Uniform S.p.A.
Item No.	DE92
Corner design	butt-cut and butt-jointed, additional sealed using pourable sealant
Additional part of internal glazing gasket	
Material	Sealing material – silicone
Manufacturer	Dow Corning Europe S.A.

Item No.	DOW CORNING ® 776 INSTNAT FIX WB BLACK; DCS600 – Uniform code
Corner design	continuous

Hardware

Manufacturer / Type	tilt and turn hardware, SIEGENIA TITAN
Hinges / Bearings	active sash: 1 tilt mechanism pivot, 1 corner pivot inactive sash: 1 pivot bearing, 1 corner pivot
Number of locking devices	active sash: at bottom 1, at top 1, on hinge side 2, on lock case front 1 inactive sash: at bottom 1, at top 1, on hinge side 1
Maximum locking distance	780 mm
Position of locking devices	Neutral

The description is based on information provided by the client and inspection of the test specimen at the **ift** (item designations / numbers as well as material specifications were provided by the client unless stated *"**ift**-checked"*).

Test specimen representations are documented in the Annex "Representation of product/test specimen". The design details were examined solely on the basis of the characteristics / performance to be classified. The drawings are based on unchanged documentation provided by the client unless stated otherwise. The photographs were taken by the ift Rosenheim unless stated otherwise.

1.2 Sampling

The below sampling data were provided to the ift:

Sampling by:	Uniform S.p.A., 37046 Minerbe VR (Italy)
Date:	08.09.2016
Verification:	A sampling report has been provided to the **ift**.
Delivered on:	15.09.2016
ift specimen No:	16-000911-PK01 / WE: 42169-001

2. Procedure

2.1 Basis*) referring to methods

Testing

EN 1026:2000-06
Windows and doors - Air permeability - Test method
EN 1027:2000-06
Windows and doors - Watertightness - Test method
EN 12046-1:2003-11
Operating forces - Test method - Part 1: Windows
EN 12211:2000-06
Windows and doors - Resistance to wind load - Test method

Classification / Evaluation

EN 12207:1999-11
Windows and doors - Air permeability - Classification
EN 12208:1999-11
Windows and doors - Watertightness - Classification
EN 12210:1999-11/AC:2002-08
Windows and doors - Resistance to wind load - Classification

*) and the equivalent national versions, e.g. DIN EN

2.2 Brief description of procedure

Air permeability - EN 1026

Prior to testing, the operating forces are determined as per EN 12046-1 for the release / locking operation of the hardware.

Air permeability is tested in accordance with EN 1026 and conducted in steps at negative pressure and positive pressure up to the maximum test pressure difference. Leakages of the test set-up are made visible using artificially generated fog and sealed using permanently resilient sealant. The test specimen is exposed to three pressure pulses Δp_{max} + 10 % or at least 500 Pa. This is followed by measurement of air permeability for the respective pressure steps.

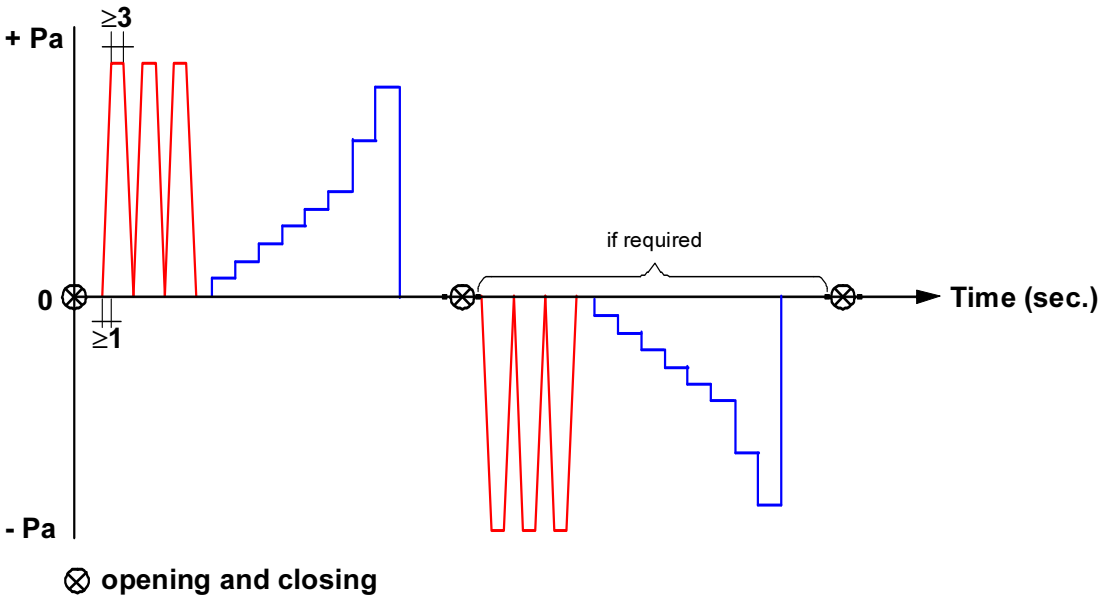


Illustration Test sequence for air permeability

Watertightness - EN 1027

Watertightness is tested in accordance with EN 1027 up to the maximum test pressure difference. The external face of the test specimen is subjected to constant spraying of water by an upper row of nozzles at a flow rate of approx. 2 l/min per nozzle while increments of positive test pressure are applied at regular intervals. For test specimen exceeding 2.50 m in overall height, additional rows of nozzles are fixed at vertical intervals at 1.5 m below the top nozzle line. The water flow rate of the additional nozzle rows is approx. 1 l/min per nozzle.

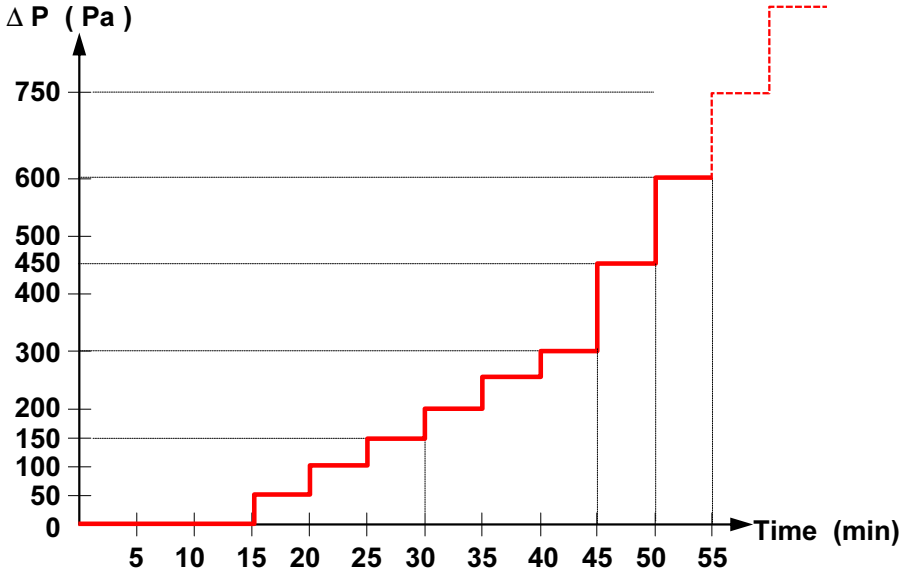


Illustration Test sequence for watertightness

Resistance to wind load - Deflection and alternating negative/positive pressures - EN 12211

Resistance to wind load is tested in accordance with EN 12211 and conducted in steps at negative pressure and positive pressure up to the test pressure p_1. The test specimen is exposed to three pressure pulses Δp_1 + 10 %. This is followed by determination of the frontal deflection of test specimen for each pressure step when exposed to positive test pressure Δp_1 and negative test pressure Δp_1. Then the test specimen is subjected to 50 cycles including negative and positive pressures of $\pm \Delta p_2 = \Delta p_1$ - 50 %.

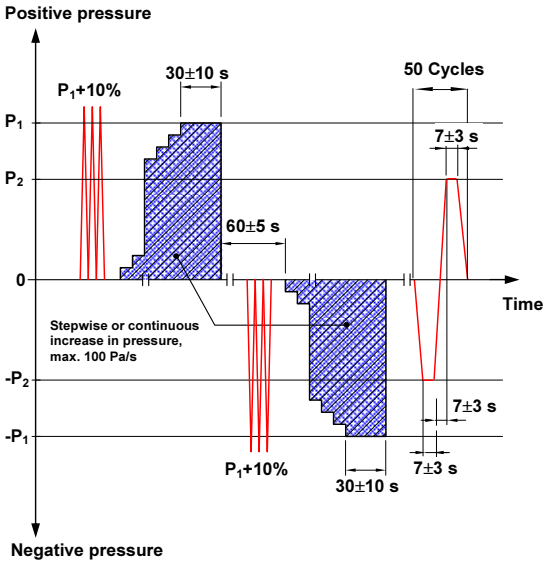


Illustration Test sequence for resistance to wind load

Air permeability – Repeat test - EN 1026

Following resistance to wind load test for p_1 (deflection) and p_2 (alternating positive/negative pressure), air permeability must not exceed by more than 20% the upper limit of the specified class as set out by EN 12207.

Resistance to wind load – Safety test - EN 12211

The wind resistance test (safety test) is conducted at negative pressure and positive pressure in accordance with EN 12211 up to test pressure $\Delta p_3 = p_1 + 50\ \%$.

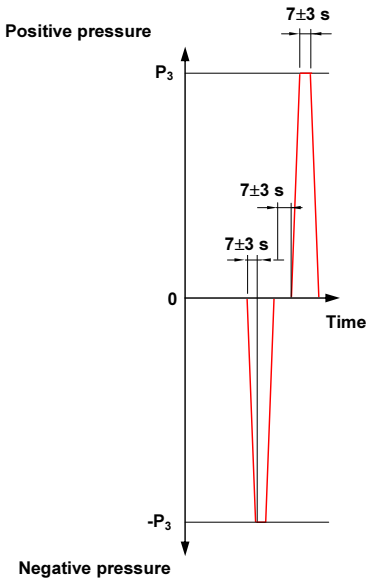


Illustration Test sequence for safety test

3. Detailed results

Air permeability - Test according to EN 1026

Project-No.	16-000911-PR01	**Task No.**	16-000911
Client	UNIFORM S.p.A., Via dell'Agricoltura 36, Minerbe, Italy		
Basis of test	EN 1026:2000-06 Windows and doors - Air permeability - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb DM/020521 - Drehmomentschlüssel SENSOTORK 60 Nm		
Test specimen	Double vent window		
Test specimen No.	42169-001		
Date of test	15. September 2016		
Responsible test engineer	Kolacny Robert		
Tester	Mario Šimunović		

Information to test assembly and testing method

Testing method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame	1500 mm	x	1400 mm
Size of active leaf	712 mm	x	1427 mm
Size of inactive leaf	712 mm	x	1427 mm
Area of test specimen	2,10 m²		
Length of opening joints	7,13 m		

Table: Measurement of operating forces

Individual measured result	1	2	3	Average value
in Nm	6,1	6,0	6,0	6,0

Initial load before positive wind pressure and negative wind pressure respectively: 660 Pa

Table: Air permeability at positive wind pressure

Measured results at positive wind pressure	Pressure differential in Pa		50	100	150	200	250	300	450	600
	Flow rate (volume)	m³/h	0,76	1,30	1,75	2,30	2,68	2,96	4,31	5,51
	Joint lenght-related	m³/hm	0,11	0,18	0,25	0,32	0,38	0,41	0,60	0,77
	Overall area-related	m³/hm²	0,36	0,62	0,83	1,09	1,28	1,41	2,05	2,62

Table: Air permeability at negative wind pressure

Measured results at negative wind pressure	Pressure differential in Pa		50	100	150	200	250	300	450	600
	Flow rate (volume)	m³/h	0,98	1,53	1,94	2,25	2,48	2,79	4,17	6,48
	Joint lenght-related	m³/hm	0,14	0,21	0,27	0,32	0,35	0,39	0,58	0,91
	Overall area-related	m³/hm²	0,46	0,73	0,92	1,07	1,18	1,33	1,99	3,08

Table: Air permeability from average values from positive and negative wind pressures

Average value from positive and negative wind pressures	Pressure differential in Pa		50	100	150	200	250	300	450	600
	Flow rate (volume)	m³/h	0,9	1,4	1,8	2,3	2,6	2,9	4,2	6,0
	Joint lenght-related	m³/hm	0,12	0,20	0,26	0,32	0,36	0,40	0,59	0,84
	Overall area-related	m³/hm²	0,41	0,67	0,88	1,08	1,23	1,37	2,02	2,85

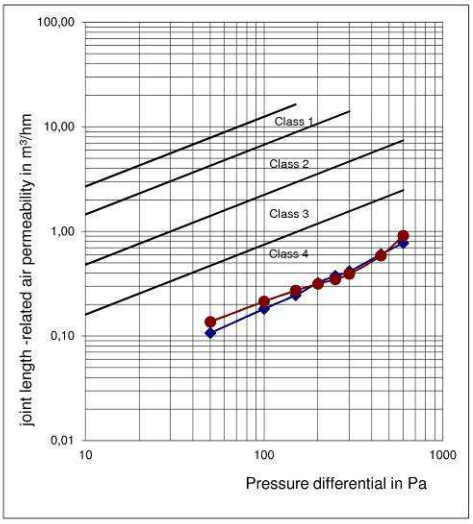


Diagram: Joint length-related air permeability (positive and negative wind pressures)

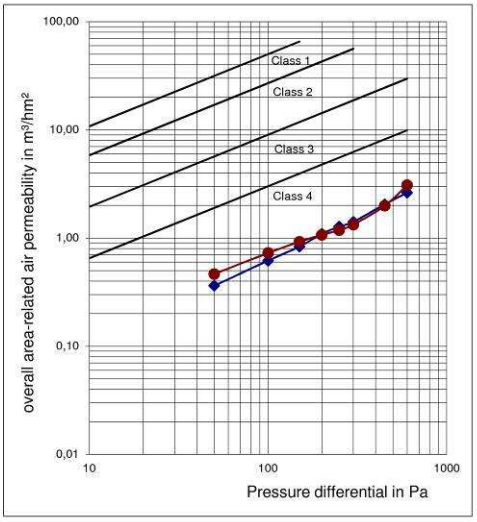


Diagram: Overall area-related air permeability (positive and negative wind pressures)

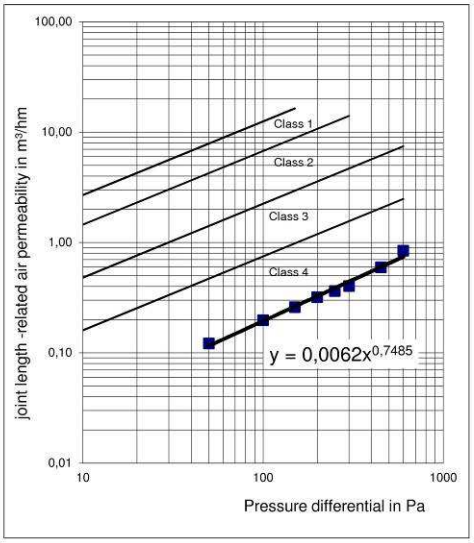


Diagram: Joint length-related air permeability (average value from positive and negative wind pressures)

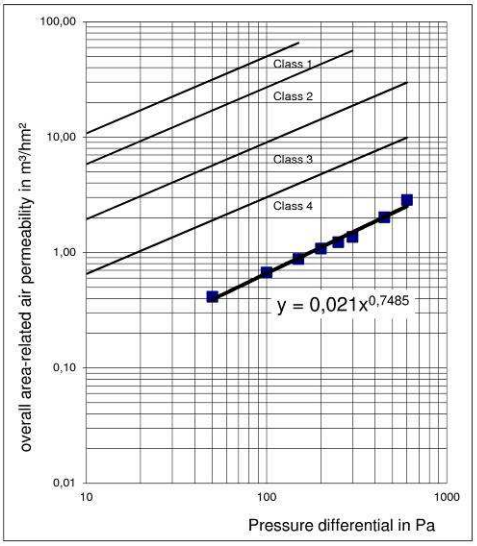


Diagram: Overall area-related air permeability (average value from positive and negative wind pressures)

Table: Measured results

Reference air permeability related to joint length	Q100 =	0,19	m³/hm
Reference air permeability related to overall area	Q100 =	0,66	m³/hm²

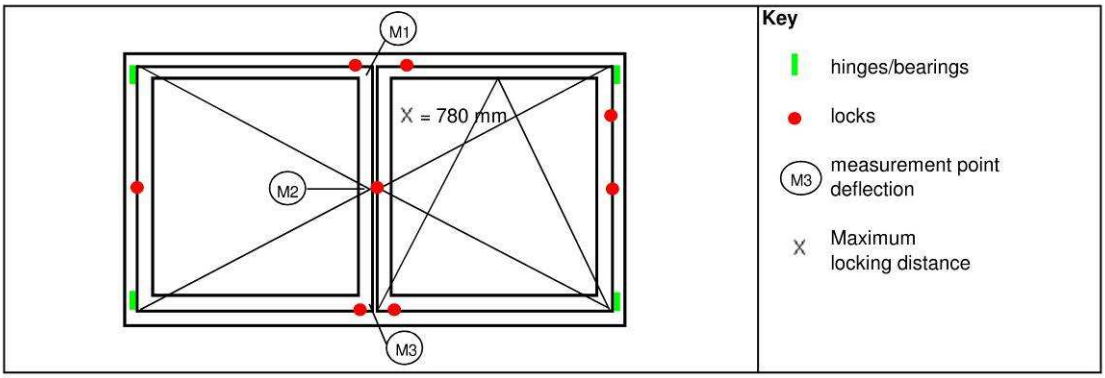
Resistance to wind load, deflection and dynamic wind load - Test according to EN 12211

Project-No.	16-000911-PR01 **Task No.** 16-000911
Client	UNIFORM S.p.A., Via dell'Agricoltura 36, Minerbe, Italy
Basis of test	EN 12211:2000-06 Windows and doors - Resistance to wind load - Test method
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb
Test specimen	Double vent window
Test specimen No.	42169-001
Date of test	15. September 2016
Responsible test engineer	Kolacny Robert
Tester	Mario Šimunović

Information to test configuration / Test method

Test method	There were no deviations from test method or test conditions.

Testing procedure



Maximum test pressure: ± 2000 Pa 3 pressure pulses of 2200 Pa

Table: Maximum deflection for classification at effective span l = 1427 mm

Class		maximum permissible relative deflection in mm
A	**(l/150)**	9,5
B	**(l/200)**	7,1
C	**(l/300)**	4,8

Table: Measured results of frontal deflection in mm at negative / positive wind pressures

		Positive wind pressure					Negative wind pressure				
Measured results of frontal deflection in mm	**p_1 in Pa**	400	800	1200	1600	2000	-400	-800	-1200	-1600	-2000
	M1 in mm	0,4	0,8	1,4	2,0	2,6	0,9	1,7	2,3	2,7	3,2
	M2 in mm	0,6	1,4	2,4	3,4	4,4	0,9	2,1	3,2	4,2	5,1
	M3 in mm	0,3	0,7	1,0	1,5	2,0	0,5	1,0	1,6	2,0	2,4
	f_{rel} in mm	0,3	0,7	1,1	1,6	2,1	0,2	0,7	1,3	1,8	2,3
	l/f_{rel}	5416	2083	1241	871	687	5958	1914	1110	791	613

Table: Permanent deformation measured at 0 Pa after 60 seconds

		Pos.pr.	Neg.pr.
Permanent deflection	**M1 in mm**	0,0	0,1
	M2 in mm	0,0	0,1
	M3 in mm	0,0	0,1
	f_{rel} in mm	0,0	0,0

Key

p_1	Test pressrue
M1, M2, M3	frontal dislodgement at measurement points M1, M2, M3
f	frontal deflection

Dynamic wind loads (negative / positive pressures)

Table: pressure pulses

p_2	Pa	200	400	600	800	1000
passed						✓

50 cycles at p_2 ± 1000 Pa

No malfunctions were detected.

Repeat test of air permeability - Test according to EN 1026

Project-No.	16-000911-PR01	**Task No.**	16-000911
Client	UNIFORM S.p.A., Via dell'Agricoltura 36, Minerbe, Italy		
Basis of test	EN 1026:2000-06 Windows and doors - Air permeability - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Double vent window		
Test specimen No.	42169-001		
Date of test	15. September 2016		
Responsible test engineer	Kolacny Robert		
Tester	Mario Šimunović		

Information to test configutation / Test method

Test method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame	1500 mm	x	1400 mm
Size of active leaf	712 mm	x	1427 mm
Size of inactive leaf	712 mm	x	1427 mm
Area of test specimen	2,10 m²		
Length of opening	7,13 m		

Subsequent to the test of resistance of wind load by application of test pressure p_1 and p_2 the upper limit of the achieved air permeability class must not be exceeded by more than 20% as set out by EN 12207

The requirements were fulfilled.

Watertightness - Test according to EN 1027

Project-No.	16-000911-PR01	**Task No.**	16-000911
Client	UNIFORM S.p.A., Via dell'Agricoltura 36, Minerbe, Italy		
Basis of test	EN 1027:2000-06 Windows and doors - Watertightness - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Double vent window		
Test specimen No.	42169-001		
Date of test	15. September 2016		
Responsible test engineer	Kolacny Robert		
Tester	Mario Šimunović		

Information to test assembly and testing method

Testing method	There were no deviations from test method or test conditions.

Testing procedure

Size of window frame 1500 mm x 1400 mm

Number of spray nozzles	4	Lower nozzle line	
Water amount	480 l/h 0,48 m³/h	Water amount	0 l/h 0 m³/h

Spray method A

No water penetration at up to 1350 Pa detected.

Resistance to wind load, Safety test - Test according to EN 12211

Project-No.	16-000911-PR01	**Task No.**	16-000911
Client	UNIFORM S.p.A., Via dell'Agricoltura 36, Minerbe, Italy		
Basis of test	EN 12211:2000-06 Windows and doors - Resistance to wind load - Test method		
Used test equipment	EPst/026026 - LWW Prüfstand - euroinspekt-drvokontrola d.o.o, - Zagreb		
Test specimen	Double vent window		
Test specimen No.	42169-001		
Date of test	15. September 2016		
Responsible test engineer	Kolacny Robert		
Tester	Mario Šimunović		

Information to test assembly and testing method

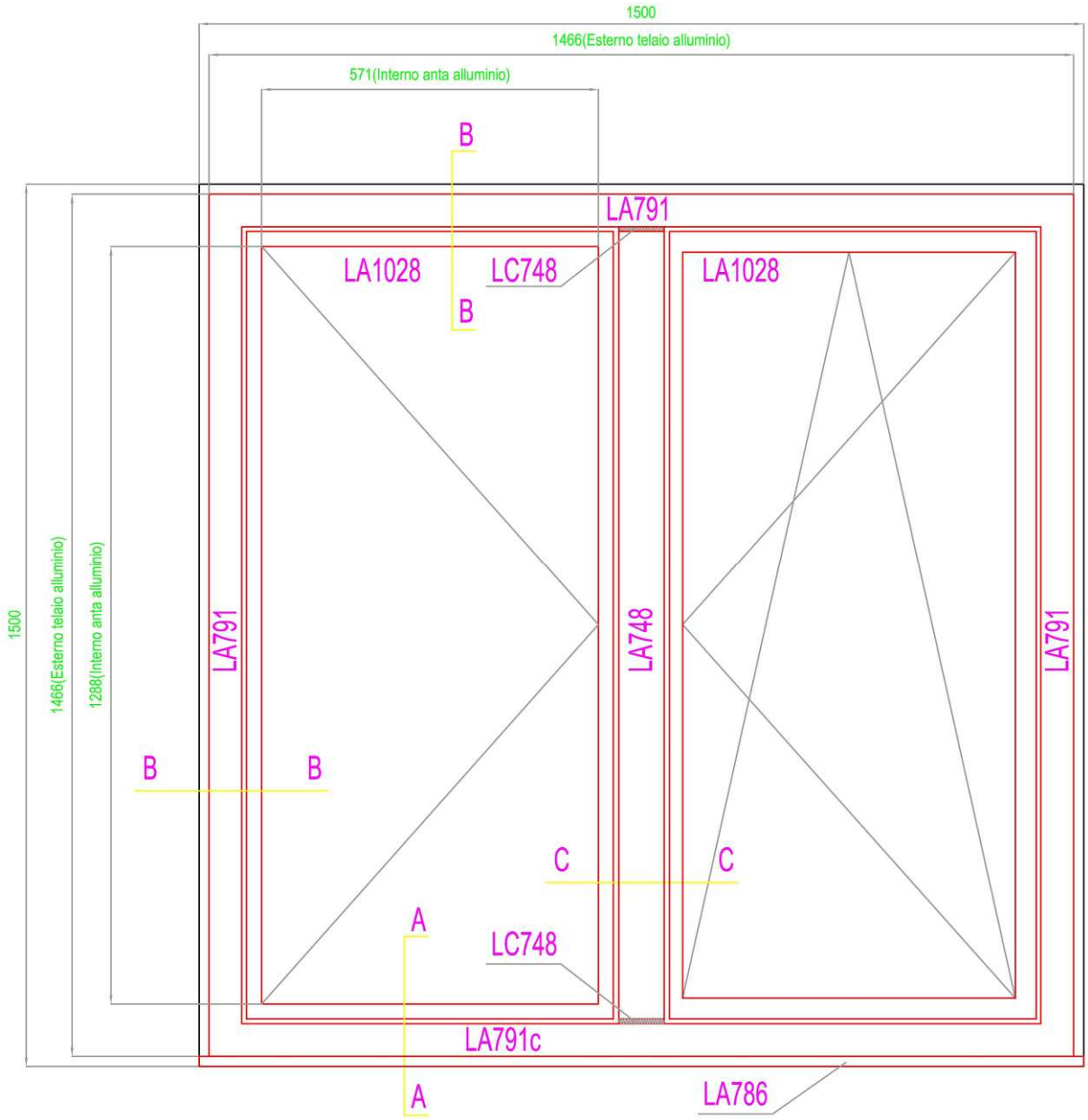
Testing method	There were no deviations from test method or test conditions.

Safety test

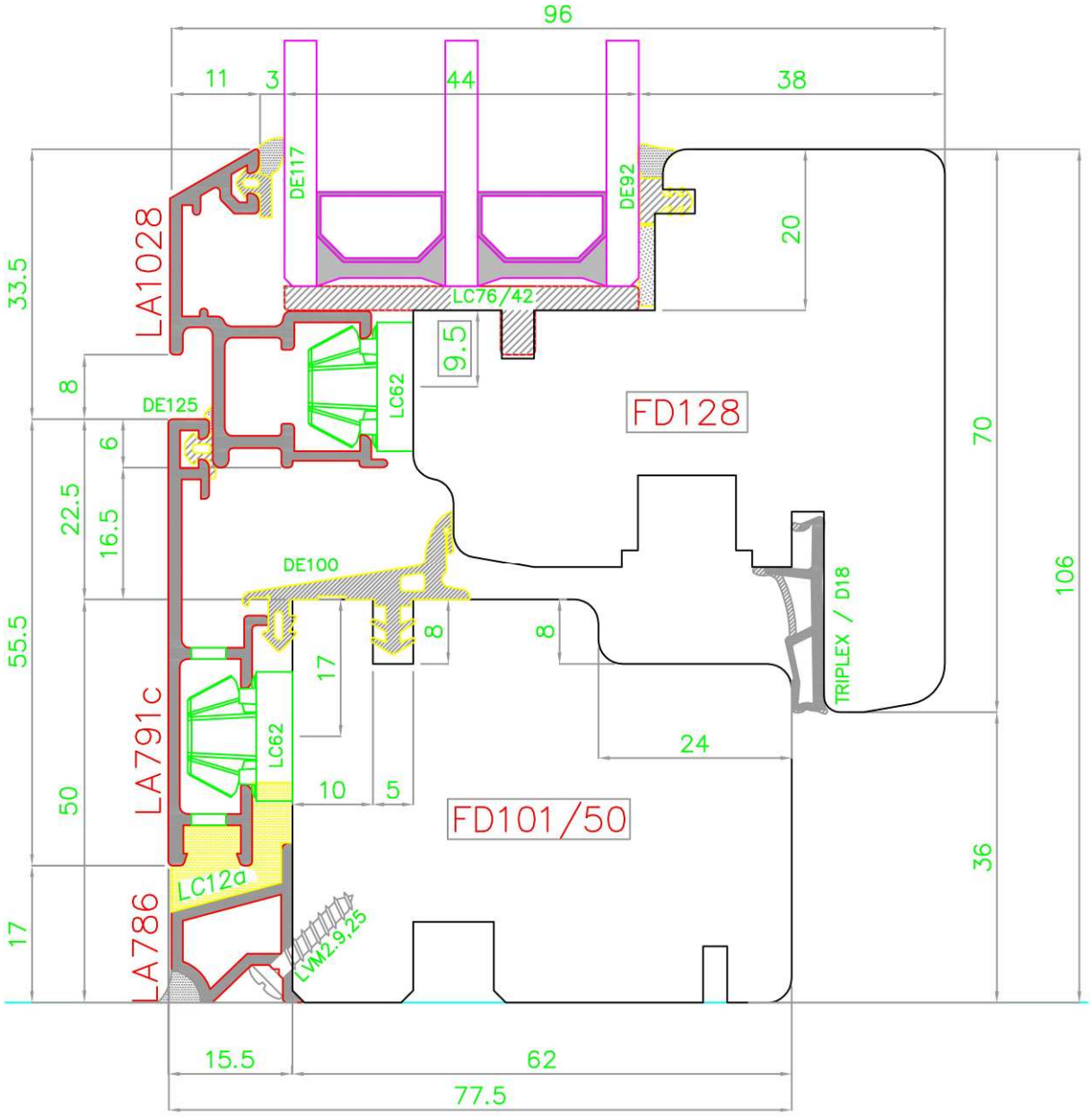
Table: Pressure steps

		Positive wind pressure					Negative wind pressure				
p_3	Pa	600	1200	1800	2400	3000	-600	-1200	-1800	-2400	-3000
passed						✓					✓

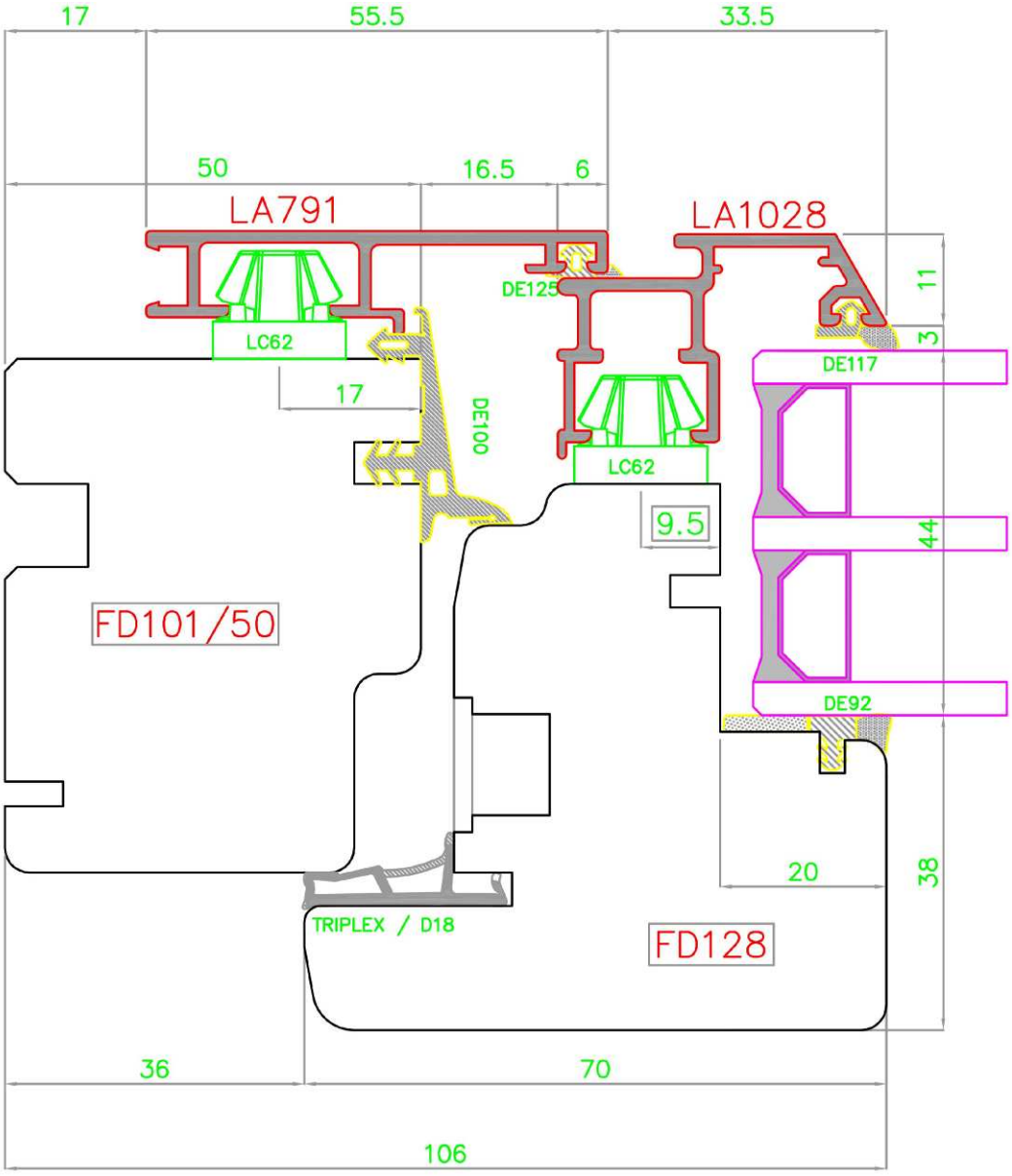
Safety test passed at up to p_3 ± 3000 Pa.



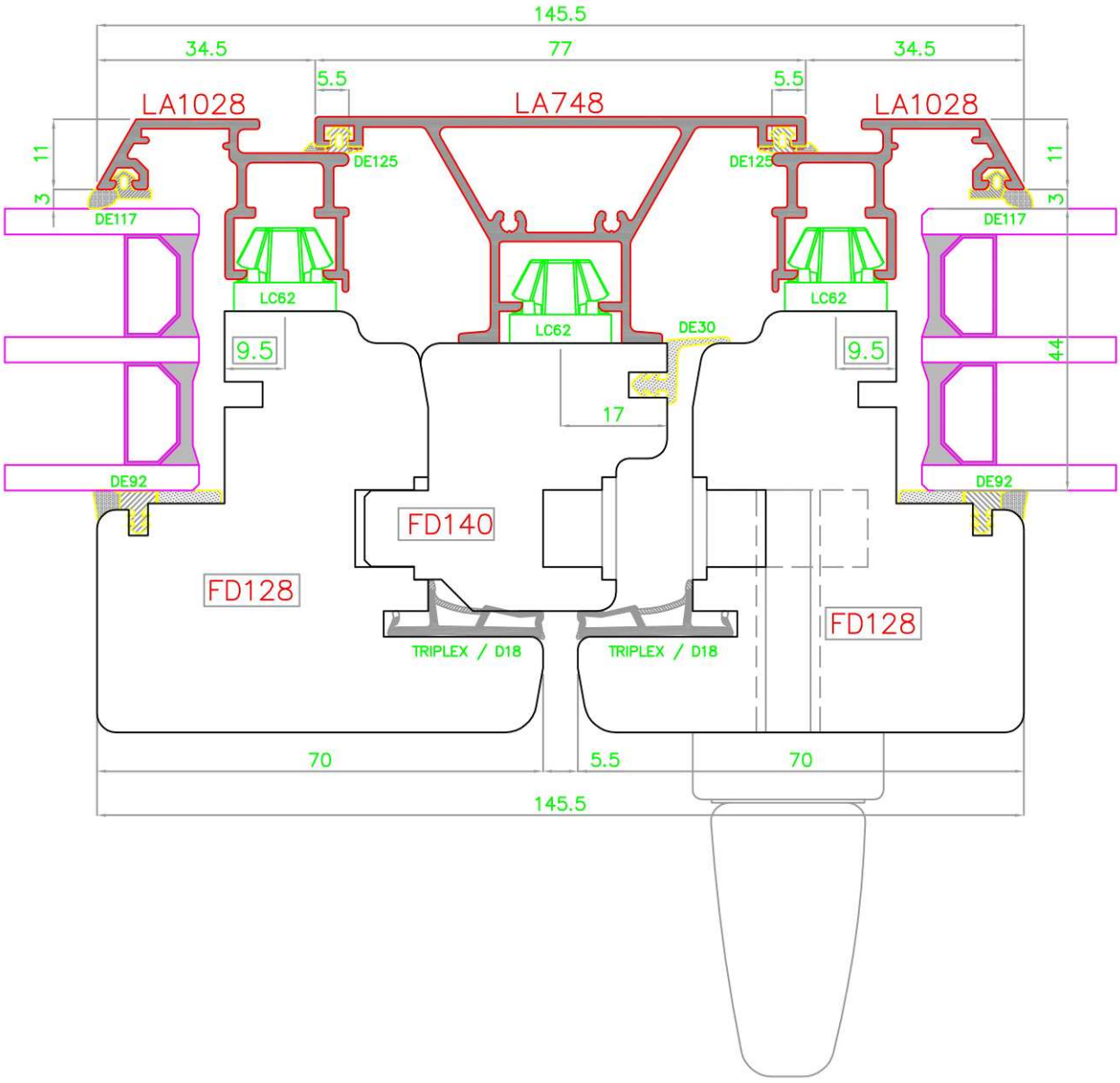
Drawing 1
Test specimen



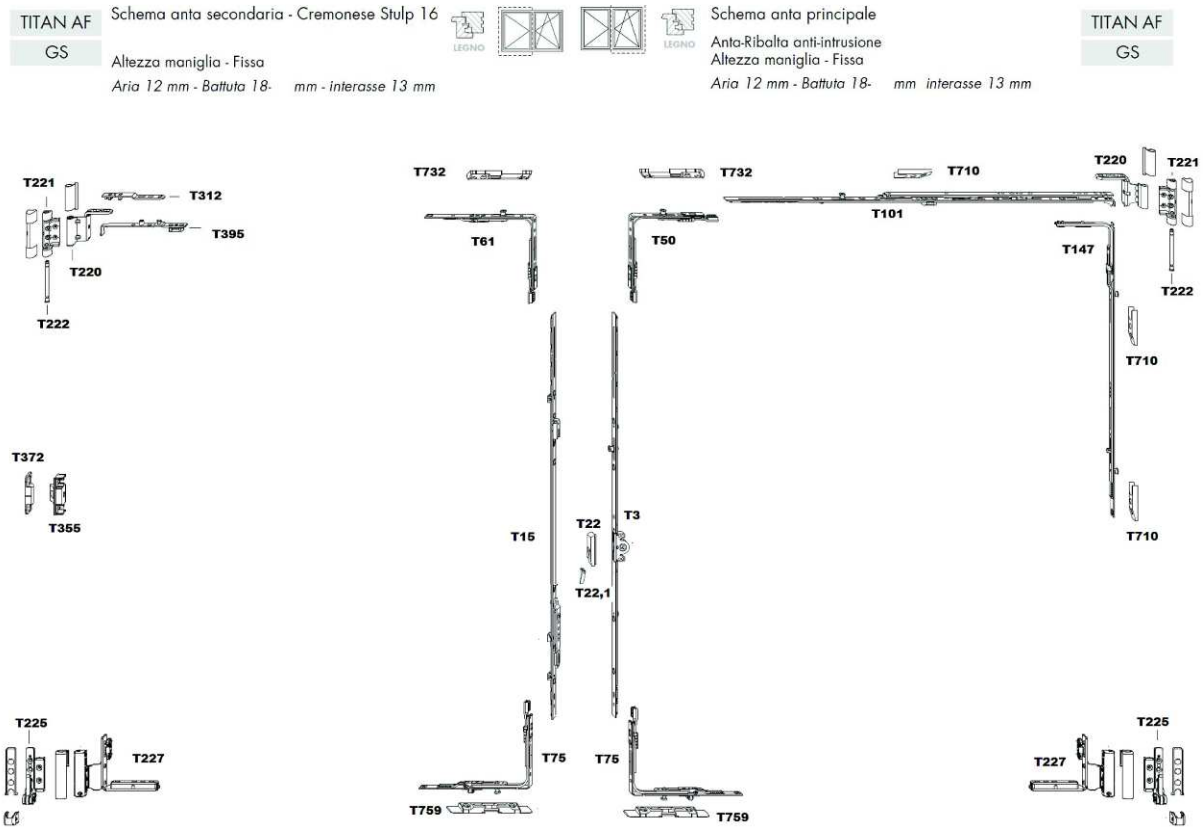
Drawing 2
Vertical section A - A



Drawing 3
Horizontal section B - B



Drawing 3
Horizontal section C - C



Drawing 4
Parts list, hardware

Number of item	Code	Description ITA	Description ENG	Pcs
T3	TGKK4170-100010	CREMONESE 15 AF GK		1
T15	TGKS4140-100011	CREMONESE STULP 16 AF GK - ASTA A LEVA		1
T22	TFBS0010-040012	CONF. SALVA FALSA MANOVRA		1
T22,1	TFFD0021-023010	LINGUETTA IN PVC	pressure piece 13 lh.	1
T50	TEUL4010-100010	ANGOLO AF VSO 140X140 1RS	corn.driveAFVSU	1
T61	TEUL4110-100010	ANGOLO AF VSO/K DF 1RS	corn.driveAFVSU	1
T75	TEUL5010-100010	ANGOLO AF VSU/K FH 1S	corn.driveAFVSU	2
T101	TSKK2010-100011	FORBICE AF		1
T147	TEUL2390-100015	ANGOLO BS/K3 2RS	corn.driveAFVSU	
T220	TBWB7030-100011	BANDELLA ANGOLARE H-DH TITAN		2
T221	TBSL7010-100011	SUPPORTO FORBICE H TITAN		2
T222	TBSB6020-100012	PERNO SUPPORTO FORBICE POLY TITAN		2
T225	TBEL7011-100010 TBEL7012-100010	SUPPORTO D'ANGOLO H TITAN		2
T227	TBFE7031-100012 TBFE7032-100012	CERNIERA A SQUADRA H TITAN		2
T312	TSAD0010-100011	BRACCETTO FORBICE DF		1
T355	700655	CHIUSURA MEDIANA A SCOMPARSA ANTA	sash part MV conc. with groove	1
T372	FRZM0150-040010	CHIUSURA MEDIANA A SCOMPARSA TELAIO	frame part MV 13 A4500	1
T395	TSSD0020-100010	BRACCETTO BASE DF/MN		1
T710	FRSB0041-100010	RISCONTRO 56	striker plate 56 A4500 lh.	3
T732	TRSK0381-100010 RSK0382-100010	RISCONTRO S-RS	striker plate SL-RS A4500 lh.	2
T759	FRKA0231-100011 FRKA0232-100011	RISCONTRO RIBALTA S-ES FH	tilt lock bear. S-ES FH WK 2	2

Drawing 4
Parts list, hardware

Photo 1
Test specimen on test rig
window closed

Photo 2
Frame, corner design

Photo 3
Sash, corner design

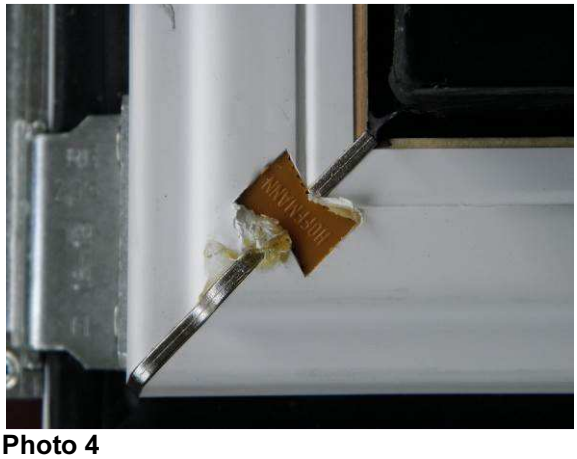


Photo 4
Sash, corner design

Photo 5
Sash, corner design

Photo 6
Frame, corner design at top, seen from outside

Photo 7
Frame, corner design at bottom, seem from outside

Photo 8
External rebate seal, corner design

Photo 9
Cross section of external rebate seal

Photo 10
Seal – connection sash – dummy mullion profile, corner design

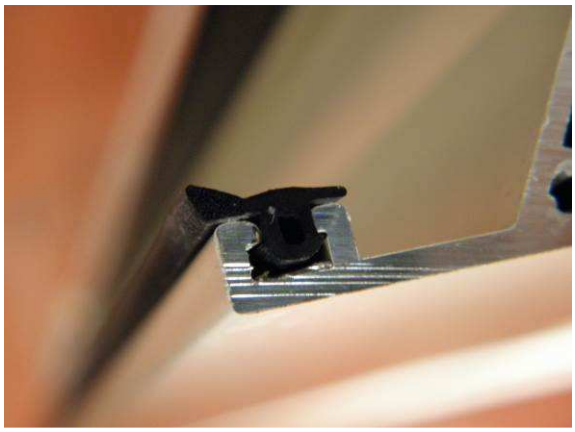


Photo 11
Cross section of seal – connection sash– dummy mullion profile

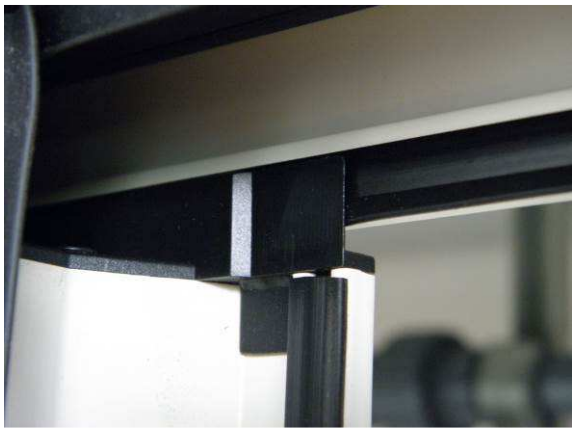


Photo 12
External rebate seal – dummy mullion profile, corner design

Photo 13
Cross section of external rebate seal – dummy mullion profile

Photo 14
Centre seal – frame, corner design

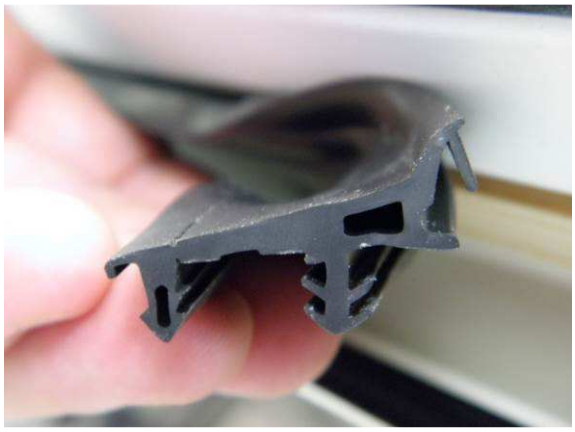


Photo 15
Cross section of centre seal

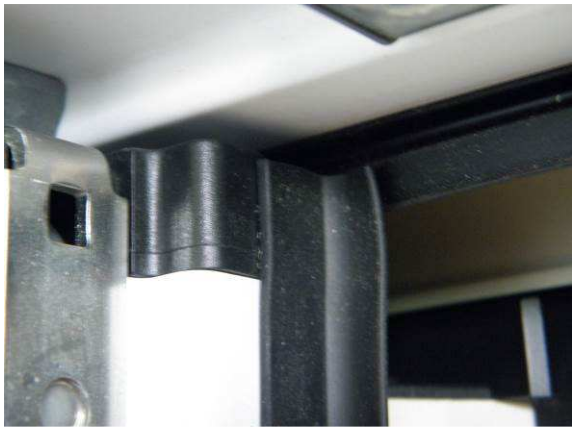


Photo 16
Centre seal – dummy mullion profile, corner design

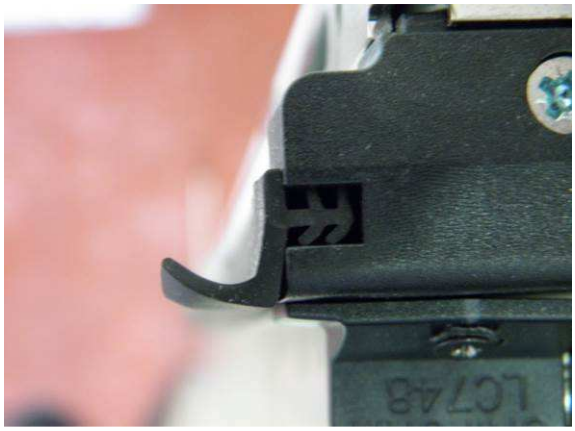


Photo 17
Cross section of centre seal – dummy mullion profile

Photo 18
Internal rebate seal, corner design

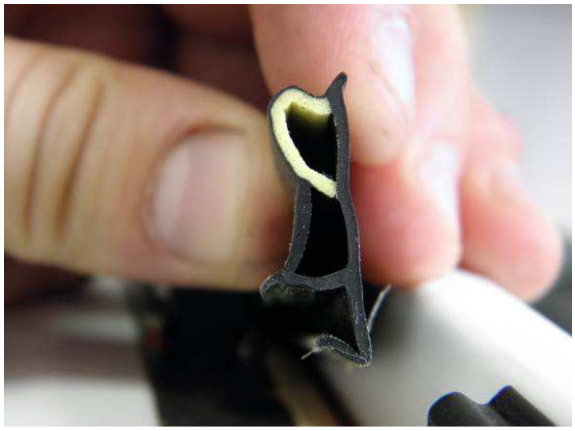


Photo 19
Cross section of internal rebate seal

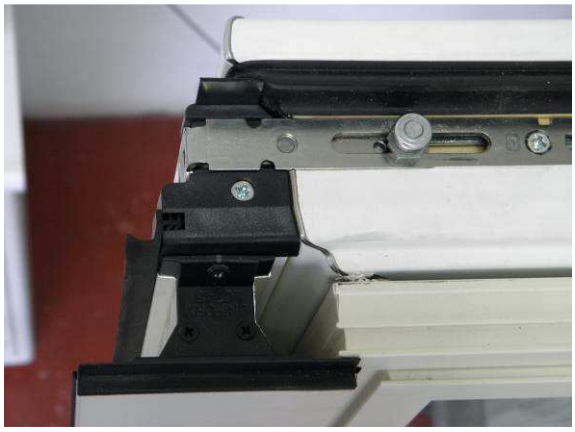


Photo 20
Overlap end cap, at top

Photo 21
Overlap end cap, at bottom

Photo 22
External glazing gasket, corner design

Photo 23
Cross section of external glazing gasket

Photo 24
Internal glazing gasket, corner design

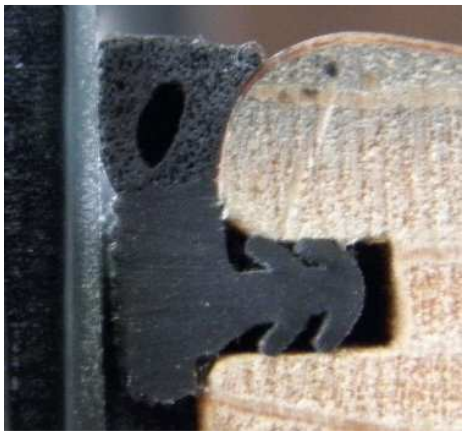


Photo 25
Cross section of internal glazing gasket

Photo 26
Tilt mechanism pivot, seen from rebate

Photo 27
Corner pivot, seen from rebate

Photo 28
PVC spacers, sash member

Photo 29
PVC spacers, dummy mullion profile

Photo 30
Position plan of locking devices

Pos. 1	
Pos. 2	
Pos. 3	
Pos. 4	
Pos. 5	

Photo 31
Key position plan

Photo 32
Locking situation 1

Photo 33
Locking situation 2

Photo 34
Locking situation 2

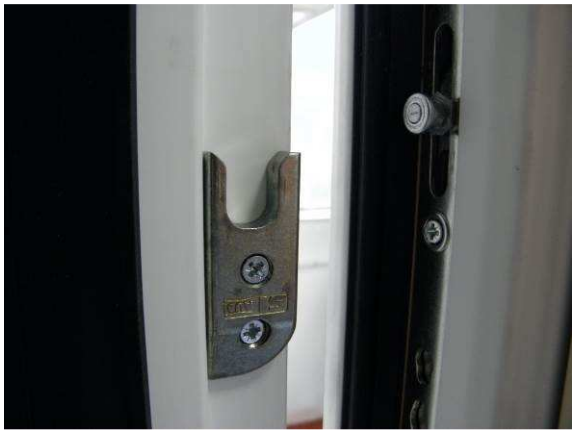


Photo 35
Locking situation 3

Photo 36
Locking situation 4

Photo 37
Locking situation 4

Photo 38
Locking situation 5

Photo 39
Locking situation 5