IAN BENNIE AND ASSOCIATES

TEST REPORT NO. 6026-S4-NZ-2014

ZENDOW UPVC 6 PANEL TILT-TURN AND FIXED WINDOW PROTOTYPE TEST to NZS 4211-2008

for

DECEUNINCK

March 2019

NATA

Accreditation No. 2371
Accredited for compliance with ISO/IEC 17025 - Testing

IAN BENNIE & ASSOCIATES PTY. LTD.
Building Performance Testing

ACN : 007 133 253

TEST REPORT NUMBER 6026-S4-NZ-2014

CAVEAT: THIS REPORT IS BASED ON THE PREMISE THAT NO DETAILING OR MATERIAL HAS CHANGED SINCE THE ORIGINAL 2006 TEST - NO LIABILITY FOR ANY SUBSEQUENT CHANGES IS APPLICABLE

Test Client: **DECEUNINCK**

Sample Identification: A Zendow UPVC 6 Panel Tilt-Turn and Fixed Window, measuring 2100 mm in height x 2700 mm in width. The sample is detailed in the DECEUNINCK drawings given in Appendix B .

Test Method: Tests were conducted and performance was assessed in accordance with the Serviceability Deflection, Air Infiltration, Water Penetration and Ultimate Strength procedures of New Zealand Standard NZS4211:2008, as detailed in Appendix A

Torsional tests and Operating Resistance force tests were not requested by the Client.

Note: The tests to this New Zealand Standard were conducted in conjunction with tests to Australian Standard AS2047.

Test Location: IBA Test Centre
Dandenong, Melbourne.

Test Date(s): 13 April 2006.

Pre-loading: The sample was operated five (5) times prior to the commencement of testing.

1 Luisa Avenue, Dandenong 3175, Victoria , Australia
Telephone : (03) 9768 3640 International : +613 9768 3640 Facsimile: (03) 9768 3642

TEST RESULTS

Serviceability Deflection Test

Deflections recorded:

	Requirement span/200	
Pressure (Pa)	**+1060**	**-970**
MULLION		
Deflection	Span/254	Span/250
SASH BOTTOM RAIL		
Deflection	Span/1328	Span/2681

All test readings and calculated deflections are given in Table 1 and measurement locations are indicated on Figure 1.

Air Infiltration Test

Air Leakage Recorded (L / s.m^2)	**Pressure Applied (Pa)**	
Condition	**+150**	**-150**
Chamber & Sample (A):	0.24	-0.23
Chamber (sample taped) (B):	NR	NR
Sample (A-B):	**0.24**	**-0.23**

Sash joint length: 7.00 m

Air Leakage Recorded (L / s.m of joint)	**0.19**	**-0.19**

NR: measurement not required

Water Leakage Test 330 Pa

Water penetrated onto the glazing seal of the bottom LH light during the test but was not 'significant leakage' and therefore does not constitute a failure.

Overall Strength Test: +2300 Pa & -2300 Pa

No sign of collapse was observed at either test pressure.

CONCLUSION

The Zendow UPVC 6 Panel Tilt-Turn and Fixed Window sample achieved the following ratings per NZS4211:2008 Amd 1 for Serviceability Deflection, Air Infiltration, Water Penetration and Ultimate Strength.*

For buildings not requiring specific design

Window Rating (SLS) .... HIGH Wind Zone

Window Rating (ULS) ... EXTRA HIGH Wind Zone

Air Leakage ..... Air conditioned

For buildings requiring specific design

Window rating for SLS .....+1060 and -970 Pa

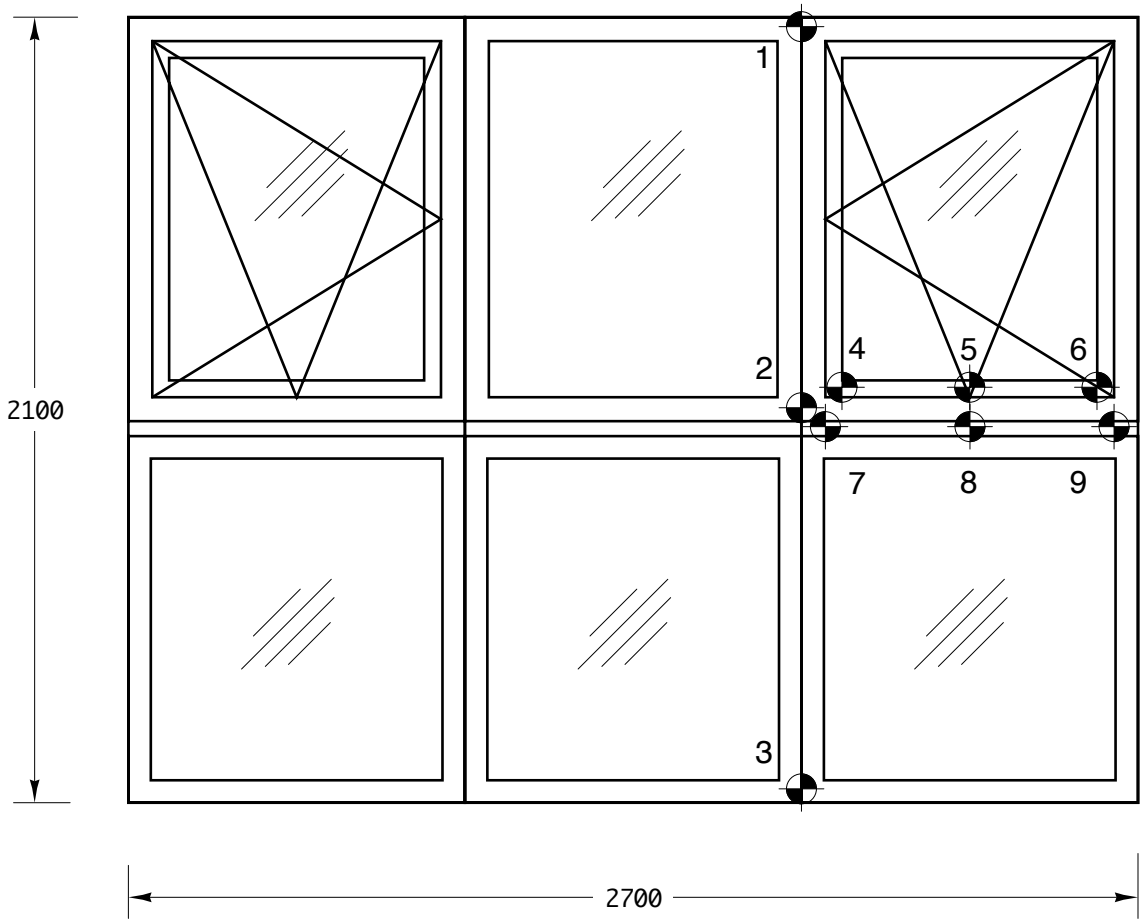
Window rating for ULS.....+2300 and -2300 Pa

Air Leakage .....Air conditioned

* Torsional tests and Operating Resistance force tests were not requested by the Client.

DISTRIBUTION:
Ian Bennie & Associates 3
DECEUNINCK ..... PDF

Ian Bennie 19 March 2019
Authorised Signatory



INDOOR VIEW

Displacement measurement locations:

1. Mullion - top
2. Mullion- centre
3. Mullion - bottom
4. Sash Bottom Rail - left
5. Sash Bottom Rail - centre
6. Sash Bottom Rail - right
7. Transom - left
8. Transom - centre
9. Transom - right

Figure 1. Indoor view of the test sample showing the displacement measurement locations.

Table 1

STRUCTURAL PERFORMANCE

DATAFILE 531		TEST NUMBER 1			DATE : 13/04/2006		
MEMBER	PRESSURE	DISPLACEMENTS (rounded to 0.1 mm)			BENDING DEFLECTION (rounded to 0.01 mm)	SPAN	SDR
		LEFT OR TOP	CENTRE	RIGHT OR BOTTOM	$DC - \frac{D1+D2}{2}$		
	(kPa)	D1 (mm)	DC (mm)	D2 (mm)	DEF (mm)	L (mm)	L/DEF
1,2,3	MULLION						
	0.38	0.4	3.2	0.4	2.80	2082	744
	0.74	1.3	6.8	1.0	5.62		370
	1.06	2.2	10.2	1.7	8.20		254
	1.45	3.1	14.1	2.5	11.31		184
	1.51	3.3	14.8	2.7	11.80		176
	0.01	0.4	0.5	0.4	0.16		13144
	-0.37	-0.3	-3.4	-0.7	-2.94		-707
	-0.74	-0.6	-7.2	-1.5	-6.12		-340
	-0.97	-1.0	-10.0	-2.3	-8.32		-250
	-1.36	-1.3	-13.9	-3.0	-11.70		-178
	-1.53	-1.5	-15.7	-3.4	-13.19		-158
	-0.00	-0.5	-1.5	-1.4	-0.54		-3875
4,5,6	SASH BOTTOM RAIL						
	0.38	0.5	2.2	3.4	0.24	702	2959
	0.74	1.2	4.5	7.1	0.39		1792
	1.06	1.9	6.9	10.7	0.53		1328
	1.45	2.8	9.7	15.0	0.76		928
	1.51	3.0	10.1	15.6	0.76		924
	0.01	0.1	0.3	0.6	0.03		24941
	-0.37	-0.6	-2.0	-3.3	-0.10		-7335
	-0.74	-1.2	-4.2	-6.9	-0.17		-4043
	-0.97	-1.7	-5.8	-9.5	-0.26		-2681
	-1.36	-2.3	-8.2	-13.4	-0.39		-1783
	-1.53	-2.6	-9.3	-15.1	-0.38		-1832
	-0.00	-0.2	-0.5	-0.9	0.02		33872

APPENDIX A - Test Procedures for NZS 4211:2008 - Amd 1

1Preparation for Tests - AS4420.1-1996

Test Description

Prior to commencement of the main tests listed below, any operable windows or doors are to be opened and close five (5) times. The sample is to be subject to positive or negative wind pressures being 50% of the nominated deflection test pressures. This is a pre-requirement for each of the main tests. However, when more than one of the tests is to be conducted the preparations need only be conducted once.

2Serviceability Deflection Test - AS4420.2-1996

Test Description

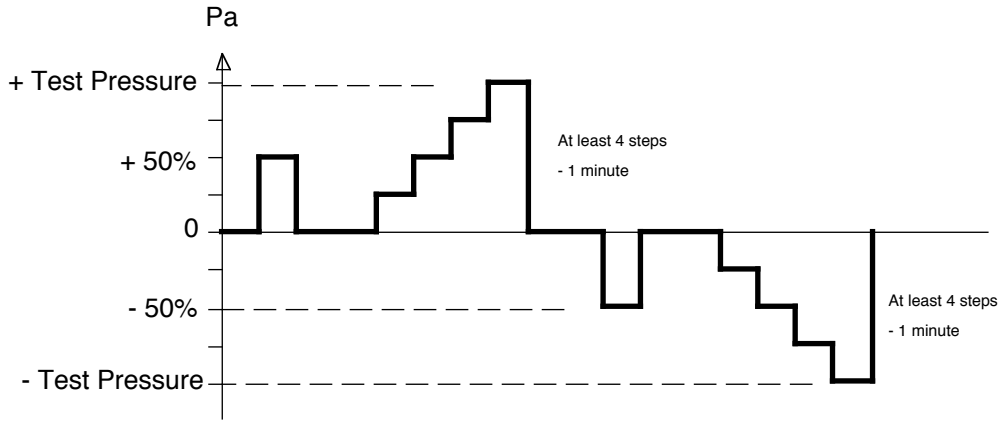
Measurements of movement of critical structural members are taken at a range of test pressures in order to determine if the bending of the members exceed the nominated requirements.

NZ Test Parameters

Test Pressure: is dependent on the Window Rating –

Window Rating	Test Pressure (Pa)
Low	±510
Medium	±680
High	±970
Very High	±1250
Extra High	±1515

Test pressure steps: as given below



Pass / Fail criteria:
Maximum deflection for structural members: 1/200 of span.

3Operating Force Test : AS4420.3-1996

Test Description

The forces required to operate sliding doors and windows are measured to test compliance with the requirements.

NZ Test Parameters

Test measurements: The forces required to initiate and sustain movement of the door/sash in both directions of movement are recorded.

Pass / Fail criteria : Forces shall not exceed the following

Force (Newtons)	Projecting sashes	Sliding window type		Sliding doors
		Horizontal	Vertical	
To initiate movement	90	110	200	180
To sustain movement	90	90	160	110

4Operation Resistance Test - per Section 7.1 and 7.2 of NZS 4211

Test Description

Small forces are applied to operable sashes to determine if they move too freely.

Test Parameters

Test loads: Vertical Sliding Sashes: 10 N upward and downward.
Projecting Sashes: Force = (35 x Area of Sash in m^2) N, inward and outward at all angles of opening.

Pass / Fail criteria : The position of the sash shall not change when subjected to the force.

5Air Infiltration Test - AS4420.4-1996

Test Description

Air leakage through the entire test sample is measured at the nominated pressures in order to determine if it exceeds the allowable rate.

NZ Test Parameters

Pass / Fail criteria : Maximum air infiltration shall not exceed the following:
Fixed Windows: Value shown on the table for "Per m^2 of Sample".
Windows Containing Sashes: Value is the geometric mean of the respective calculated infiltration rates for both the "Per m2 of Sample" and "Per m of opening joint length" in the table.

Rate of air infiltration	Litres per second (L/s)	
	Air conditioned	Non air conditioned
Per m^2 of Sample	1.6	8.0
Per m of opening joint length	0.6	2.0

6Water Penetration Resistance Test - AS4420.5-1996

Test Description

Water is sprayed onto the outdoor face of the test sample with air pressure simultaneously being applied across it to determine if unacceptable water leakage occurs.

NZ Test Parameters

Test pressure : The test pressure is dependent on the rating:

Window Rating	Test Pressure (Pa)
Low	153
Medium	204
High	291
Very High	375
Extra High	455
Specific Design	30% of SLS

Test duration: The test pressure shall be maintained for 15 minutes.

Water application rate : 0.05 litre per second per square metre of sample area.

Pass / Fail criteria :

The window shall be designed to permit no uncontrolled water penetration through the window at a static positive air pressure.
Uncontrolled water penetration is defined as-

(a) water that is not contained in a purpose-built drainage area;

(b) water that may wet window fixtures and finishes, reveal linings or window furnishings beyond the window frame; or

(c) water that flows in a constant stream on the inside, or dripping.

Acceptable water penetration is defined as-

(a) minor splashing which occurs due to air infiltration, within 1 mm after change of pressure;

(b) minor, intermittent leakage on the indoor side of operable sashes, which is contained on gaskets, sill tracks and thresholds.

A purpose built collection or drainage area is defined as a system that allows water to collect or be drained to the outside (at the cessation of testing) from sills, other framing members or cavities.

7Ultimate Strength Test - AS4420.6-1996

Test Description

Air pressure greater than the design pressure is applied across the test sample in order to demonstrate that it has a suitable structural safety margin.

NZ Test Parameters

Test Pressure: is dependent on the Window Rating -

Window Rating	Test Pressure (Pa)
Low	±720
Medium	±960
High	±1360
Very High	±1760
Extra High	±2130
Extreme	±2500

Pass / Fail criteria:

Windows shall not collapse when subjected to the test pressures for a period of ten (10) seconds. Collapse is defined as any one, or any combination, of the following:

(a) Dislodgement or breaking of any glazing.
(b) Dislodgment of a frame or any part of a frame.
(c) Dislodgement of a sash from its frame.
(d) Loss of support of a frame, such as when it is unstable in its opening in the building structure.
(e) Failure of any sash, locking device, fastener or supporting stay allowing an opening light to open.

8Tortsional Strength of Sashes - per Appendix A of NZS 4211

Test Description

Projecting sashes are tested with a torsional load to provide an indication of the likely smoothness of operation.

Test Parameters

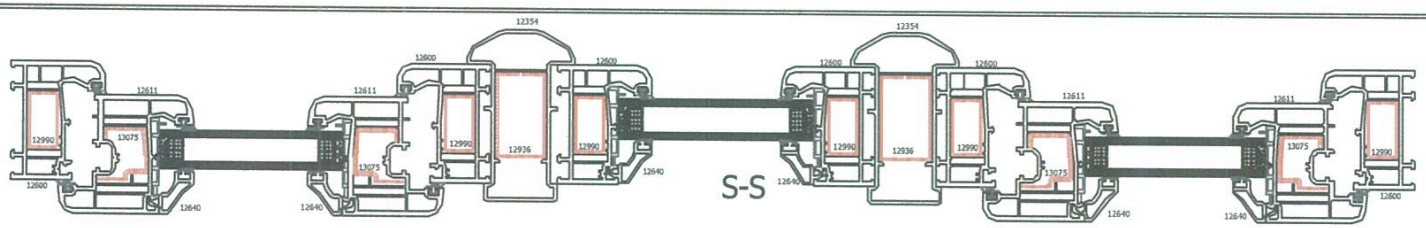
Test Load: a load of 45 N is applied at one corner of the sash in both directions, perpendicular to the plane of the sash, while the other three corners of the sash are held in plane.

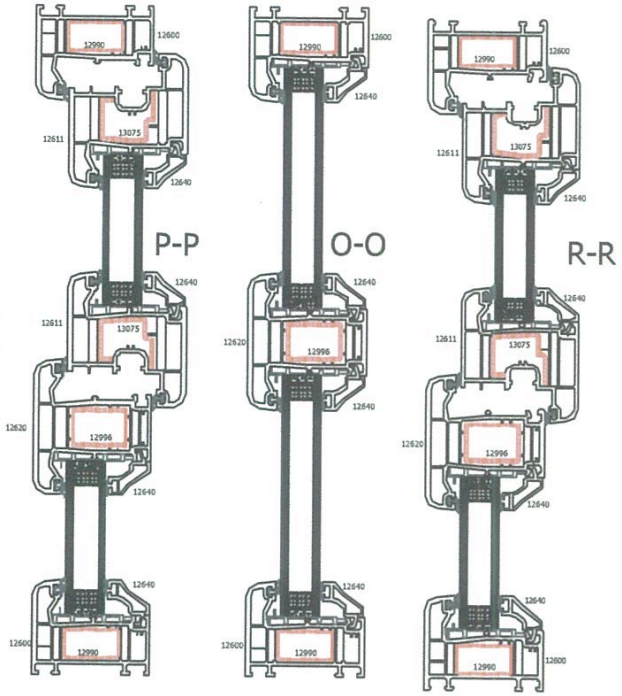
Pass / Fail criteria:

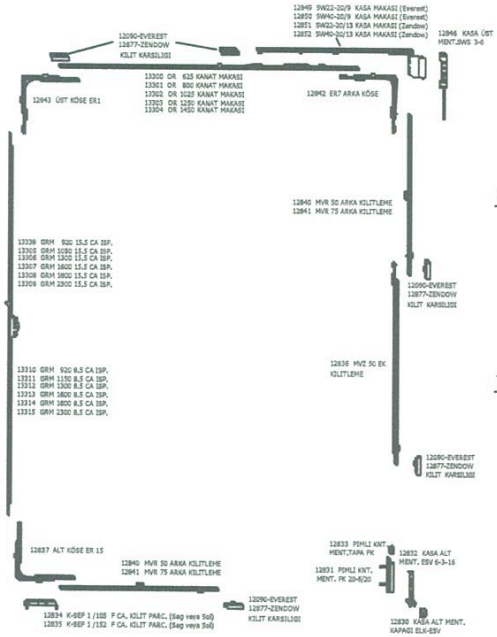
The deflection at the corner of the sash shall not exceed 0.04 times the length of the shortest of the two members joined at the point of the load, or 50 mm whichever is the lesser.

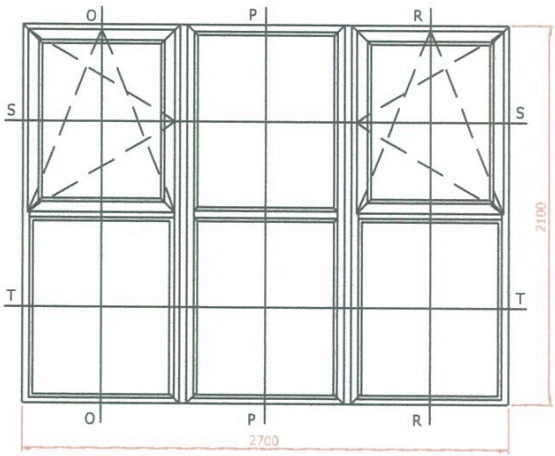
Appendix B – Client drawings

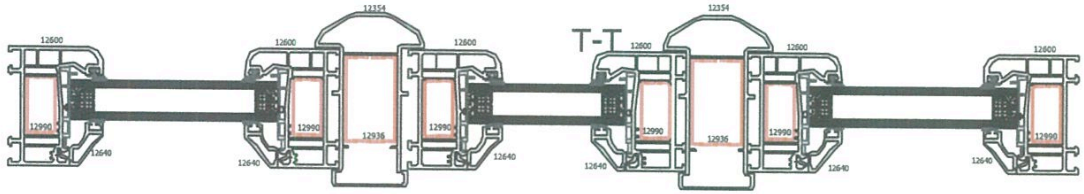
Sample elevation
Drainage details
Hardware accessory drawing
Main profiles
Glazing beads











Date : 19.04.2006	ENGINEERING DEPARTMENT	System: zendow	Type: View from inside Left & Right panel Tilt & Turn Center panel Fix

Gaskets : TPE (Thermo Plastic Elastomer)
Sealant used on outdoor gaskets.

Drain Holes – Frame : two on each panel

Sash : two on each sash

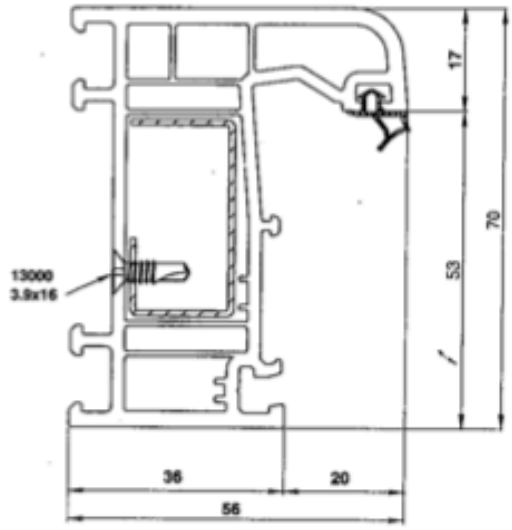
A cap used outlet of each drain holes (part number 12084)

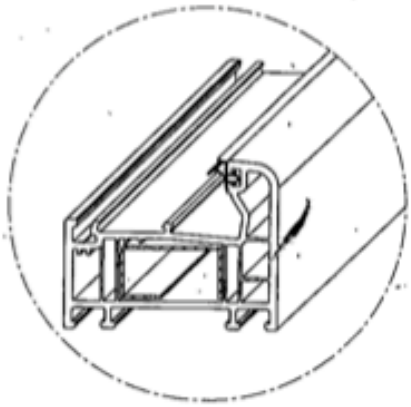
Air Slots – 5 mm diameter : two each pair of frame and sash

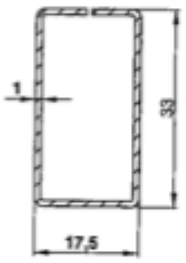
Glazing 4 mm Clear Float; 4-12-4 double glazing units used

The fasteners used to fix, each steel reinforcement should be no less than 3, with a gap around 300 mm.

12600



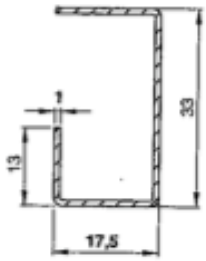




Y
X

12990

Ix : 1.3215 cm4
Iy : 0.4993 cm4

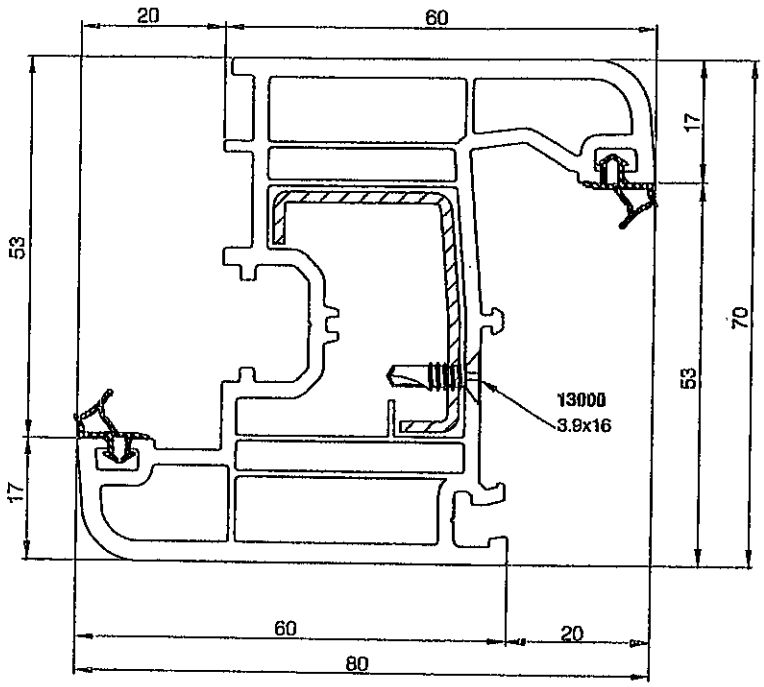


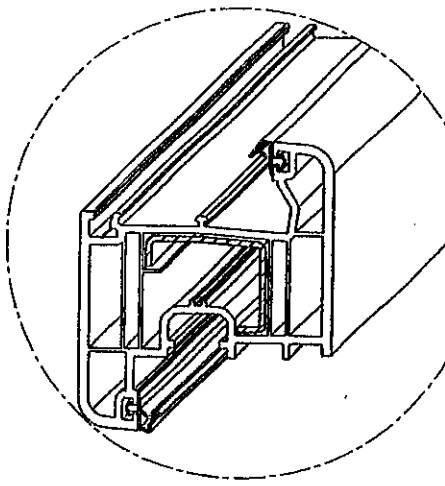
Y
X

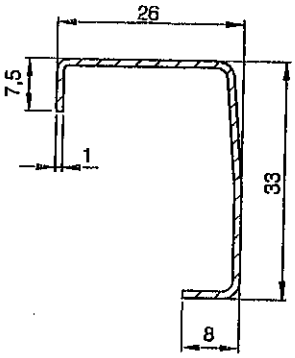
12991

Ix : 1.2182 cm4
Iy : 0.3424 cm4

12611







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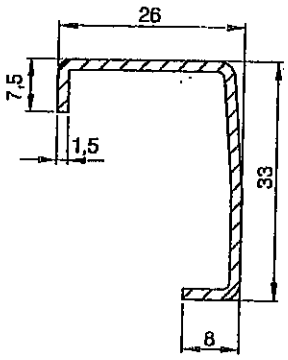
Ix : 0.9571cm4
Iy : 0.5516 cm4



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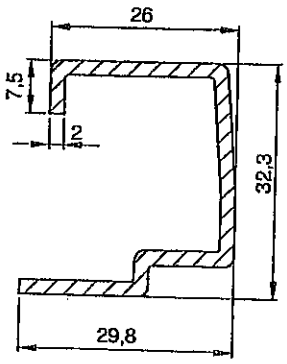
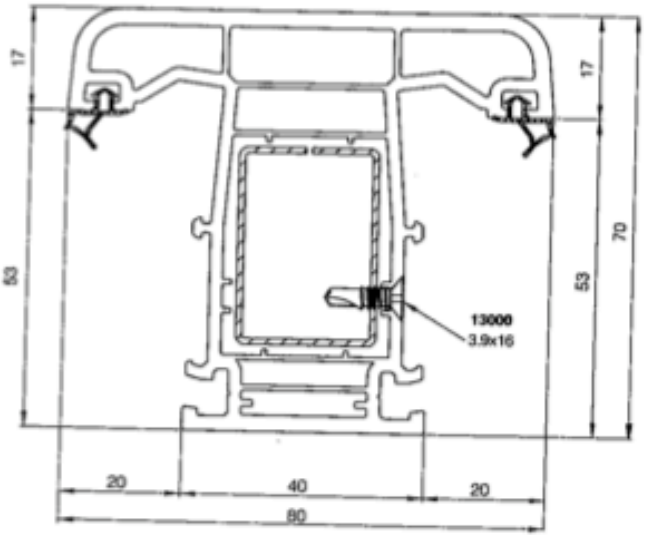
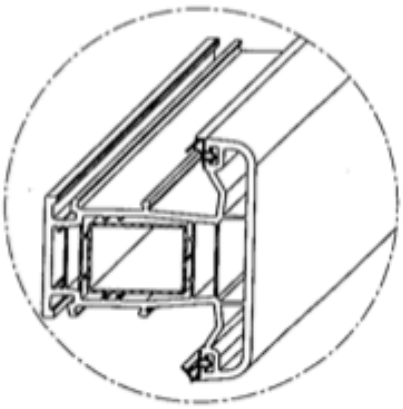
Ix : 1.3713 cm4
Iy : 0.7847 cm4

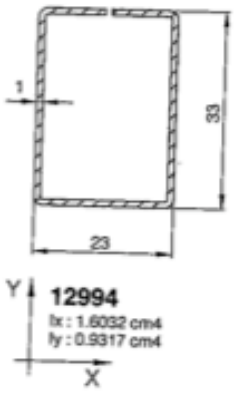


13075
Ix : 2.7149 cm4
Iy : 1.4577 cm4

12620







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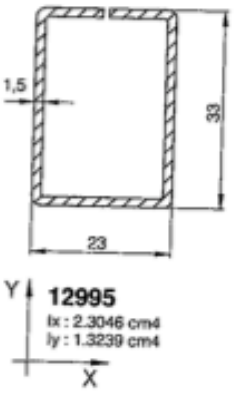
Ix : 1.6032 cm4
Iy : 0.9317 cm4



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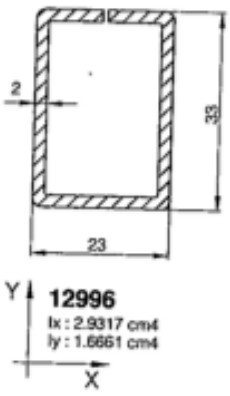
Ix : 2.3046 cm4
Iy : 1.3239 cm4



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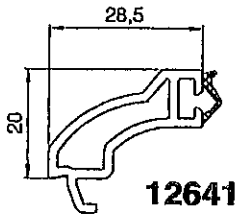
Ix : 2.9317 cm4
Iy : 1.6661 cm4



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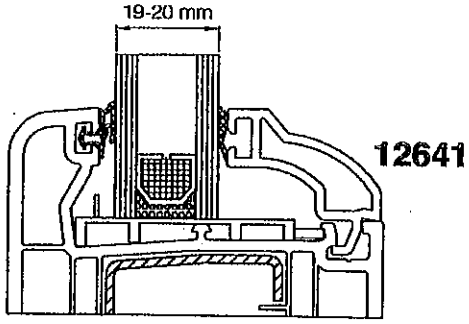

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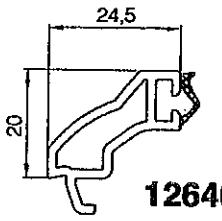

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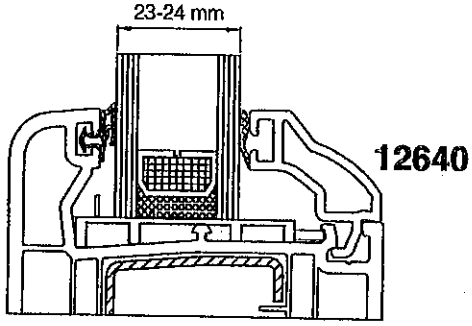

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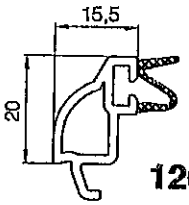

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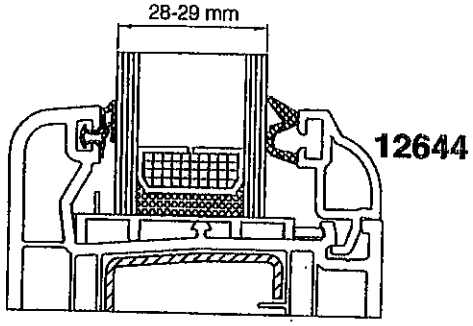

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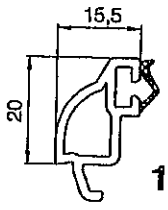

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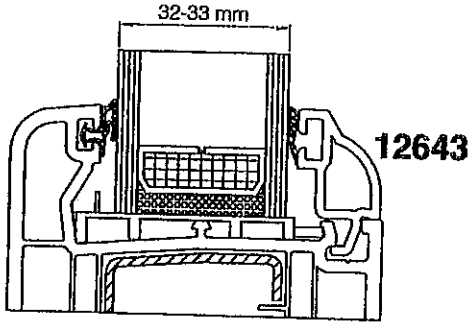

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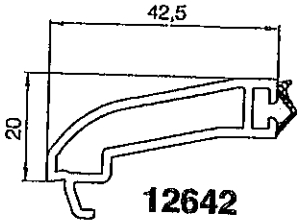

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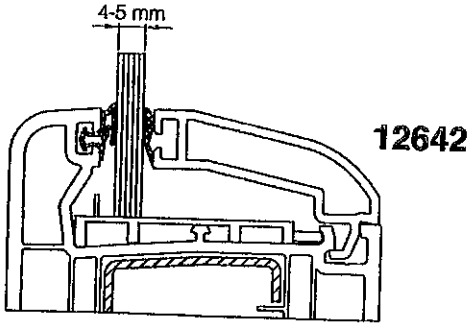

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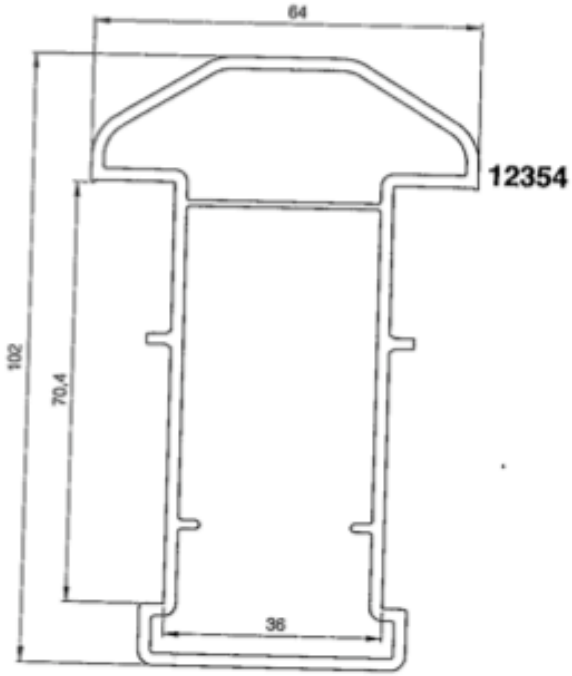
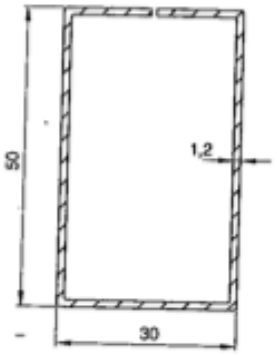
auxiliary profiles

zendow

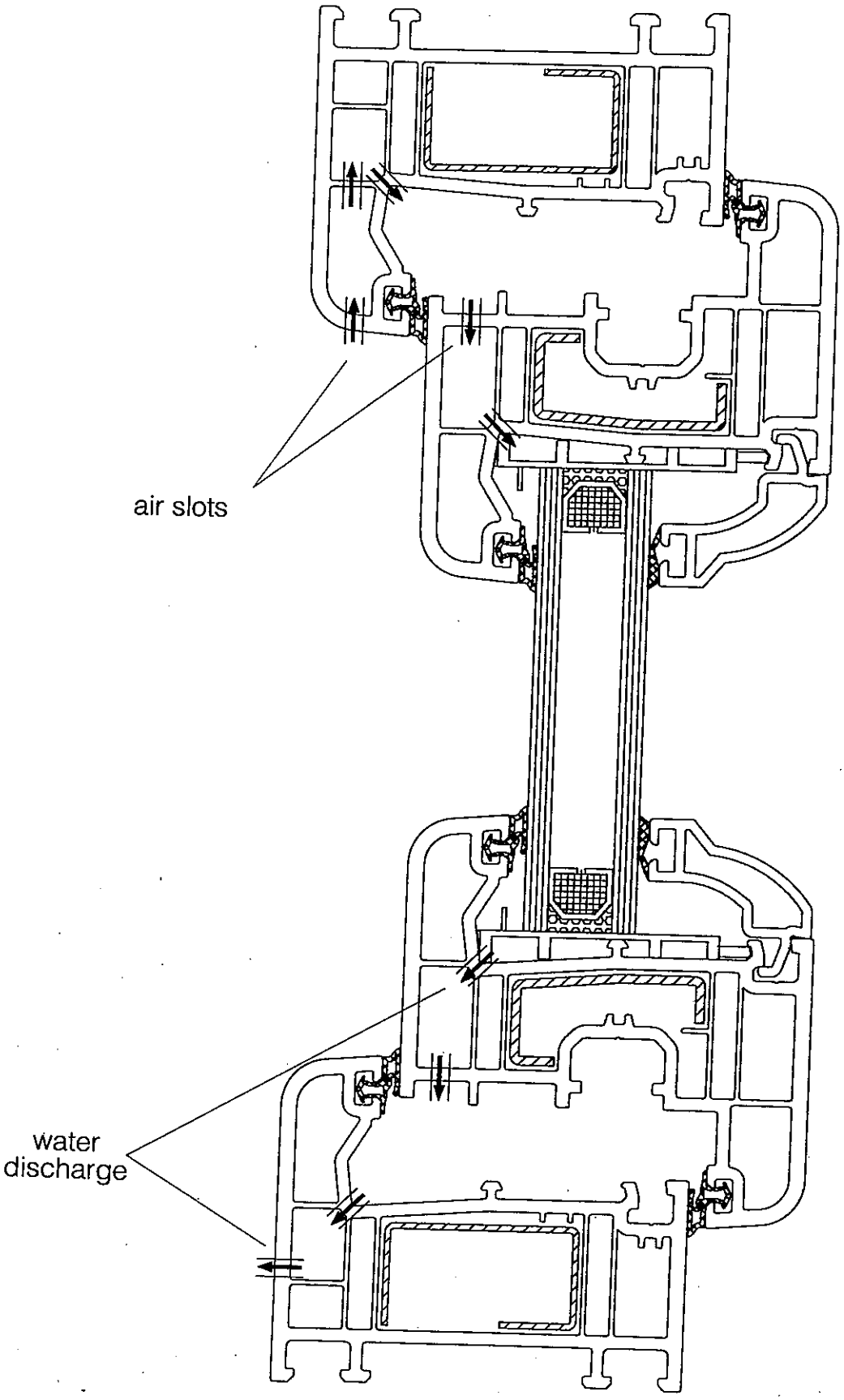




Y **12936**
Ix : 6.3712 cm4
Iy : 2.9095 cm4
X

drainage

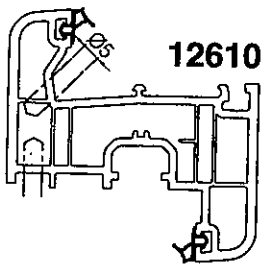
water discharge and air slots



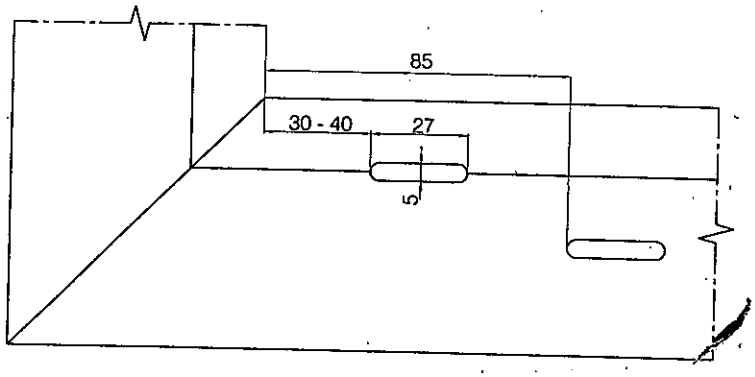
drainage

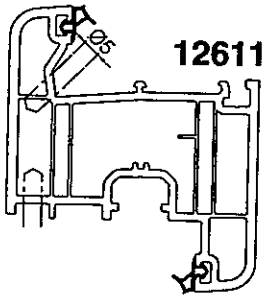
sash profile

zen



12610





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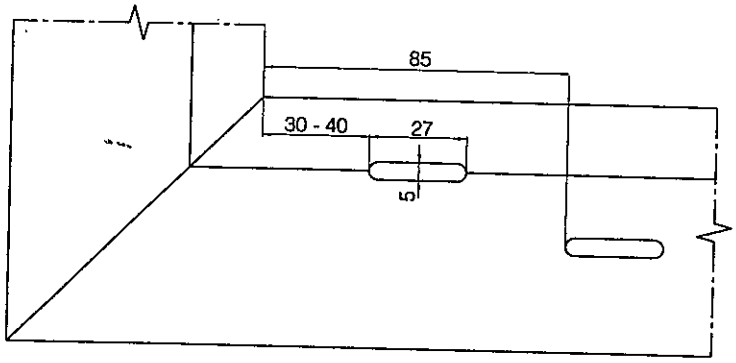

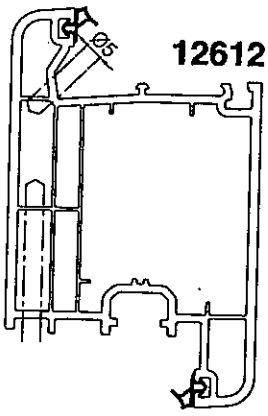

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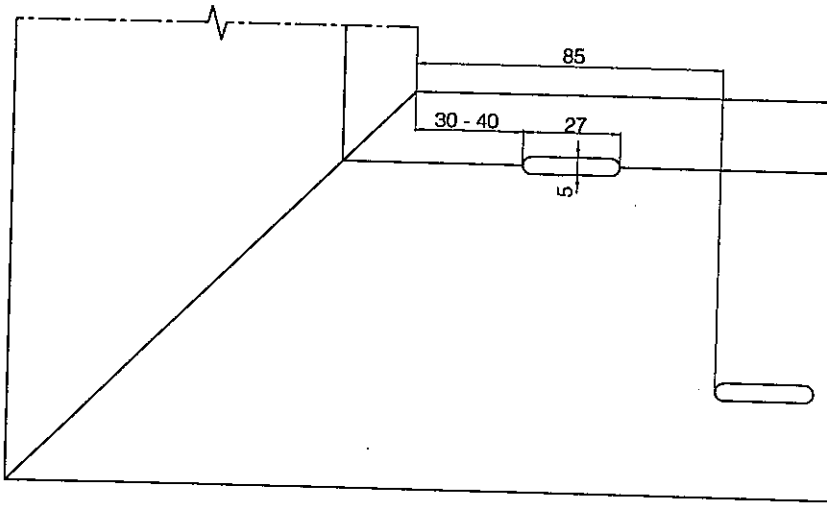

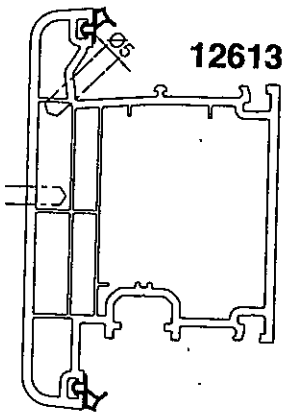

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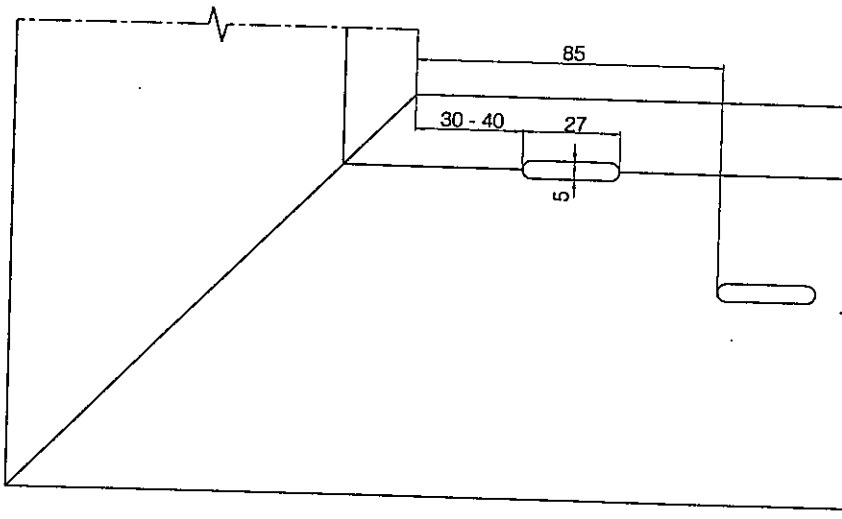
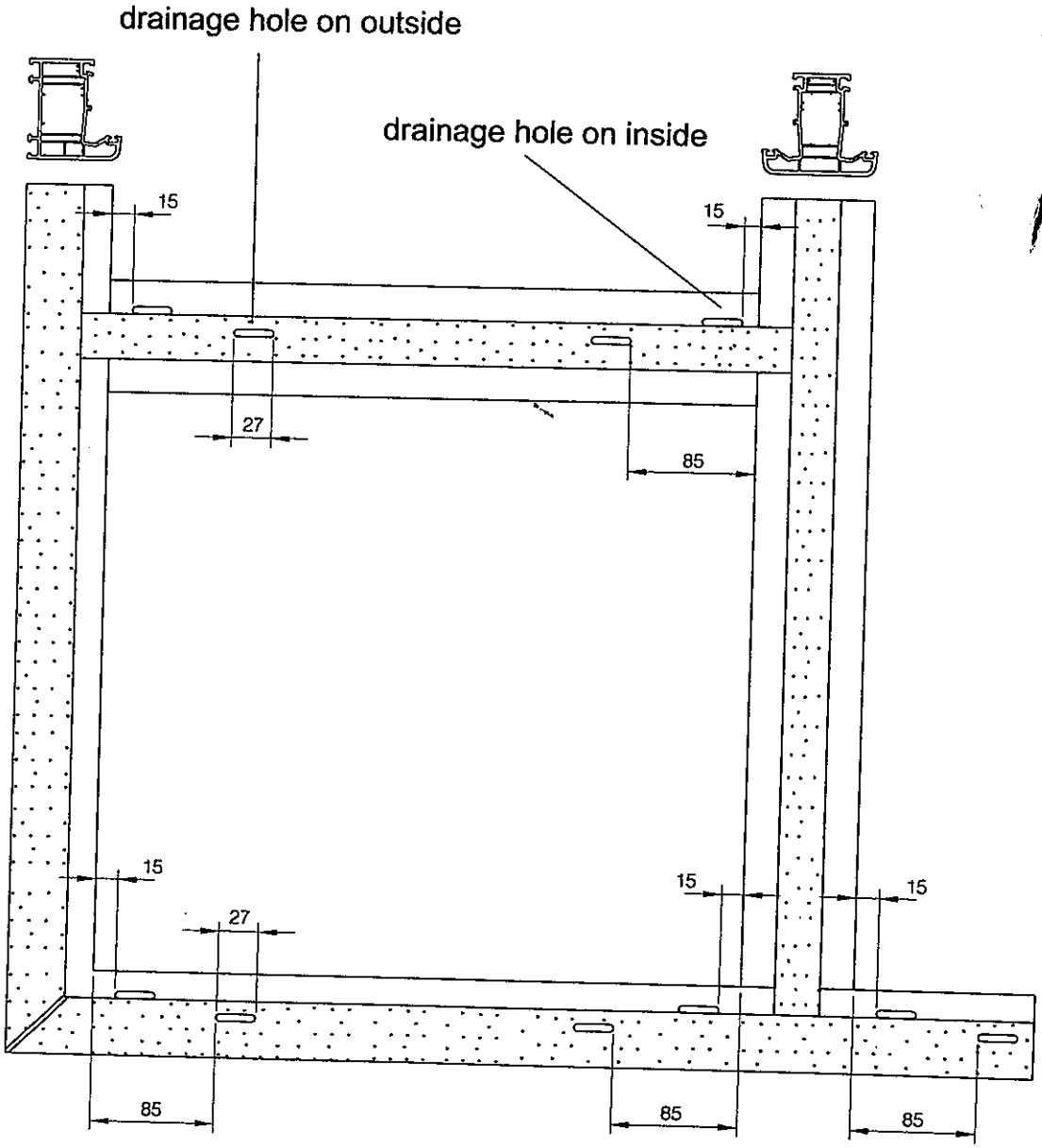
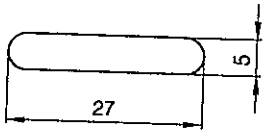


drainage

zen

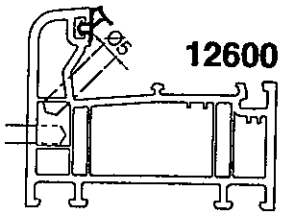
View from inside

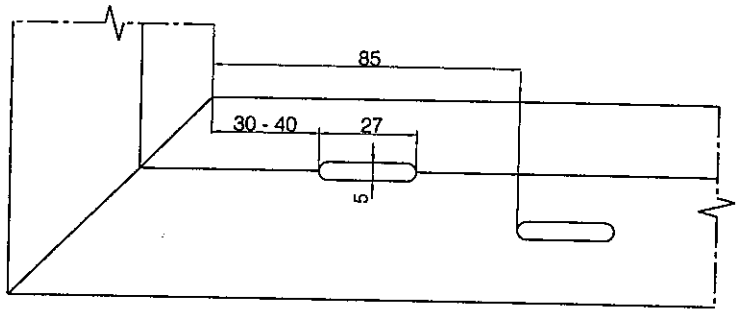


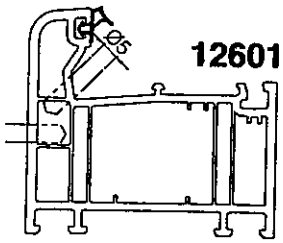


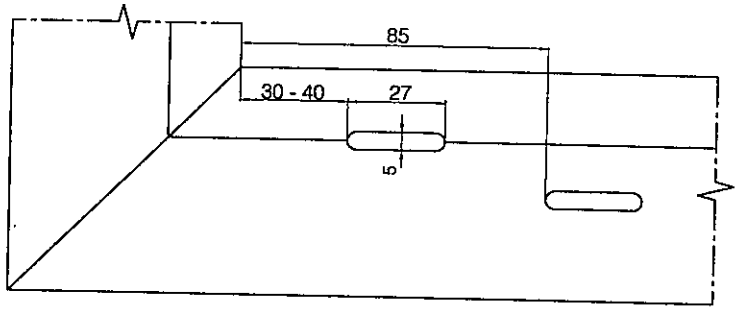
drainage

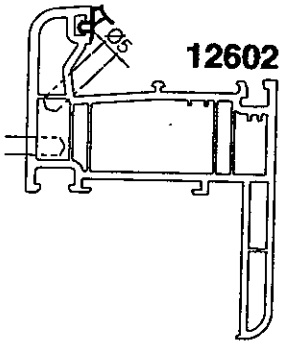
frame

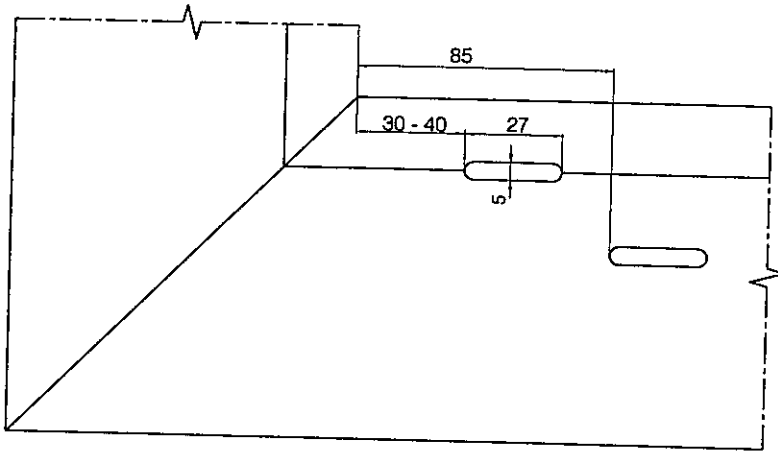


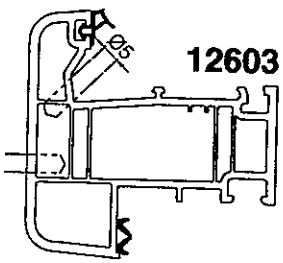


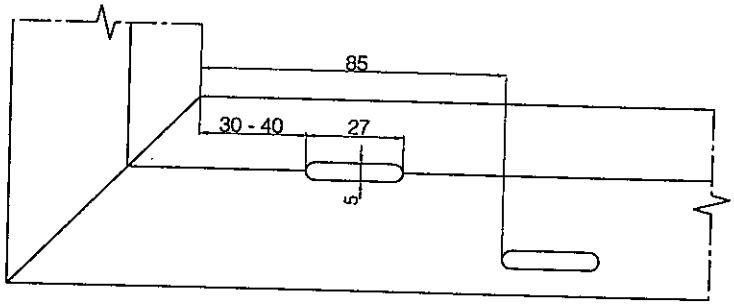


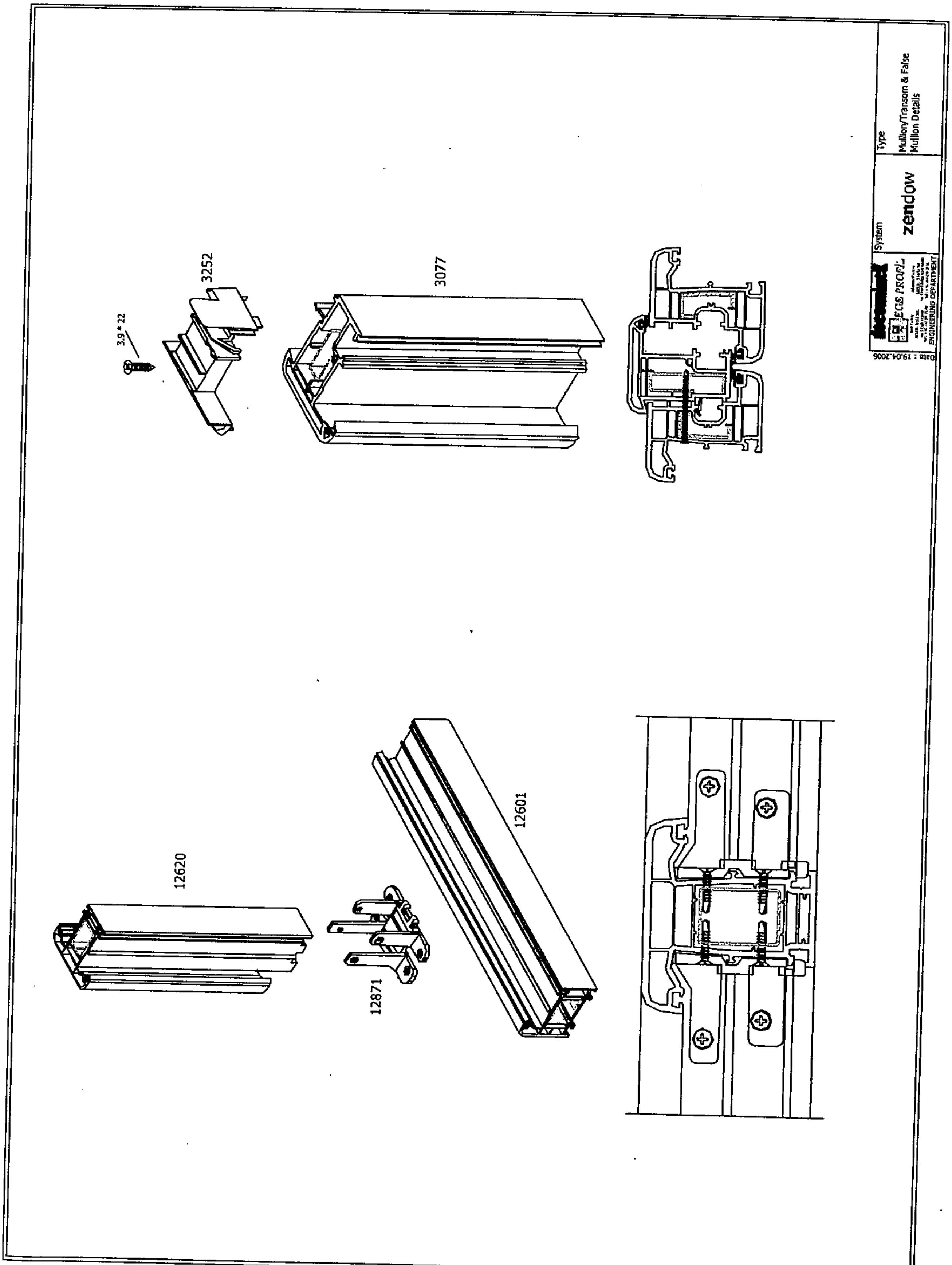








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System
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Type
Mullion/Transom & False
Mullion Details
ENGINEERING DEPARTMENT
Date : 19.04.2006