TESTING LABORATORY REPORT

TEST REPORT NO: QMTL 331-901493

REHAU PTY LIMITED

UNIT 2 BUILDING 2 BESSEMER BUSINESS PARK
13 B BESSEMER STREET
BLACKTOWN NSW 2148

Schlegel®

PRODUCTS

TECHNOLOGY

SERVICE

SCHLEGEL PTY LIMITED
ABN 27 000 419 876

ACCREDITED LABORATORY

NO. 2299

ACCREDITED FOR TECHNICAL COMPETENCE

ISSUE DATE: 29/02/12

TEST REPORT NO: QMTL 331-901493

ON BEHALF OF

REHAU PTY LIMITED
UNIT 2 BUILDING 2 BESSEMER BUSINESS PARK
13 B BESSEMER STREET
BLACKTOWN NSW 2148

SAMPLE DETAIL

2 LITE SLIDING WINDOW ASSEMBLY MEASURING 1.200m (H) X 1.100m (W) with 9.52/6.4/6 IGU's IN BOTH SASHES

CONFIDENTIAL TO THE CLIENT AND SCHLEGEL PTY LIMITED

The results and conclusions shown in this report are given in good faith and SCHLEGEL Pty. Ltd. Accepts no responsibility for any loss or damage occurring from the use of same. It should be noted the results contained in this report relate only to the specific individual sample tested.

This laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation.

LARRY FLEMING
Authorised Signatory

SCHLEGEL PTY LIMITED
ABN 27 000 419 876

EXPLANTORY NOTES

TERMINOLOGY, EXPLANATION OF AUTHORITIES, REFERENCES ETC

This Test Report certifies the performance of a sample submitted to Schlegel Pty Ltd for testing within their N.A.T.A. accredited facility, # 1764, which was accredited by N.A.T.A. (National Association of Testing Authorities) on 29.07.83.

The facility referred to is the Schlegel Mobile Testing Laboratory, which is operated by N.A.T.A. approved Schlegel Technicians, and is located either at the Schlegel Headquarters, 44-48 Riverside Road, CHIPPING NORTON, N.S.W. 2170, or at any location in Australia or overseas.

N.A.T.A. the National Association of Testing Authorities has its headquarters at 7 Leeds Street, RHODES, and N.S.W. 2138. The Association was formed in 1947 to govern testing laboratory standards of practice within Australia and to maintain the integrity of test reporting issued by members.

The Schlegel Mobile Testing Laboratory has been accredited for specific testing within the field of Mechanical Testing.

Tests carried out may be as stated or, as is generally the case in conformity to specific standards.

The majority of Standards utilised by Schlegel Mobile Laboratories are AS 2047 –1999 "Windows in Buildings". AS 4420.1-6 Windows – Methods of Test.

All Australian Standards are as laid down by the S.A.A. (Standards Association of Australia) which maintains it's Headquarters at, Level 10, 20 Bridge Street, Sydney, and N.S.W. 2000.

Test results reported herein are only those carried out by personnel and with equipment approved by N.A.T.A. and do not include tests carried out with any other equipment which may be utilised by Schlegel from time to time in their role as a specialist manufacturer of Weatherseal.

The 'Approved' or "Authorised Signatory" is the Schlegel employee approved by N.A.T.A. as a signatory of endorsed test results.

TESTING CAPABILITY

The Testing capacity of the Schlegel Mobile Testing Laboratory is as follows: -

Maximum Size - 3600mm wide x 2200mm high (mounted sample)
Maximum Pressure - 4000 pascals average (dependant on sample)
Standard Tests - As per AS2047 –1999. Deflection, Operating Force, Air Infiltration, Water Penetration & Ultimate Strength.

SCHLEGEL PTY LIMITED
ABN 27 000 419 876

TEST REPORT

ACCREDITED FOR TECHNICAL COMPETENCE

DATE OF TEST: 17/02/12

LOCATION: MALAGA

CLIENT: REHAU PTY LIMITED

DESCRIPTION OF SAMPLE: 2 LITE PVC SLIDING WINDOW ASSEMBLY

DRAWING NUMBER /ISSUE: REH-0100 & REH-0101

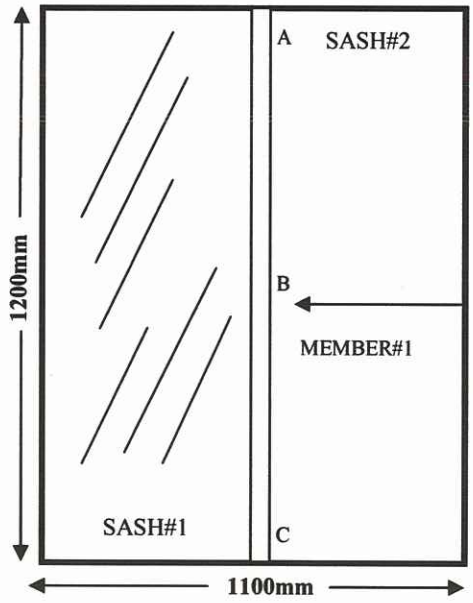
Copies of the above drawing are attached to, and form part of this report. The drawings are endorsed by the Client as regards the accuracy of representation of the details in relation to the sample submitted for test.

NOMINAL DIMENSIONS: 1200mm (H) x 1100mm (W)

GLAZING DETAIL: 9.52/6.4/6 IGU BOTH SASHES

WEATHERSEAL DETAIL: QEZ 48

SCHEMATIC OUTINE AND ARRANGEMENT (VIEW OF INDOOR FACE)



Deflection measurement points shown thus (A), (B), (C) etc.
Span members shown thus: (1), (2), (3). Etc

STANDARDS DETAIL: (When Applicable)
REFER AS 2047-1999
REFER AS 4420.1 – 6 –1996

LARRY FLEMING
Authorised Signatory

METHODS OF TEST

WINDOWS IN GENERAL

(RELATING TO TESTING COVERED BY THE ABOVE REFERENCE REPORT)
NOTE: "**POSITIVE** PRESSURES": WIND **LOAD:** OUTDOOR **TOWARDS INDOOR.**
"**NEGATIVE** PRESSURES : WIND **DRAG** : INDOOR **TOWARDS OUTDOOR**

STANDARDS REFERENCE TESTS (WHICH SHALL BE CARRIED OUT IN SPECIFIC ORDER - REFER STANDARD AS4420.0

.AS 4420.1
1. OPERATE & PRE – LOADING:
The test sample shall be operable, i.e. 5 cycles of opening, closing and locking prior to testing. An initial pressure equivalent to 50% of either the positive or negative test pressure shall be applied and held for 1 min.

AS 4420.2
2. DEFLECTION: Differential pressures in the same direction shall then be applied across the test sample in not less than 4 approximately equal increments until the test pressure is reached. The pressure shall be held for at least 1 min at each pressure increment, and the readings of the displacement measuring devices recorded. The differential pressure shall be removed and after 2 min the zero displacement readings shall be taken. The process is then repeated using the opposite loading. The nett midspan is calculated to result in a ratio which is referred to a table of maximum allowable deflection ratios. This test is required in both Positive and Negative modes. Observations are recorded detailing any damage, distortion etc.

AS 4420.3
3. OPERATING FORCE: With the window closed, but unlocked an operating force shall be applied, without shock, in the plane and direction of the sash operation. For both directions of sash travel, the following forces shall be noted and recorded:
(a) That capable of setting the sash in motion.
(b) That capable of maintaining the motion after the sash frame is clear of the perimeter frame of the sample.
Each sliding sash of the test sample shall be tested separately. For horizontally sliding sashes, the force shall be applied either at the position of a fixed handle, or at 1/3 of the height of the pull stile above the sill for continuous or adjustable hand grips. For vertically sliding sashes, the forces shall be applied at the sash pulls or at the mid point of the bottom rail, or at a position nominated by the manufacturer.

AS 4420.4
4. AIR INFILTRATION: Operation and pre-loading as described in As 4420.1. The face of the test sample shall then be sealed airtight by covering it with an impervious film. If this is not practicable, all joints, weep-holes, and glazing or sealant lines of the test sample shall be sealed with impervious adhesive tape. Positive and negative test pressures shall then be applied and the base air infiltration rates through the test apparatus shall be determined by air-flow meter. The sealing tape or film shall be removed from the test sample and the air infiltration rates determined. The air infiltration through the test sample shall be the difference between the base and total readings.

AS 4420.5
5. WATER PENETRATION: The test sample shall be subjected to water sprayed uniformly and continuously over the exterior face of the test sample at a rate of not less than .051 / sq. m / sec. At the start of the test, the water sprays shall operate for 5 min with zero air pressure differential on the test sample. The test pressure shall be applied and maintained for 15 min with the water sprays still operating. The pressure and water sprays shall then be removed. Any water appearing on the inside surfaces of the test sample, and its source, shall be noted and recorded.

AS 4420.6
6. ULTIMATE STRENGTH: The test sample shall be subjected to a smoothly increasing differential pressure up to the test pressure determined in AS 2047 –1999, conducted in both positive and negative directions. The time taken to reach the structural test pressure shall be approximately 1 min. Test pressure shall be maintained on the test sample for a period of 10 sec. If the sponsor requires incremental tests, each increment shall represent a separate test requiring 10-sec. duration. At the conclusion of the test at each loading, the test sample shall be inspected and any signs of damage or collapse of the test sample noted and recorded.
'Collapse" shall be as defined in AS 2047 – 1999.

THIS APPENDIX WAS PREPARED AND INCLUDED AS A REFERNCE SUMMARY ONLY AND IS NOT TO BE REGARDED AS ANY FORM OF REPLACEMENT OF THE RELEVANT STANDARDS.

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SCHLEGEL PTY LIMITED
ABN 27 000 419 876

TEST REPORT

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

SUMMARY 0F TEST RESULTS

SEQUENCE OF TESTING	TEST	REQUIRED RESULT		ACHIEVED RESULT		PASS / FAIL COMMENT	REFER PAGE NO.
1	:DEFLECTION (POSITIVE)	1 : 250 3000 Pascals	4.42mm 3000 Pascals	1 : 2663 3000 Pascals	00.42mm 3000 Pascals	PASS	6
2	:DEFLECTION (NEGATIVE)	1 : 250 3000 Pascals	4.42mm30 3000 Pascals	1 : 3203 3000 Pascals	00.35mm 3000 Pascals	PASS	6
3	:: OPERATING FORCE (INITIATING)	200 Newtons Per Total Sash		80.5 Newtons Per Total Sash		PASS	7
4	:: OPERATING FORCE (MAINTAINING)	160 Newtons Per Total Sash		50.40 Newtons Per Total Sash		PASS	7
5	AIR INFILTRATION (POSITIVE)	1.0 litres / sec m^2 @ 75 Pascals		0.92 litres / sec m^2 @ 75 Pascals		PASS	8
6	AIR INFILTRATION (NEGATIVE)	1.0 litres / sec m^2 @ 75 Pascals		0.58 litres / sec m^2 @ 75 Pascals		PASS	8
7	WATER PENETRATION	15 Minutes 600 Pascals		15 Minutes 600 Pascals		PASS	9
8	ULTIMATE (POSITIVE)	6000 Pascals		6000 Pascals		PASS	10
9	ULTIMATE (NEGATIVE)	6000 Pascals		6000 Pascals		PASS	10
M.T.L. TEST #	DRAWING #	DATE DRAWN		DRAWN BY		NO. OF PAGES	
QMTL370	REH-0100/0101	14/02/2011		M. TONG		2	

THE SAMPLE TESTED IS THEREFORE SUITABLE FOR:
3000 PASCAL DESIGN RATING
600 PASCAL WATER PENETRATION RATING
AIRCONDITIONED APPLICATIONS
HOUSING RATING – N6 / C4
REFER AS 2047 –1999
REFER AS 4420.0-6 -1996

: THE RESULT STATED IS RELEVANT TO THE MEMBER RECORDING THE GREATEST DEFLECTION.
:: THE RESULT STATED IS RELATIVE TO THE SASH OFFERING THE GREATEST RESISITANCE TO THE FORCE APPLIED.

LARRY FLEMING
Authorised Signatory

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TEST REPORT

NATA
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DEFLECTION TEST RESULTS

AS 2047 – 1999

2.3.1.3 Deflection test
Window assemblies for housing shall be subjected to the deflection test in accordance with AS4420.2. The test pressure shall be the design wind pressure specified in table 2.1. No structural members in a completely assembled and glazed window shall deflect by an amount greater than span /150 when tested at the serviceability design wind pressure.

(A) span/150 when tested at the serviceability design wind pressure: or
(B) span/180 or 250 when tested at the serviceability limit state design wind pressure

AS4420.2 - 1996

7. Calculation of displacement / span ratio
Where a structural member of the test sample is effectively supported at its ends only, its mid-span displacement and resultant displacement / span ratio under load shall be calculated as follows.

$$\text{Deflection Ratio} = \frac{\text{Net mid-span deflection – Average of net end deflections.}}{\text{Span of member between points of Support.}}$$

DEFLECTION RATIO CACULATION = $B - \frac{[A + C]}{2}$ / SPAN (LENGTH)

Member	Positive Pressure Applied						Negative Pressure Applied					
	Measured Deflection (mm)						Measured Deflection (mm)					
Span	Pressure (Pascals)	A	B (Centre)	C	Ratio	Def. (mm)	Pressure (Pascals)	A	B (Centre)	C	Ratio	Def. (mm)
No. 1	*2700*	*2.07*	*2.58*	*2.46*	*1 : 3508*	*0.32*	*2700*	*2.43*	*3.29*	*3.48*	*1 : 3299*	*0.34*
Length 3000mm	*2800*	*2.15*	*2.71*	*2.45*	*1 :2695*	*0.41*	*2800*	*2.52*	*3.42*	*3.61*	*1 : 3113*	*0.36*
	2900	*2.23*	*2.73*	*2.50*	*1 : 3027*	*0.37*	*2900*	*2.59*	*3.45*	*3.54*	*1 : 2870*	*0.39*
	3000	*2.35*	*2.85*	*2.52*	*1 : 2663*	*0.42*	*3000*	*2.62*	*3.47*	*3.63*	*1 : 3203*	*0.35*

LARRY FLEMING
Authorised Signatory

SCHLEGEL PTY LIMITED
ABN 27 000 419 876

TEST REPORT

ACCREDITED FOR TECHNICAL COMPETENCE

OPERATING FORCE TEST

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AS 2047 – 1999

2.3.1.4 Operating Force Test
Windows for housing shall be subjected to the operating force test in accordance with AS 4420.3. The force shall not be greater than the value for windows and doors given in Table 2.2.

Procedure
With the window closed, but unlocked, an operating force shall be applied, without shock, in the plane and direction of the sash operation. For both directions of sash travel, the following forces shall be noted and recorded.

'A' That capable of setting the sash in motion

'B' That capable of maintaining the motion after the sash frame is clear of the perimeter frame of the test sample.

AS4420.3 - 1996

Each sliding sash of the test sample shall be tested separately.

For horizontally sliding sashes, the force shall be applied either at the position of a fixed handle, or at 1/3 of the height of the pull stile above the sill for continuous or adjustable handgrips.

For vertically sliding sashes, the force shall be applied at the sash pulls or at the mid-point of the bottom rail, or at the position nominated by the manufacturer.

Drawing of Sample showing point at which force applied and distance from sill.

RESULTS			
FORCE IN NEWTONS (N) PER TOTAL SASH			
Sash Number	Sash Area (m^2)	Initiate	Maintain
1	0.612	00	00
2	0.612	80.50	50.40
3	0.000	00	00
4	0.000	00	00
5	0.000	00	00
6	0.000	00	00

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ABN 27 000 419 876

TEST REPORT

ACCREDITED FOR TECHNICAL COMPETENCE

AIR INFILTRATION TEST

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AS 2047 – 1999 **AS4420.4 - 1996**

5.2.1.5 Air Infiltration Test

Windows for housing shall be subjected to the air infiltration test in accordance with **AS4420.4** and under either of the test pressures specified in Table 2.3. The air infiltration shall not exceed the amount given in Table 2.3.

Notes

The air infiltration shall not exceed

[A] 5 litres / sec m^2 @ 75 Pa and 8 litres / sec m^2 @ 150 Pa for non- – air-conditioned buildings.
[B] 1 litres / sec m^2 @ 75 Pa and 1.6 litres / sec m^2 @ 150 Pa for air-conditioned buildings.
[C] 20 litres / sec m^2 @ 75 Pa and 32 litres / sec m^2 @ 150 Pa for louvre windows.

Other:

TEST CONDITIONS

DRY BULB TEMPERATURE : 31.00 DEG. C

WET BULB TEMPERATURE : 25.00 DEG. C

RELATIVE HUMIDITY : 59%

BAROMETER READING : 1009 M bar

Note:

THE LEAKAGE FLOW RATE AS CALCULATED IS THAT WOULD BE EXPECTED FOR AIR DENSITY 1.266Kg/m^3 CORRESPONDING, APPROXIMATELY, TO 15^{0}C AND 1013 MILLIBARS.

SAMPLE AREA (As 1.200 Height x 1.100 Width (metres)

= 1.320 m^2

RESULTS	INWARDS PRESSURE (POSITIVE)		OUTWARDS PRESSURE *(NEGATIVE)
BASE LEAKAGE	3.757	$Q_B = k \sqrt{P_B}$ litres / sec	4.140
GROSS LEAKAGE	4.970	$Q_G = k \sqrt{P_G}$ litres / sec	4.899
NETT LEAKAGE	1.213	$Q_S = Q_G - Q_B$ litres / sec	0.759
RATE OF INFILTRATION	0.92	$\frac{Q_S}{A_S}$ (litres / sec m^2)	0.58

*Samples only for air-conditioned buildings

COMMENT: SAMPLE SUITABLE FOR AIRCONDITIONED APPLICATIONS

LARRY FLEMING
Authorised Signatory

TEST REPORT

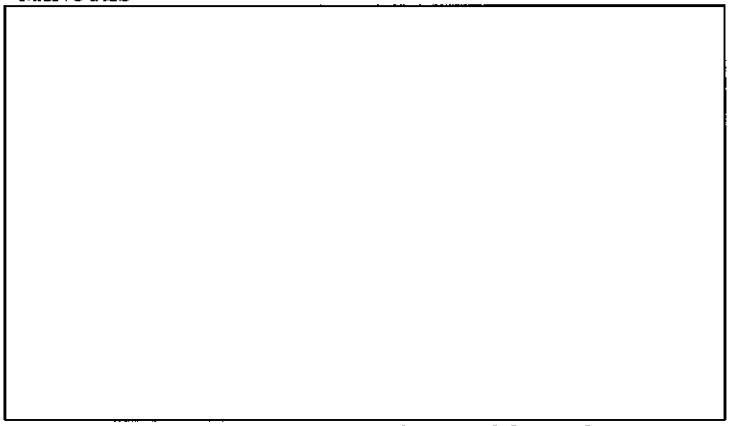
WATER PENETRATION RESISTANCE TEST

AS 2047 – 1999 **AS4420.4 - 1996**

2.3.1.6 Water Penetration Resistance test
Windows for housing shall be subjected to the water penetration resistance test in accordance with Table 2.4. During and at the completion of the test there shall be no penetration of uncontrolled water beyond a plane extending parallel and flush with the interior face of the window frame. This plane is meant to signify the inner most extent of the window frame and water, with the exception of that defined in the notes below, that has passed this point is no longer controlled by the product and is likely to cause damage to property or concern to occupants.
Uncontrolled water is defined as –
'A' Water that is not contained in a purpose built containing drainage area; or
'B' Water that is likely to wet insulation, fixtures and finishes, reveal linings or window furnishings beyond the window frame.

Notes:
1. Window sill tracks and thresholds, which are part of a drainage system that allows water to flow to the outside of the product at cessation of the test, are regarded as purpose built drainage areas.
2. Minor splashing due to air infiltration during change of pressure is not deemed a failure.
3. Water appearing upon the interior face of the window that is, or is likely to be, contained within a purpose built drainage area is not deemed a failure providing it is droplets or intermittent flow. Constant streams would be regarded as a failure.
4. At the completion of the test, water that lies on transoms, rails, sills etc., with the exception of minor splashing (see Note 2), that has no method of escape to the outside of the product via the drainage system will have deemed to fail the test.

SAMPLE AREA As 1.200mm Height 1.100 mm Width
= 1.320 m^2
WATER FLOW RATE REQUIRED – 0.05 x L / m^2 . sec
TOTAL WATER FLOW REQUIRED – 0.05 x Sample Area
= 0.05 x 0.066m^2
= 3.960 L / m^2 . sec
AIR PRESSURE (POSITIVE) APPLIED – 150 Pascals minimum
DURATION OF TEST – 15 MINUTES
STANDARDS AS4420.5 PROCEDURE 6.2 REQUIRE 15 MINUTES



SAMPLE VIEWED FROM INDOOR FACE

RESULT :

PASSED @ 600 PASCALS

Nil water ingress beyond the interior face of the sample for the duration of the test. Note: Sample achieved 300Pa for 15 minutes prior to achieving 600Pa water penetration test result.

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TEST REPORT

ULTIMATE STRENGTH TEST

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AS 2047 – 1999 **AS4420.6 - 1996**

2.3.1.7 Ultimate Strength

Windows for housing shall not collapse when subjected to the ultimate strength test in accordance with **AS4420.6**. 'Collapse' shall mean any one, or any combination, of the following:

(A) Dislodgment of any glass.
(B) Dislodgment of a frame or any part of a frame.
(C) Removal of a light, either with or without its framing sash, from a frame
(D) Loss of a support 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.

The test pressure shall not be less than the value given in Table 2.5.

SAMPLE VIEWED FROM INDOOR FACE

RESULT :

PASSED @ 6000 PASCALS

DESIGN RATING:

3000 PASCALS

NON COLLAPSE;

N/A

POSITIVE PRESSURE:

6000 PASCALS

NEGATIVE PRESSURE:

6000 PASCALS

COLLAPSE

NIL COLLAPSE

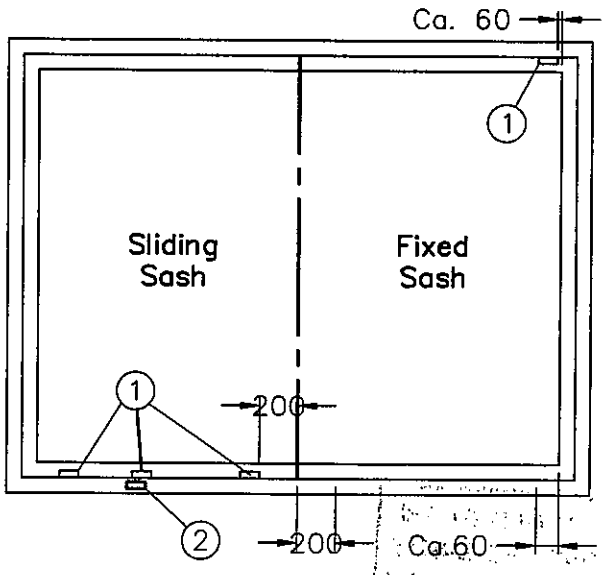
LARRY FLEMING
Authorised Signatory

CAD

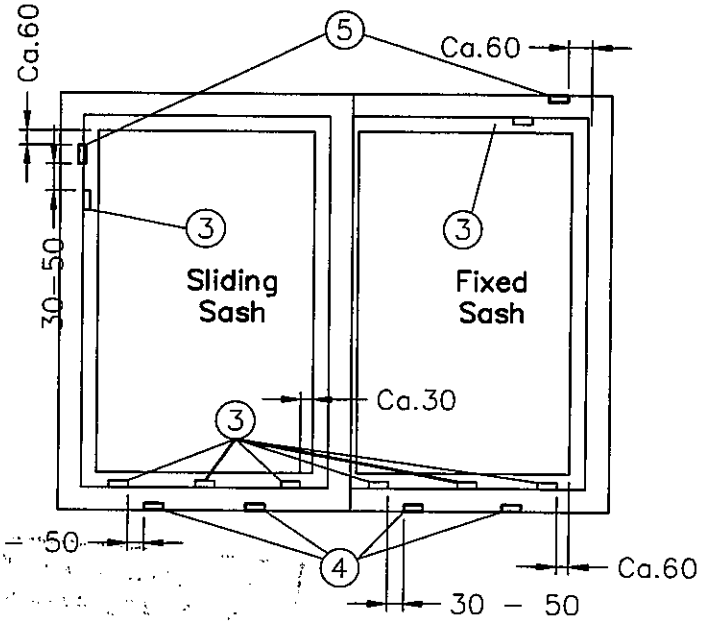
Projector
Feeler gouge
Slide
Measuring microscope
ISO 128

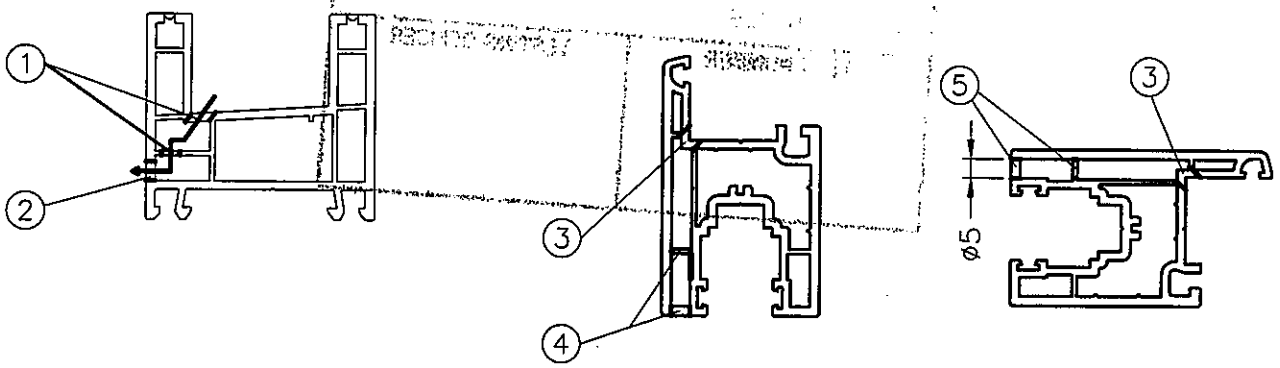
AA
LA
KA
TLE
TLV

FRAME 2



SASH 1





View from Outside

		Tolerances for linear dimensions and geometrical tolerances: DIN 16941– 3A				Art.No. –
		Year 2011	Date	Name	Tel. Nr.	Cust.Drwg.No.
		Drawn	14/03	M.Tong	syd548	VK:
		Process Engineering Checked				Projector
		Technical Application Checked				K / SR
		M	SLIDING WINDOW - DRAINAGE AND VENTILATION HOLES			Material / Shore-A
No.	Revision					Drawing No. REH–0100 A4

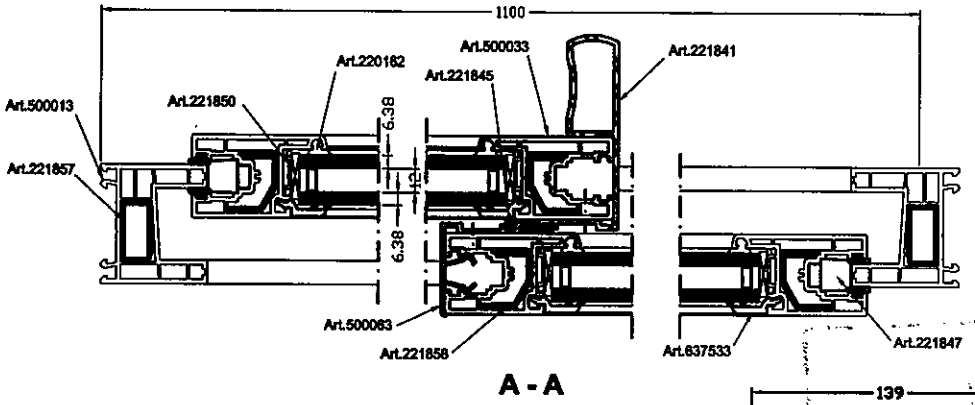
REHAU

TLV | KA | AA | TLE | LA

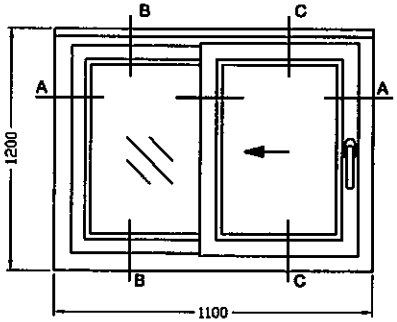
ISO 128

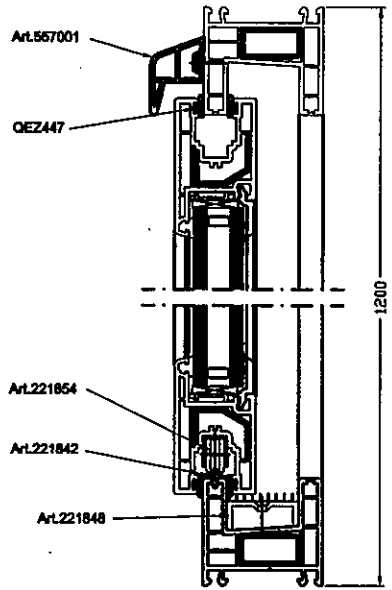
Feeler gauge
Measuring microscope
Slide
Projector

CAD

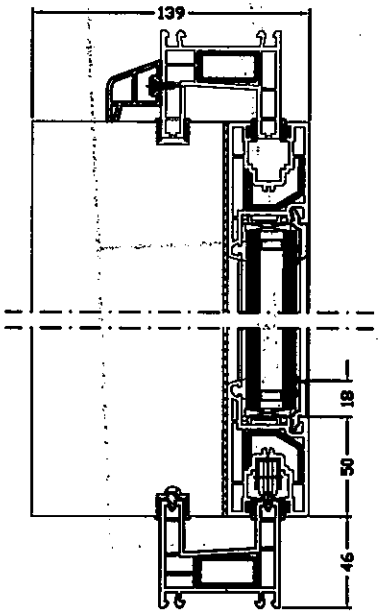


A - A





B - B



C - C

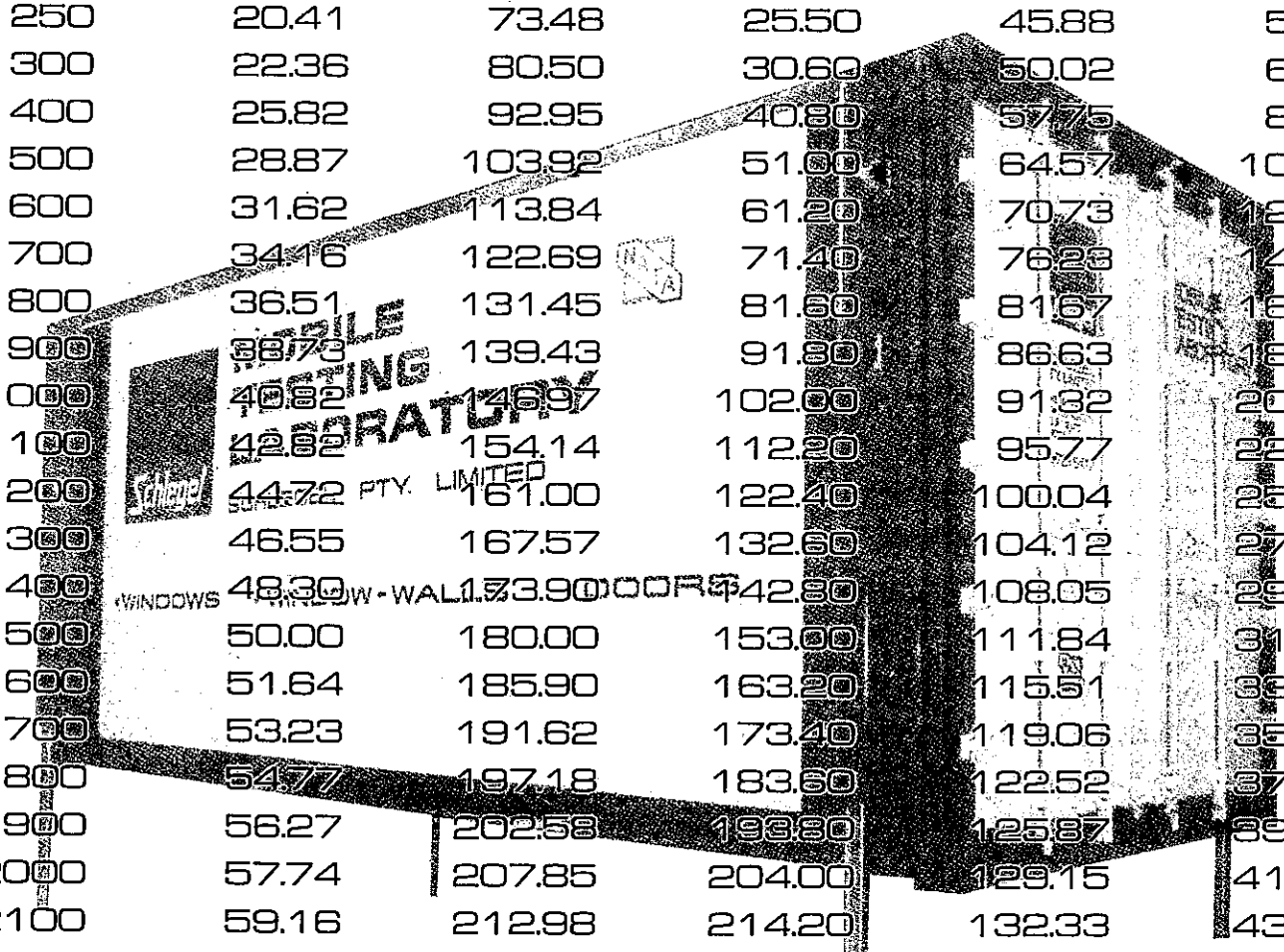
Tolerances for linear dimensions and geometrical tolerances: DIN 16941-3A				Art.No.	–
Year 2011	Date	Name	Tel. Nr.	Cust.Drwg.No.	
Drawn	14/03	M.Tong	syd548	VK:	
Process Engineering Checked				Projector	
Technical Application Checked				K / SR	
M	SLIDING WINDOW – DETAIL DRAWING			Material	
				Shore-A	
				Drawing No.	A4

REHAU

REH_0101

SCHLEGEL™ Pressure Conversion Chart

Pascals	m/sec.	Km/hr	mmH_2O	MPH	Psf
75	11.18	40.25	7.65	25.01	1.56
100	12.91	46.48	10.20	28.88	2.08
150	15.81	56.92	15.30	35.36	3.13
200	18.26	65.73	20.40	40.84	4.17
250	20.41	73.48	25.50	45.88	5.22
300	22.36	80.50	30.60	50.02	6.26
400	25.82	92.95	40.80	57.75	8.35
500	28.87	103.92	51.00	64.57	10.44
600	31.62	113.84	61.20	70.73	12.53
700	34.16	122.69	71.40	76.28	14.62
800	36.51	131.45	81.60	81.67	16.71
900	38.73	139.43	91.80	86.63	18.80
1000	40.82	146.97	102.00	91.32	20.89
1100	42.82	154.14	112.20	95.77	22.97
1200	44.72	161.00	122.40	100.04	25.06
1300	46.55	167.57	132.60	104.12	27.15
1400	48.30	173.90	142.80	108.05	29.24
1500	50.00	180.00	153.00	111.84	31.33
1600	51.64	185.90	163.20	115.51	33.42
1700	53.23	191.62	173.40	119.06	35.51
1800	54.77	197.18	183.60	122.52	37.60
1900	56.27	202.58	193.80	125.87	39.69
2000	57.74	207.85	204.00	129.15	41.78
2100	59.16	212.98	214.20	132.33	43.86
2200	60.55	218.00	224.40	135.45	45.95
2300	61.91	222.90	234.60	138.50	48.04
2400	63.25	227.68	244.80	141.47	50.13
2500	64.55	232.38	255.00	144.39	52.22
3000	70.71	254.56	306.00	158.17	62.67
4000	81.65	293.94	408.00	182.64	83.56
5000	91.29	328.63	510.00	204.20	104.45
6000	100.00	360.00	612.00	223.69	125.34



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