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NB 2547 no'lu AB Onaylanmış Kuruluşu / EU Notified Body Nr. 2547

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DENEY SERTİFİKASI / Test Certificate



AB-0531-T

020.448.1 / 2015

10 / 2015



**Üreticinin Adı ve Adresi / Manufacturer's Name & Address :** BURAK ALUMİNYUM San. ve Tic. A.Ş.

Orta Mah. Hamdi Efendi Sk. No:16 D:32 İztower Soğanlık - Kartal / İstanbul / TÜRKİYE

**Ürün Kabul Tarihi :** 27 / 08 / 2015

Acceptance Date of Item

**FTI Referans No :** 2015.497

FTI Reference No

**Ürün Tipi Kimlik Kodu / Identification Code of the Product Type :** BS 66 - Sliding Window System

**İlgili Ürün Standardı :** TS EN 14351 - 1 + A1

Relevant Product Standard

**Performansın Değişmezliğinin Değerlendirilmesi ve Doğrulanması Sistemi :** System 3

System of Assessment and Verification of Constancy of Performance

**Uygulanan Test Standartları :** TS EN 1026, TS EN 1027, TS 4644 EN 12211, TS EN 13049

Applied Test Standards

TS EN 14609

**Sonuçlar / Results :** Air Permeability - TS EN 12207 : Class 4 for positive ,Class 3 for negative ( 600 Pa )

Watertightness - TS EN 12208 : Class 5 A ( 200 Pa )

Wind Resistance -TS EN 12210 : Class C 5 ( 2000 Pa ; for L/300 criteria )

Impact Resistance -TS EN 13049 : Class I 5 ( 950 mm ; 475 joule )

Static Torsion - TS EN 14609 : OK ( 350 N )

**Test Tarihi / Date of Test**

01 / 10 / 2015

**Sayfa Sayısı / Number of Pages**

1 / 21

Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanıma anlaşması imzalamıştır.

The Turkish Accreditation Agency (TURKAK) is signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual Recognition of test reports.

Uygulanan metodlar, test sonuçları ve genişletilmiş ölçüm belirsizlikleri (talep edilirse), bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir. Bu sertifika yalnız test edilen numuneye ait sonuçları içerir ve ekte sunulan ilgili test raporu ile birlikte geçerlidir.

The applied methods test results and the uncertainties (if requested) with confidence probability are given on the following pages which are part of this report. This certificate includes the test specimen which is identified above and its valid with the related test report which is presented as annex.

Bu sertifika, NB-2547 no'lu Avrupa Birliği Onaylanmış Kuruluşu FTI Fasad Teknoloji Merkezi tarafından 305/2011/AB Yapı Malzemeleri Yönetmeliği doğrultusunda verilmektedir.

This certificate is issued by FTI Façade Testing Institute - European Union Notified Body Nr. 2547 according to the Construction Products Regulation 305/2011/EU.

Mühür / Seal

**Tarih / Date of Issue**

06 / 10 / 2015

**NB 2547 no'lu AB Onaylanmış Kuruluşu adına / on behalf of EU NB 2547**

**Onaylanmış Kuruluş Direktif Yöneticisi / Directive Manager of Notified Body**

Öner ARSLAN



## TEST REPORT

**Report Number** : 020.448.1 / 2015

**Report Date** : 06 / 10 / 2015

**Testing Reference** : TS EN 14351 -1 + A1 Windows and Doors - Product Standard

**Product** : BS 66 Sliding Window System

**Client** : Burak Alüminyum San ve Tic. A.Ş.

## 1. PREFACE

This report comprises of tests and results, which were performed by FTI Façade Testing Institute at the address; Çakıl Mah. Şehit Teğmen Tamer Aydın Sok. No:60/A 34540 Çatalca – İstanbul / TÜRKİYE.

Test sample name is BS 66 Sliding Window System which has been produced by Burak Alüminyum San. ve Tic. A.Ş.

Tests were carried out on 11-15 / 09 / 2015 – 01 / 10 / 2015 for the determination of air infiltration, water penetration ( under static pressure ) , wind resistance , impact resistance and static torsion performances.

Test sample has been sent to FTI Façade Testing Institute's testing laboratories on 27 / 08 / 2015.

## 2. CLIENT

Burak Alüminyum San. ve Tic. A.Ş.

Orta Mah.Hamdi Efendi Sk. No:16 D:32 İztower - 34880

Soğanlık-Kartal / İstanbul / TÜRKİYE

## 3. TEST METHODS

The above mentioned tests have been carried out as per the test methods provided in project specifications and classified on the standards indicated below. Tests have been reported as the number of 020.448.1 / 2015 and the report has been prepared by Ayfer DİNCEL.

EN 14351-1+ A1\* Windows and doors - Product standard, performance characteristics

EN 1026 \* Windows and doors - Air permeability - Test method

EN 12207 \* Windows and doors - Air permeability - Classification

EN 1027 \* Windows and doors - Watertightness - Test method

EN 12208 \* Windows and doors - Watertightness - Classification

EN 12211 \* Windows and doors - Resistance to wind load - Test method

EN 12210 \* Windows and doors - Resistance to wind load – Classification

EN 14609 \* Windows - Determination of the resistance to static torsion

EN 13049 \* Windows - Soft and heavy body impact - Test method safety requirements and classification

## 4. TEST DATE AND PARTICIPANTS

Test was performed on 11-15 / 09 / 2015 – 01 / 10 / 2015 with the following participants:

Mr. Öner ARSLAN FTI Directive Manager of Notified Body

Mr. M. Serhat ÇOLAK FTI Testing Manager

Mr. Sinan BAYRAKTAR FTI Testing Engineer

Miss.Nilay BULUT FTI Testing Engineer  
 and partially by ;  
 Mr. Hüseyin GÜRSOY BURAK ALÜMİNYUM

## 5. DESCRIPTION OF TEST SAMPLE

* Type of sample	Sliding Window System
* System Name	BS 66
* Dimensions of sample	1600 mm x 1400 mm
* Surface area of sample	2,24 m <sup>2</sup>
* Operable joint length	8,80 m
* Glass Type	6mm Helio clear + 12mm Air cavity + 6mm Helio clear

## 6. CONDITIONS

Date	:	11/09/2015	15/09/2015	01/10/2015
Local Temperature °C	:	28	27	19
Humidity %	:	62	51	64
Atmospheric Pressure mbar	:	1015,0	1018,0	1025,0

## 7. TEST PERFORMANCE

### 7.1. Pressure Sequence

STEPS		POSITIVE PRESSURE (Pa)	NEGATIVE PRESSURE (Pa)
1	PA	600	600
2	PW	600	-
3	PD	2000	2000
4	PC	1000	1000
5	PA	600	600
6	PE	3000	3000

PA: Pressure for Airtightness ; PW: Pressure for Watertightness ; PD: Design Pressure  
 PC: Pressure Cycle ; PE: Extreme Pressure

## 7.2. Air Permeability

Before starting the test, 3 pulses at 660 Pa is applied to the sample. During the tests, the pressure at the following values is applied for 10 seconds. The following data includes the remaining values of the system after tare.

### Air permeability measurements based on overall area ;

POSITIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m <sup>2</sup> )
$\phi 1$	50	1,41	0,63
$\phi 1$	100	4,40	1,96
$\phi 1$	150	2,25	1,01
$\phi 1$	200	4,81	2,15
$\phi 1$	250	7,11	3,17
$\phi 1$	300	9,76	4,36
$\phi 1$	450	15,88	7,09
$\phi 1$	600	21,41	<b>9,56</b>

Test No : 2015.497.05 / 11.09.2015

NEGATIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m <sup>2</sup> )
$\phi 1$	50	1,75	0,78
$\phi 1$	100	5,36	2,39
$\phi 1$	150	3,76	1,68
$\phi 1$	200	7,05	3,15
$\phi 1$	250	9,95	4,44
$\phi 1$	300	12,73	5,68
$\phi 1$	450	20,26	9,04
$\phi 1$	600	28,27	<b>12,62</b>

Test No : 2015.497.06 / 11.09.2015

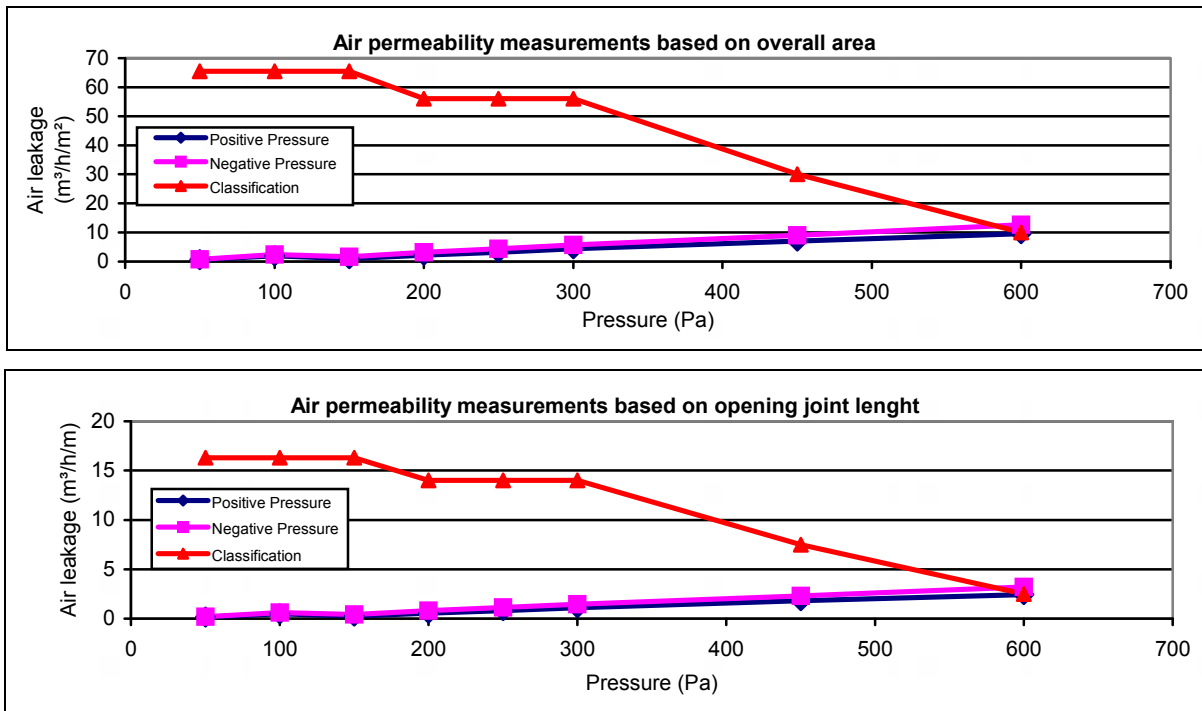
### Air permeability measurements based on opening joint length;

POSITIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m)
$\phi 1$	50	1,41	0,16
$\phi 1$	100	4,40	0,50
$\phi 1$	150	2,25	0,26
$\phi 1$	200	4,81	0,55
$\phi 1$	250	7,11	0,81
$\phi 1$	300	9,76	1,11
$\phi 1$	450	15,88	1,80
$\phi 1$	600	21,41	<b>2,43</b>

Test No : 2015.497.05 / 11.09.2015

NEGATIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m)
$\phi 1$	50	1,75	0,20
$\phi 1$	100	5,36	0,61
$\phi 1$	150	3,76	0,43
$\phi 1$	200	7,05	0,80
$\phi 1$	250	9,95	1,13
$\phi 1$	300	12,73	1,45
$\phi 1$	450	20,26	2,30
$\phi 1$	600	28,27	<b>3,21</b>

Test No : 2015.497.06 / 11.09.2015



### 7.3. Watertightness Under Static Pressure

Before starting the test, 3 pulses at 660 Pa were applied to the sample. Waiting duration between each impacts were 3 seconds. An adjustable device for spraying water 2,0 l/m<sup>2</sup>.min so that a constant and continuous film was applied to the outside surface of the specimen.

The amount of water applied to the façade = 2,0 l/min x 2,24 m<sup>2</sup> = 4,48 l/min. = 268,8 l/h

#### Observations

Pressure Value (Pa)	Time Period (min)	Observations
0	15	Water started to fill the drainage channel after 10 minutes from beginning of the test.
50	5	
100	5	
150	5	
200	5	Drainage channel was completely filled by water.
250	5	Water started to fill the inside channel of the horizontal profile
300	-	-
450	-	-
600	-	-

Test No : 2015.497.07 / 11.09.2015

#### 7.4. Resistance to Wind Load

Before starting the test, 3 pulses at - 2200 / + 2200 Pa are applied to the sample. Waiting duration between each impacts were 3 seconds. During the tests, the pressure values are applied for 10 seconds.

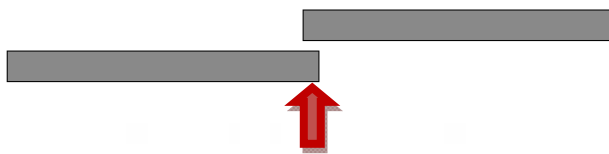
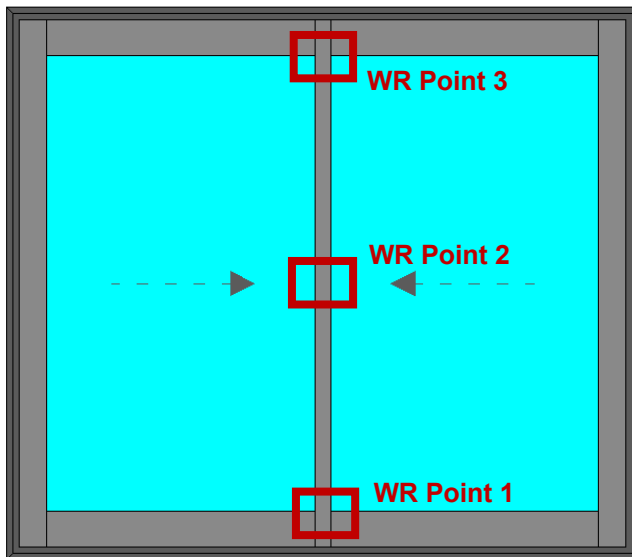
Acceptable proportion at resistance to wind load:

Position: Vertical distance for mullion at middle axis

Scale: **Vertical**      **1340 mm**

The measured frontal deflection between points of the structural support should not exceed the minimum of 1/300 of the framing member's span or 15 mm, which is smaller, under the positive and negative design loads:

**Vertical**       $1340 / 300 = 4,46 \text{ mm}$  for L/300 criteria



*Specimen dimensions and sensor replacement coordinates;*

	X coordinates (mm)	Y coordinates (mm)
<b>External Dimensions</b>	1600	1400
<b>Sensor 1 Replacement</b>	800	70
<b>Sensor 2 Replacement</b>	800	700
<b>Sensor 3 Replacement</b>	800	1330

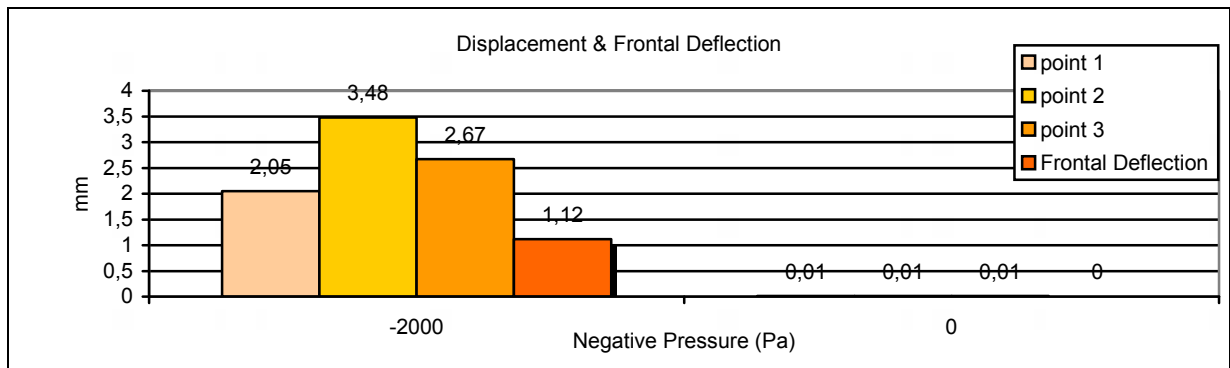
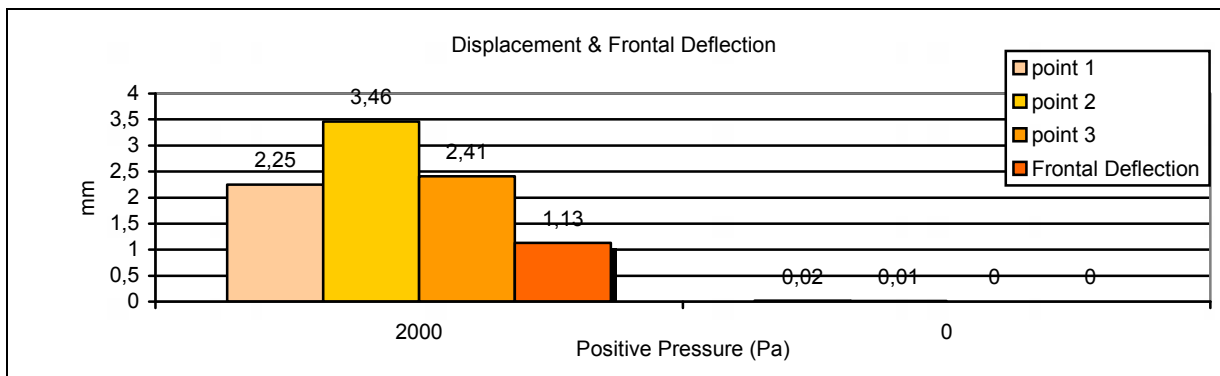
**Frontal deflection measurement results on the vertical profile;**

Positive Pressure (Pa)	Point 1 (mm)	Point 2 (mm)	Point 3 (mm)	Frontal Deflection (mm)
2000	2,25	3,46	2,41	1,13
0	0,02	0,01	0,00	0,00

Test No : 2015.497.08 / 11.09.2015

Negative Pressure (Pa)	Point 1 (mm)	Point 2 (mm)	Point 3 (mm)	Frontal Deflection (mm)
2000	2,05	3,48	2,67	1,12
0	0,01	0,01	0,01	0,00

Test No : 2015.497.09 / 11.09.2015



**7.5. Cycle Test**

+ 1000 Pa and -1000 Pa were applied for 50 cycle.

There was no damage observed on the sample at the end of the test. (Test No: 2015.497.10 / 11.09.2015)

**7.6. Air Permeability ( Repeat )**

Before starting the test, 3 pulses at 660 Pa is applied to the sample. During the tests, the pressure at the following values is applied for 10 seconds. The following data includes the remaining values of the system after tare.



**Air permeability measurements based on overall area ;**

POSITIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m <sup>2</sup> )
$\phi 1$	50	1,01	0,45
$\phi 1$	100	3,67	1,64
$\phi 1$	150	1,18	0,53
$\phi 1$	200	3,21	1,43
$\phi 1$	250	5,54	2,47
$\phi 1$	300	7,40	3,30
$\phi 1$	450	12,52	5,59
$\phi 1$	600	16,80	<b>7,50</b>

Test No : 2015.497.11 / 11.09.2015

NEGATIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m <sup>2</sup> )
$\phi 1$	50	2,19	0,98
$\phi 1$	100	5,87	2,62
$\phi 1$	150	4,17	1,86
$\phi 1$	200	7,21	3,22
$\phi 1$	250	9,91	4,42
$\phi 1$	300	12,51	5,59
$\phi 1$	450	19,68	8,79
$\phi 1$	600	28,29	<b>12,63</b>

Test No : 2015.497.12 / 11.09.2015

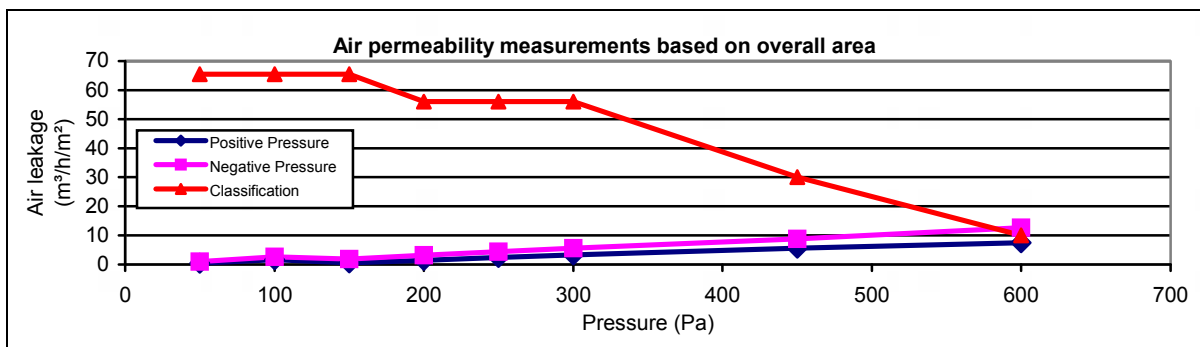
**Air permeability measurements based on opening joint length;**

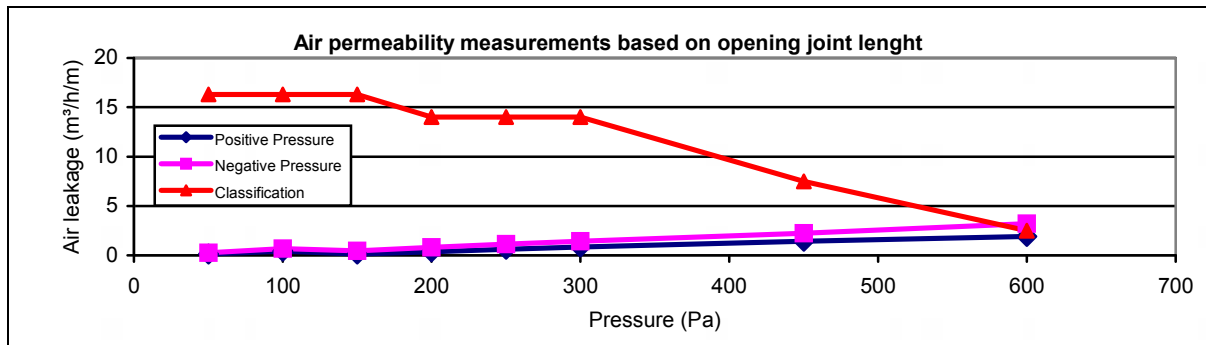
POSITIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m)
$\phi 1$	50	1,01	0,12
$\phi 1$	100	3,67	0,42
$\phi 1$	150	1,18	0,13
$\phi 1$	200	3,21	0,36
$\phi 1$	250	5,54	0,63
$\phi 1$	300	7,40	0,84
$\phi 1$	450	12,52	1,42
$\phi 1$	600	16,80	<b>1,91</b>

Test No : 2015.497.11 / 11.09.2015

NEGATIVE PRESSURE			
$\phi 1 / \phi 2$ Pipe	Test Pressure (Pa)	Air Leakage (m <sup>3</sup> /h)	Air Leakage (m <sup>3</sup> /h/m)
$\phi 1$	50	2,19	0,25
$\phi 1$	100	5,87	0,67
$\phi 1$	150	4,17	0,47
$\phi 1$	200	7,21	0,82
$\phi 1$	250	9,91	1,13
$\phi 1$	300	12,51	1,42
$\phi 1$	450	19,68	2,24
$\phi 1$	600	28,29	<b>3,22</b>

Test No : 2015.497.12 / 11.09.2015





### 7.7. Extreme Load Test

Test Pressure	Applied		Observations
	Positive	Negative	
PE = + 3000 Pa	+ 3000 Pa	-	No damage was observed on the sample
PE = - 3000 Pa	-	- 3000 Pa	No damage was observed on the sample

There was no damage observed on the sample at the end of the test. (**Test No: 2015.497.13 / 11.09.2015**)

### 7.8. Impact Resistance Test

This test was performed in compliance with EN 13049. Thus, soft body impact testing shall be carried out by means of a suspended weight a cord at least 3 m long to swing in pendulum movement until it hits the test specimen normal to its face. The impact body is occurred by two 3.50-R8 4 PR rubber tire and a steel frame. Totally weight of impact body is 50 kg. Internal pressure of tires were adjusted to 0,35 MPa (0,50 psi) before the test.

Impact Point (internal face) - Center of the Glass

\*Impact body was released to 200 mm (100 J) height from impact point.

No damage was observed on the specimen.

\*Impact body was released to 300 mm (150 J) height from impact point.

No damage was observed on the specimen.

\*Impact body was released to 450 mm (225 J) height from impact point.

No damage was observed on the specimen.

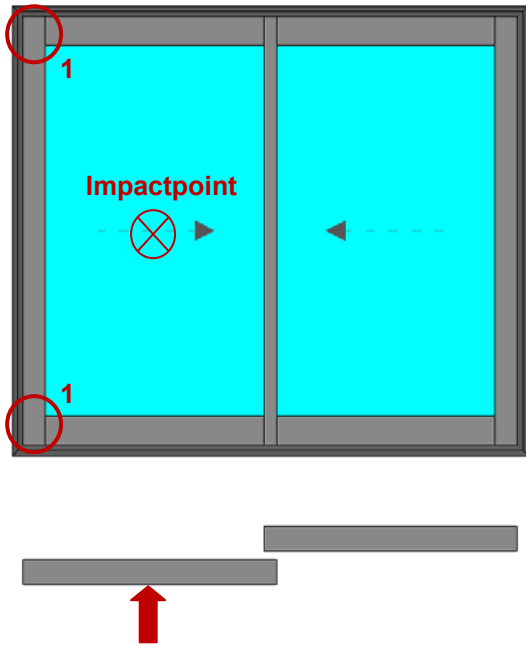
\*Impact body was released to 700 mm (350 J) height from impact point.

No damage was observed on the specimen.

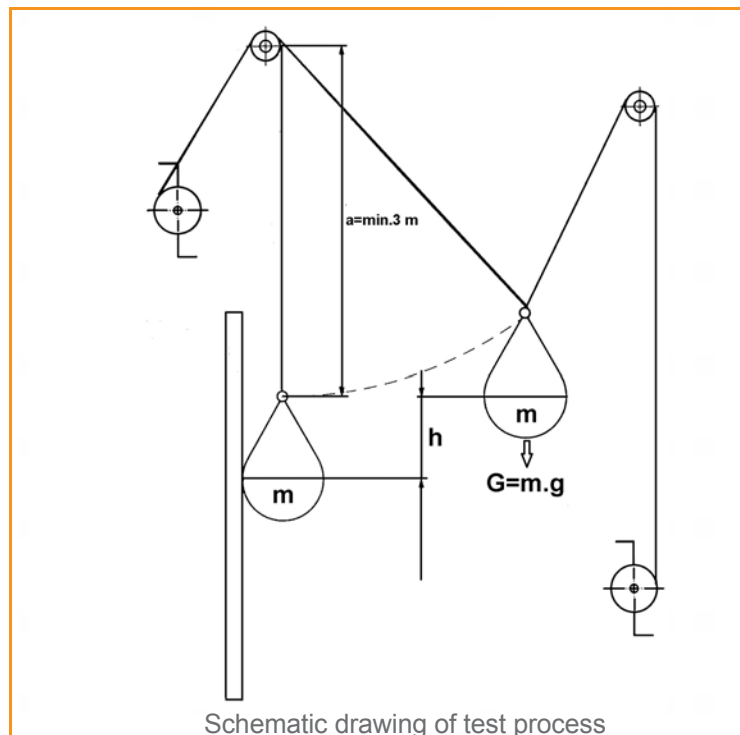
\*Impact body was released to 950 mm (475 J) height from impact point.

There were observed deformations on the junction of the corners between horizontal and vertical profiles.<sup>1</sup>

(**Test No: 2015.497.15 / 15.09.2015**)



7.8.1. Test Mechanism



Schematic drawing of test process

For each impact ;  $m = 50 \text{ kg}$  ,  $g = 10 \text{ m/s}^2$

**Calculation**

Impact 1	Impact 2	Impact 3	Impact 4	Impact 5
$E = m.g.h$	$E = m.g.h$	$E = m.g.h$	$E = m.g.h$	$E = m.g.h$
$E = 50.10.0,2$	$E = 50.10.0,3$	$E = 50.10.0,45$	$E = 50.10.0,7$	$E = 50.10.0,95$
E = 100 Joule	E = 150 Joule	E = 225 Joule	E = 350 Joule	E = 475 Joule

**7.9. Static Torsion Test**

**7.9.1. Loads and Descriptions**

Test Load (F) = 350 N

Preload (F<sub>p</sub>) = 35 N

a<sub>0</sub> = plastic deformation after preload

a<sub>1</sub> = temporary deformation during the test load

a<sub>2</sub> = permanent deformation after test load

**7.9.2. Test Process**

Status	Duration (second)	Deformation (mm)
Preload (F <sub>p</sub> ) = 35 N	60	0,50
After Preload = 0 N	60	0
Test Load (F) = 350 N	300	2,90
After Test Load = 0 N	60	0,10

**Test No : 2015.497.17 / 01.10.2015**

a<sub>0</sub> = 0 mm

a<sub>1</sub> = 2,90 mm

a<sub>2</sub> = 0,10 mm

**max. deformation**

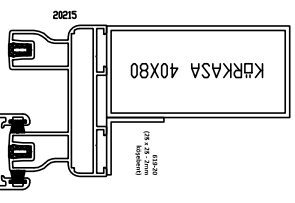
a<sub>1</sub> - a<sub>0</sub> = 2,90 - 0 = **2,90 mm**

**permanent deformation**

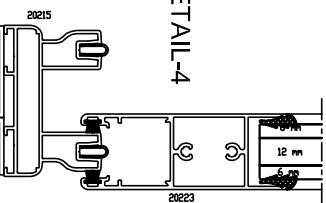
a<sub>2</sub> - a<sub>0</sub> = 0,10 - 0 = **0,10 mm**

**8. RESULTS**

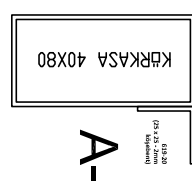
	<b>CONDITIONS</b>	<b>RESULTS</b>		<b>CLASSIFICATION</b>
<b>AIR PERMEABILITY EN 12207</b>	at 600 Pa $\phi < 10 \text{ m}^3/\text{h},\text{m}^2$ at 600 Pa $\phi < 2,5 \text{ m}^3/\text{h},\text{m}$	Positive Pressure	9,56 2,43	<b>Class 4</b> for overall area <b>Class 4</b> for opening j. I.
	at 600 Pa $\phi < 10 \text{ m}^3/\text{h},\text{m}^2$ at 600 Pa $\phi < 2,5 \text{ m}^3/\text{h},\text{m}$	Negative Pressure	12,62 3,21	<b>Class 3</b> for overall area <b>Class 3</b> for opening j. I.
<b>WATER-TIGHTNESS (Static Pressure) EN 12208</b>	There should be no water leakage	Water leakage was observed 250 Pa		<b>Class 5A</b>
<b>RESISTANCE TO WIND LOAD (design load) EN 12210</b>	Deflection < limit value at +2000 Pa	max. 1,13 mm < 4,46 mm		<b>Class C 5</b>
	Deflection < limit value at -2000 Pa	max. 1,12 mm < 4,46 mm		<b>Class C 5</b>
<b>CYCLE TEST</b>	There should be no damage during the test ( + 1000 Pa and – 1000 Pa x 50 cycle )	No damage was observed		<b>OK</b>
<b>AIR PERMEABILITY EN 12207 (repeat and compare)</b>	at 600 Pa $\phi < 10 \text{ m}^3/\text{h},\text{m}^2$ at 600 Pa $\phi < 2,5 \text{ m}^3/\text{h},\text{m}$	Positive Pressure	7,50 1,91	<b>Class 4</b> for overall area <b>Class 4</b> for opening j. I.
	at 600 Pa $\phi < 10 \text{ m}^3/\text{h},\text{m}^2$ at 600 Pa $\phi < 2,5 \text{ m}^3/\text{h},\text{m}$	Negative Pressure	12,63 3,22	<b>Class 3</b> for overall area <b>Class 3</b> for opening j. I.
<b>RESISTANCE TO SAFETY LOAD EN 12210</b>	There should be no damage at +3000 Pa and -3000 Pa.	There was no damage observed at +3000 Pa and -3000 Pa (extreme loads)		<b>OK</b>
<b>IMPACT RESISTANCE EN 13049</b>	There should not be any damage which might possibly cause bodily injuries of anybody standing around the mock-up.	Impact point :Center point of the glass ( Internal face ) - There were observed deformations on the junction of the corners between horizontal and vertical profiles. It is not evaluated as a dangerous damage. 950mm - 475 J		<b>Class I 5</b>
<b>STATIC TORSION TESTS EN 14609</b>	Window shall be subjected to 350 N	OK		<b>OK</b>



DETAIL-5

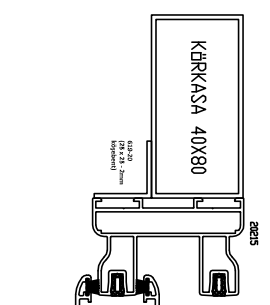


DETAIL-4

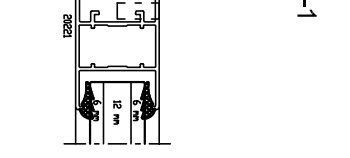
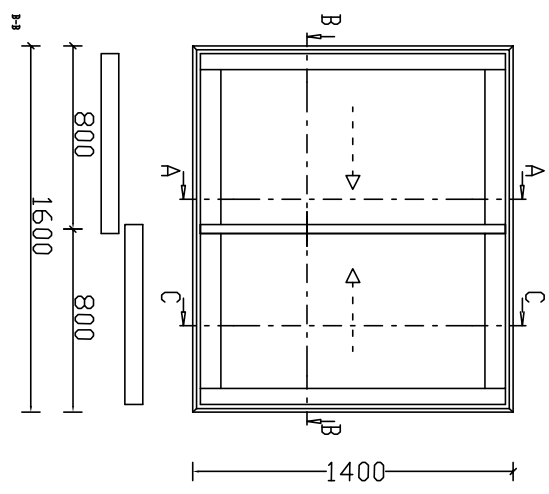


DETAIL-1

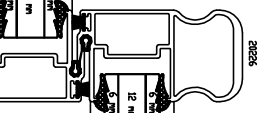
A-A



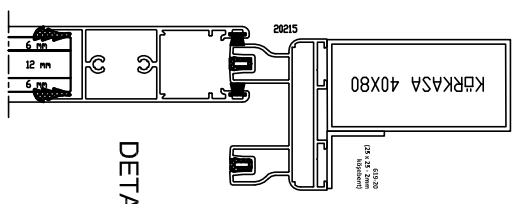
DETAIL-2



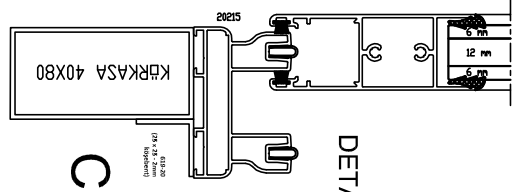
DETAIL-3



C-C

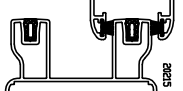


DETAIL-7

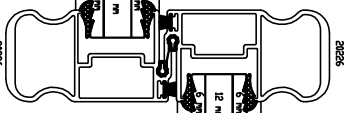


DETAIL-6

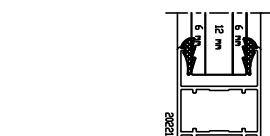
B-B



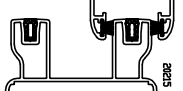
DETAIL-1



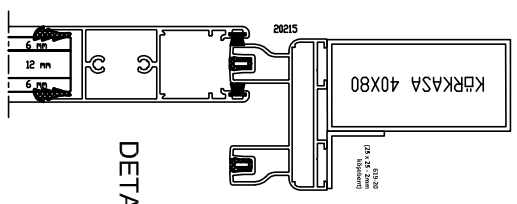
DETAIL-2



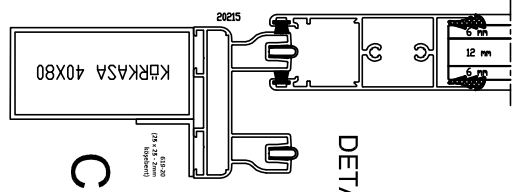
DETAIL-3



C-C



DETAIL-7



DETAIL-6



I-9↑

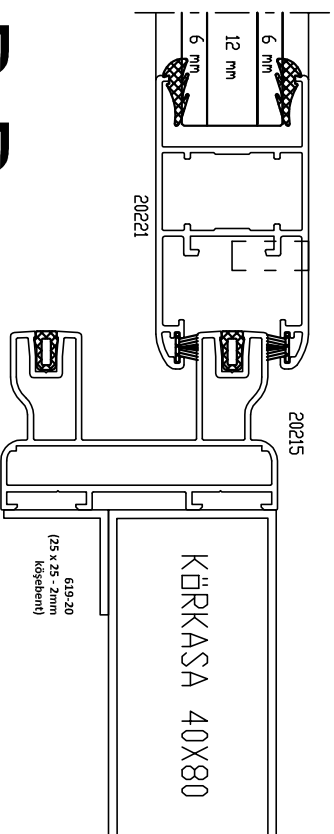
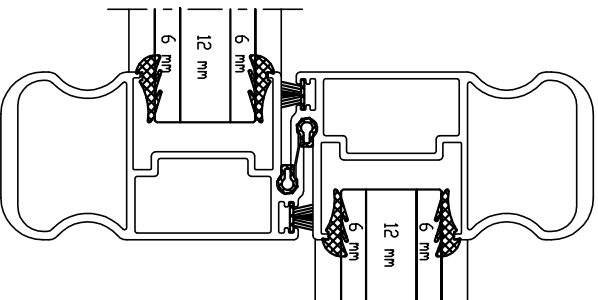
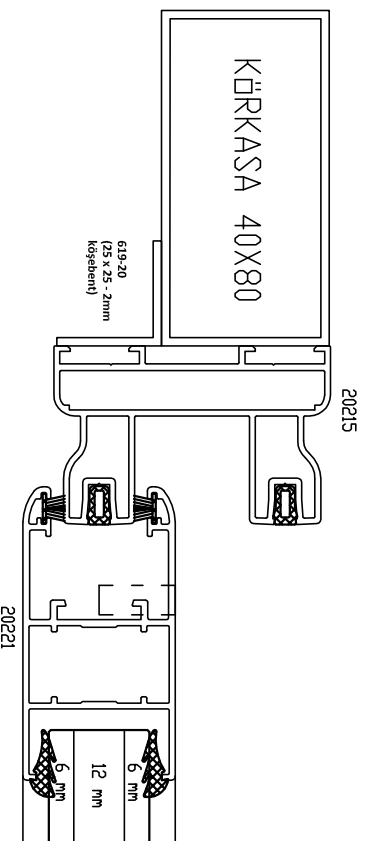
## DETAIL-2

20226

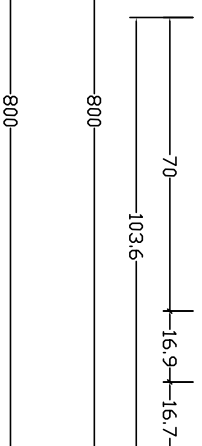
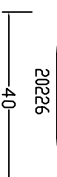
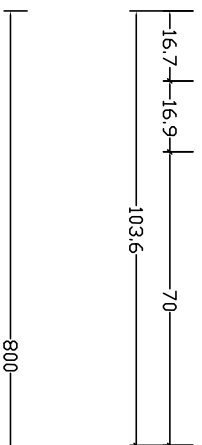
I-9↑

## DETAIL-1

## DETAIL-3



## B-B



800

800



C-C

DETAIL-7

DETAIL-6

