

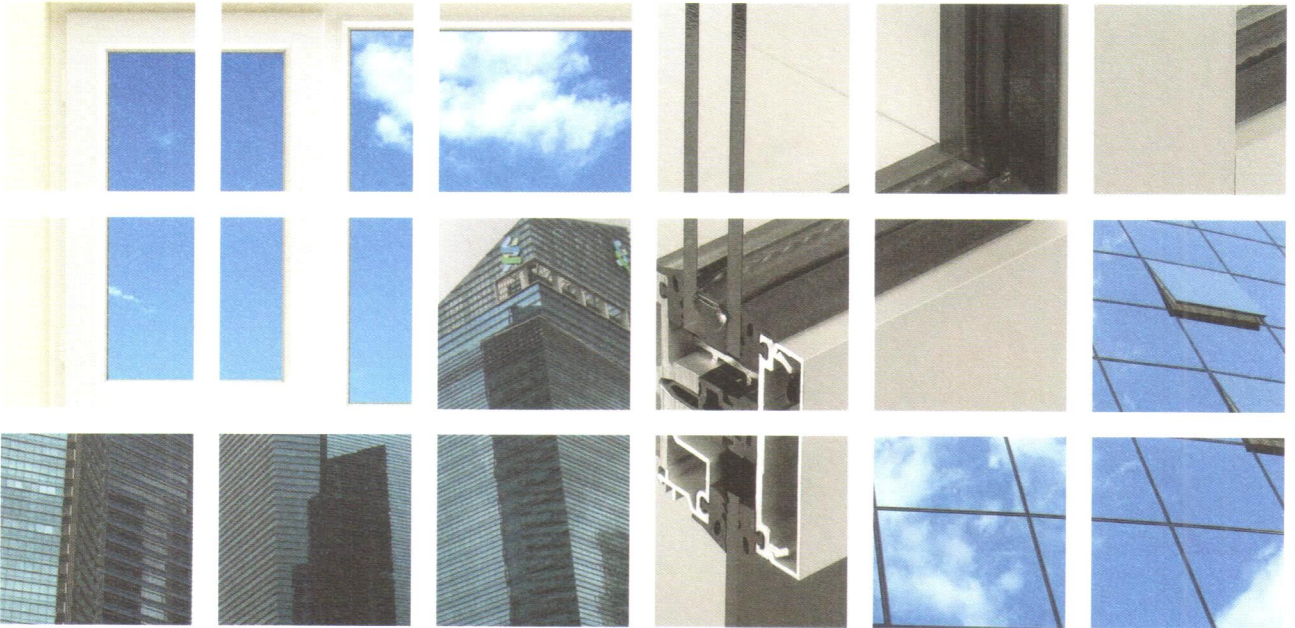
## PERFORMANCE ASSESSMENT REPORT

### ORAFOL TURKEY FOLYO TİCARET VE SANAYİ A.Ş.

TS EN 12600: 2004 Glass in building – Pendulum test – Impact test method and classification  
for flat glass

Report No: DY22-011-0

*...yapı kalitesi için çalışır*





## Summary of Performance Assessment Report

### Client and Production Information

Client	Orafol Turkey Folyo Ticaret ve Sanayi A.Ş.
Client Address	Akçaburgaz Mah. 9. Cad. 117. Sokak No:5 Kıraç
Manufacturer Name	Astaş Cam Yapı San. ve Tic. A.Ş.
Address of Manufacturer of specimens	Cihangir Mah. Şehit Komando Çvş. Murat Altıntaş Sok. No:7/2 Avcılar-İstanbul
Type of Product/Specimen	4 mm flat glass coated with safety glass film
Product/Specimen Trade Name or Description	4 mm flat glass coated with Oracal Safety 100 micron film
Product Standard	Not applicable
Test Standard	TS EN 12600: April 2004
Product/Specimen Description	Specimen Data Form (NBF.12600) dated 22.06.2020
Date of Manufacture/Batch	07 June 2019
Nominal Thicknesses of Specimens (mm)	4mm flat glass + Oracal Safety 100 micron film

### Conclusion

Product / Specimen Trade Name or Description	Performance Classification
4 mm flat glass coated with Oracal Safety 100 micron film	3(B)3

#### **Notes:**

- (1) These test results apply only to the particular specimens tested and to the specific tests carried out, as detailed in the test performance assessment report no. DY22-011-0 dated 16.07.2020. This certificate contains only the summary of the test results given in the relevant performance assessment report.
- (2) This certificate confirms that the 'Pendulum test - Impact test method for flat glass and classification' test was performed based on TS EN 12600: 2004 for the product specimens of which client and product information were given above.
- (3) This certificate may only be used as the evidence of the test result and is an integral part of the relevant performance assessment report but it cannot be used on its own.
- (4) This certificate has been issued to establish whether the product conforms to the definition / properties described in the relevant standard.

Mehmet Yakut  
Technical Manager

#### Standart Belgelendirme Denetim Deney Muayene ve Teknik Kontrol Ltd. Şti.

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PDR.12600-D/00/01.01.2019



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### TEST REQUESTED BY :

**Client No.:** 1120

**Client Contract No.:** 2

**Date of Contract:** 02.06.2020

**Client:** Orafol Turkey Folyo Ticaret ve Sanayi A.Ş.

**Address:** Akçaburgaz Mah. 9. Cad. 117. Sokak No:5 Kıraç  
Esenyurt / İstanbul

**Telephone:** (212) 671 26 83

### SPECIFICATION OF SPECIMENS:

**Manufacturer of Specimens:** Astaş Cam Yapı San. ve Tic. A.Ş.

**Address of Manufacturer of Specimens:** Cihangir Mah. Şehit Komando Çvş. Murat  
Altıntaş Sok. No:7/2 Avcılar-İstanbul

**Type of Specimens / Product :** 4 mm flat glass coated with safety glass film

**Tradename and Description of** 4 mm flat glass coated with

**Specimens / Product:** Oracal Safety 100 micron film

**Date and of code of specimen data form:** 22.06.2020 / NBF.12600

**Total number of specimens :** 7 pieces

**Date of Manufacture of Specimens :** 07.06.2020

**Date of Delivery of Specimens :** 09.06.2020

**Date of Completion of Tests :** 12.07.2020

**Specification (Test Standard Used) :** TS EN 12600: 2004

**Product Standard :** Not applicable

**Total number of Pages of the Report:** 7 pages (except cover page) + Annexes

### APPROVALS:



### Prepared By:

Gürcan ŞAHİN

Laboratory Chief

### Approved By:

Mehmet YAKUT

Technical Manager

**Standart Belgelendirme Denetim Deney Muayene ve Teknik Kontrol Ltd. Şti.**

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## PERFORMANCE ASSESSMENT REPORT

### CONDITIONS OF ISSUE AND USE OF THE REPORT

1. This report is issued according to the provisions of the Performance Assessment Contract approved in the stated date. The reports are invalid if not signed and stamped properly.
2. The results contained herein apply only to the particular specimens tested and to the specific tests carried out, as detailed in this report.
3. The issuing of this report does not indicate any measure of Approval, Certification, Supervision, Technical Control and Surveillance by SBD of any product.
4. This report is not a 'Product Certificate' and may not be used as a 'Product Certificate'.
5. Any part of this report must not be copied and/or reproduced in any form without the written permission of the SBD laboratory. No extract, abridgement or abstraction from this report may be published or used to advertise a product without the written consent of the managing director, SBD. SBD reserves the absolute right to agree or reject all or any of the details of any items or publicity for which consent may be sought.

(SBD is the abbreviation of Standart Belgelendirme Denetim Deney Muayene ve Teknik Kontrol Ltd.Şti.)

### INTRODUCTION

According to "TS EN 12600: 2004 Glass in building – Pendulum test – Impact test method and classification for flat glass" standard, the product performance type testing is carried out to establish if the glass used in building conforms to the specified characteristic, i.e. the 'safety in use – Pendulum body impact resistance: Shatter properties (safe breakability) and resistance to impact'.

SBD laboratory performs the pendulum test and based on the results determines the impact resistance and further the classification of the test specimens for the 'safety in use' essential characteristics of the product.

Upon the request of the client, the test specimens of which technical specification were detailed below and submitted by the client were tested and assessed according to the applicable requirements of the relevant Standard. The performance assessment results were shown on the following pages of this report. The performance assessment method was explained to the client and the client agreed on the method and the provisions of the contract and approved the contract. The contract was mutually signed on the stated date between the client and SBD.

### DESCRIPTION AND SPECIFICATION OF TEST SPECIMEN (Clauses 5.2.2 and 5.2.3)

SBD has not taken any responsibility and has not been involved in sampling and/or preparing and/or delivering the test items. The test items were delivered at the laboratory address. All the information taking place in this report regarding the identity of the product, sampling method and test specimens are based on the information provided by the client.

The glass components of the specimens send to the laboratory by the customer was produced by Astaş Cam Yapı San. ve Tic. A.Ş. The film component was produced by Orafol Turkey Folyo Tic. ve San. A.Ş. The lamination process was carried out by Astaş Cam Yapı San. ve Tic. A.Ş.



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The technical specifications of the test items were identified and recorded under the laboratory project number **DY.22-011**. The test specimens have the following properties as declared by the client.

<b>Manufacturer of specimens</b>	Astaş Cam Yapı San. ve Tic. A.Ş.		
<b>Address of manufacturer of specimens</b>	Cihangir Mah. Şehit Komando Çvş. Murat Altıntaş Sok. No:7/2 Avcılar-İstanbul		
<b>Type of specimens / product</b>	4 mm flat glass coated with safety glass film		
<b>Trade name and description of specimens / product</b>	4 mm flat glass coated with Oracal Safety 100 micron film		
<b>Date and code of 'Specimen Data form'</b>	22.06.2020 / NBF.12600		
<b>Dimensions of specimens (mm x mm)</b>	876 mm x 1938 mm		
<b>(Total) nominal thicknesses (mm)</b>	4mm flat glass + Oracal Safety 100 micron safety film		
<b>Are the specimens symmetrical?</b>	<input type="checkbox"/> Symmetric <input checked="" type="checkbox"/> Asymmetric	<b>Surface of specimens*</b>	Oracal Safety 100 micron safety film
<b>The surface of which the force will be exerted for asymmetric materials:</b>			
<input checked="" type="checkbox"/> <b>X:</b> Flat or unenamelled or not film-applied or laminated glass (with the thicker glass pane) <input type="checkbox"/> <b>Y:</b> Patterned or enamelled or film applied or laminated glass (with the thinner glass) <input type="checkbox"/> <b>Z:</b> Both faces <input type="checkbox"/> Not Applicable			
<b>Manufacturer of film</b>	Orafol Turkey Folyo Tic. ve San. A.Ş.	<b>Type and trade name of film</b>	Oracal Safety
<b>Was the film clamped in the frame?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>Thickness of film</b>	100 micron

*\*For the surface of the asymmetrical test specimens, type of surface should be written (such as flat, patterned, enamelled, film applied, etc.).*

### TEST PROCEDURE (Clause 5.1 and 5.3)

- The test specimens are conditioned at  $(20\pm5) ^\circ\text{C}$  at least for 12 hours.
- The test is carried out at  $(20\pm5) ^\circ\text{C}$ .
- A test piece is placed in the clamping frame so that its edges are encased in the rubber strip to a minimum depth of 10mm. When clamped, the rubber is compressed by not more than 20% of its original thickness.
- The rubber strips used have dimensions of  $(20\pm2)$  mm x  $(10\pm1)$  mm and have a hardness of  $(60\pm5)$  IRHD in accordance with ISO 48.
- Both impactor tires are inflated to a pressure of  $(0,35 \pm 0,02)$  MPa [ $(3,5\pm 0,2)$  bar]. Pressure is checked before each drop height.



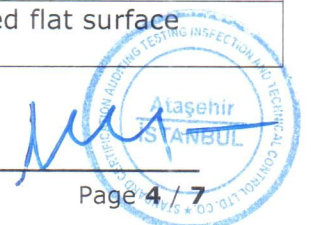
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6. The impactor is raised to the lowest drop height (S3) and stabilized. At the drop height the suspension cable should be taut and the axis of the impactor and cable should be in line.
7. The impactor is released by pulling the string of snap shackle so that it falls with a pendulum movement and without initial velocity. The direction of the impact on the center of the test piece should be normal to the surface and the impactor should strike the test piece only once. Therefore after the first impact, the impactor is held by the laboratory technicians. (The weight of the impactor should not make contact with the test piece during the impact.)
8. The test piece is inspected after impact and the followings are noted on the relevant test form:
  - a) The test piece is unbroken or broken
  - b) If the test piece broken, it breaks in accordance with the requirements of Clause 4.a and the result is recorded as APPROPRIATE or NOT APPROPRIATE.
  - c) If the test piece is broken (disintegrated / fragmented), it disintegrates into pieces in accordance with the requirements of Clause 4.b and the result is recorded as APPROPRIATE or NOT APPROPRIATE.
9. If any of the initial four test pieces – at the same nominal thickness – fails to conform to the requirements of Clause 4, the test operation is terminated.
10. If all of the four test pieces – at the same nominal thickness – either do not break or else break (or disintegrated / fragmented) according to the criteria given in Clause 4.a and 4.b and if it is required to test the material to a higher impact level, the drop height is increased to the next level (S2) and later to the higher level (S1).
11. The test is repeated on four more samples of the same material. (If the test pieces remained unbroken, the same specimens may be used. However a careful inspection is required before carrying out the test at the higher drop heights.)
12. For asymmetrical materials where the risk of impact is from both sides, the test is carried out on both sides. This also means that the number of test specimen doubles. For asymmetrical materials where the classification is required only for one face, then only the designated face is tested and this will be reported in the report.

### TEST RIG, TEST INFORMATION AND DIMENSIONAL MEASUREMENTS OF SPECIMENS (Clause 5.1; 5.2 and 5.3)

<b>(1) Information on the test rig</b>	
Manufacturer of the test rig	AGM Mühendislik Ltd. Şti.
Calibration body of the test rig	Bias Mühendislik Ltd. Şti.
Date of the calibration of the test rig according to the Annex B	14.01.2019
<b>(2) Information on testing</b>	
Specific gravity of glass (g/cm <sup>3</sup> )	2,5
Duration of conditioning at (20 ± 5) °C (hour)	12
Ambient temperature during testing (°C)	22
The surface which is impacted (For asymmetrical specimens)	Uncoated flat surface





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The surface which is impacted (For patterned specimens)	Not applicable
In case of applied films, is the film clamped in the frame?	No

### (3) Dimensions of the test specimens

The dimensions of the test specimens were measured and the measurement results were found to conform to the requirements of the standard. [Length: (1938±2) mm; Width: (876±2) mm; Thickness: ±0,2 mm for thicknesses ≤6 mm nominal thicknesses and ±0,3 mm for thicknesses above 6 mm nominal thicknesses up to 15 mm].

The measurement results are given below:

#### Results of Dimensional Measurements

	Specimen Code	Length (mm)	Width (mm)	Thickness (mm)	Dimensions Appropriate?
1	#1	1939	877	3,93	APPROPRIATE
2	#2	1938	877	3,92	APPROPRIATE
3	#3	1939	877	3,93	APPROPRIATE
4	#4	1938	876	3,93	APPROPRIATE
5	#5	1938	876	3,93	APPROPRIATE
6	#6	1938	876	3,93	APPROPRIATE
7	#7	1938	876	3,93	APPROPRIATE
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-

The masses equivalent to the specified areas of the measured thicknesses of the original test specimens were calculated and the calculation results were given below. The equivalent masses were calculated based on the glass thicknesses by subtracting the film thicknesses from the total measured glass thicknesses.

The encasement depths of specimens on rubber and the ratio of the rubber compression were measured and the measured values were found as appropriate with respect to the requirements of the standard.

#### Calculation of Equivalent Masses And Check List Items During Testing

#	Specimen Code	The mass equivalent to an area of 10.000 mm <sup>2</sup> (g)	The mass equivalent to an area of 4.400 mm <sup>2</sup> (g)	The mass equivalent to an area of 6.500 mm <sup>2</sup> (g)	Rubber compression ratio (Max %20) and specimen encasement depth (Min 10 mm)	Tire pressure [0,35±0,02] MPa]
1	#1	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE

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2	#2	98,00	43,12	63,70	APPROPRIATE	APPROPRIATE
3	#3	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE
4	#4	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE
5	#5	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE
6	#6	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE
7	#7	98,25	43,23	63,86	APPROPRIATE	APPROPRIATE
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-

### TEST FINDINGS AND RESULTS (Clause 4 and 6)

Classification	Drop Height (mm)	Specimen code	The surface which was impacted	Breakage (Yes /No)	Opening (Yes /No)	Total glass mass (g)	Mass of the single particle (g)	(4.a) Are masses less than the equivalent masses?	Mass of 10 crack-free particles (g)	(4.b) Is mass less than the equivalent mass ?
3	190	#1	X	NO	-	-	-	-	-	-
		#2	X	YES	NO	-	-	-	-	-
		#3	X	YES	NO	-	-	-	-	-
		#4	X	YES	NO	-	-	-	-	-
2	450	#1	X	YES	NO	-	-	-	-	-
		#5	X	YES	YES	~0	~0	YES	-	-
		#6	X	YES	NO	-	-	-	-	-
1	1200	#7	X	YES	NO	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-

### SUMMARY OF TEST FINDINGS

<b>CLASSIFICATION 3 (190 mm)</b>	<ul style="list-style-type: none"> <li>One test specimen did not break.</li> <li>Three test specimens broke in accordance with Clause 4.a</li> </ul>
<b>CLASSIFICATION 2 (450 mm)</b>	<ul style="list-style-type: none"> <li>All four specimens broke.</li> <li>Three test specimens broke in accordance with Clause 4.a</li> <li>One test specimen did not break in accordance with Clause 4.a</li> </ul>
<b>CLASSIFICATION 1 (1200 mm)</b>	<ul style="list-style-type: none"> <li>Not applied.</li> </ul>



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Mode of Breakage	B
Performance classification	3(B)3

CONCLUSION (Clause 4 and 6)	
<p>The glass products sent by  <b>Orafol Turkey Folyo Ticaret ve Sanayi A.Ş.</b>  were tested and assessed by our laboratory based on the criteria given in TS EN 12600: April 2004 and the performance classification is given below:</p>	
Types of specimens / products	Performance Classification
4 mm flat glass coated with Oracal Safety 100 micron film	<b>3 (B) 3</b>

THE REVISION NUMBER, REASON OF THE REVISION AND OTHER EXPLANATIONS
-

**Annex-1:** Complaint and feedback form

**Annex-2:** Letter on disposal of left-over test specimens