

## Test report

**Test report relating to a glass product according to European standard EN 1096-4:2018, Coated glass, concerning the product marked as: Sapphire AR™ 4 mm, manufactured by: Groglass SIA**

Report number	89219177-01
Date	18th October 2021
Author(s)	S.el Bardai
Client	Groglass Ltd. Katlakalna iela 4B Riga, LV-1073, Latvia
Project number	89219177
Project name	19.A269 - EN1096-2
Number of pages	13



*All rights reserved.*

*No part of this report may be reproduced, provided to and/or examined by third parties, and/or published by print, photoprint, microfilm, in electronic form or any other means without the explicit previous written consent of TÜV Rheinland Nederland B.V.*

*In case this report was drafted within the context of an assignment to TÜV Rheinland Nederland B.V., the rights and obligations of contracting parties are subject to the General Terms & Conditions for Advisory, Research and Certification assignments to TÜV Rheinland Nederland B.V and/or the relevant agreement concluded between the contracting parties.*

© 2010 TÜV Rheinland Nederland B.V.

## Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
1.1	Purpose	3
1.2	Description of the test specimen	3
1.3	Sampling procedure	3
1.4	Application	3
1.5	Method of testing	3
1.6	Put out to contract	3
1.7	Privacy statement	3
1.8	Notifications, accreditations, designations	3
<b>2</b>	<b>Test results</b>	<b>5</b>
<b>3</b>	<b>Conclusion</b>	<b>11</b>
<b>4</b>	<b>References</b>	<b>12</b>
<b>5</b>	<b>Signatures</b>	<b>13</b>

# 1 Introduction

## 1.1 Purpose

The tests have been performed in order to establish whether or not the product meets the requirements of the European standard EN 1096-4 [1] when tested according to EN 1096-2 [2].

## 1.2 Description of the test specimen

### General

Name of the manufacturer	Groglass SIA
Address of the manufacturer	Katlakalna iela 4B, Riga, LV-1073, Latvia
Production plant of the samples	Katlakalna iela 4B, Riga, LV-1073, Latvia
Line ID where the samples are made	Sidrabe 2SV2215MR In-Line System
Production date	14-20.03.2021
Sampling date	24.05.2021
The product was marked as	Sapphire AR™ 4 mm
Dimensions of the samples	300 x 300 mm

### Specific

Class of the coating	A
Commercial name of the coating	Sapphire AR™ 4 mm
Method of spectrophotometric measurement (for toughened or heat-strengthened coated glass)	Not applicable

## 1.3 Sampling procedure

TÜV Rheinland B.V., acting as Notified Test Laboratory, has had no influence on the selection of the sample. All test specimen within the sample were test-worthy and were received on 25<sup>th</sup> June 2021.

## 1.4 Application

The request for testing was submitted by the manufacturer on 6<sup>th</sup> April 2021, order or reference number or name: -. Assignment Form number: 19.A269.

## 1.5 Method of testing

All applicable tests have been performed according to the European standard EN 1096-2 [1].

## 1.6 Put out to contract

No tests were performed at third parties.

## 1.7 Privacy statement

Due to privacy reasons, the names of involved personnel that executed the tests, are not disclosed in the report. However, this information is available on internal work sheets, test forms etc. in the project file.

## 1.8 Notifications, accreditations, designations

TÜV Rheinland Nederland B.V. has been notified by the Dutch Minister for Housing and the Central Government Sector as Notified Laboratory (number 1750) and Notified (Factory Production Control) Certification Body (number 0336) for the European Construction Products Regulation 305/2011 (EU).

TÜV Rheinland Nederland B.V. has been accredited by the Dutch Accreditation Council (RvA) as ISO 17025 Test Laboratory (nr. L 484) and ISO 17065 Certification Body (nr. C078).

TÜV Rheinland Nederland B.V. has been designated as Technical Service (Laboratory) by the Approval Authorities for Germany (KBA – E1) and the Netherlands (RDW – E4) for automotive safety glass (ECE R43, 92/22/EC, 2009/144/EC).

TÜV Rheinland Nederland B.V. has been recognised by the German Institute for building technics (DIBt) under number NL005 as test, control and certification body.

#### **Remark**

The reported tests were performed under ISO 17025 accreditation.

## 2 Test results

Test results after performing all applicable tests according to European standard EN 1096-2 [1].

Description of the requirement	Required	Value of the test	Pass / fail
<b>Requirements</b> The coated glass complying with this European Standard shall respect the requirements related to the different characteristics given in table 1 of the Standard.			
<b>Visual inspection</b>			
Condensation resistance	<ul style="list-style-type: none"> <li>No defect &gt; 3 mm</li> <li>Max. 1 defect between 2 and 3 mm</li> <li>Max. 5 defects between 1 and 2 mm</li> <li>No scratches, staining of the coating or clusters of pinholes &gt; 1 mm</li> <li>When compared with the reference test piece, in both reflection and transmission, no significant colour change</li> </ul>	<ul style="list-style-type: none"> <li>No defect &gt; 3 mm</li> <li>Number: 0</li> <li>Number: 0</li> <li>No scratches, staining of coating, clusters of pinholes &gt; 1 mm</li> <li>No significant colour change</li> </ul>	<p><b>Initial</b> pass</p> <p><b>Final</b> pass</p>
Acid resistance	No requirements	--	not applicable
Neutral salt spray resistance	<ul style="list-style-type: none"> <li>No defect &gt; 3 mm</li> <li>Max. 1 defect between 2 and 3 mm</li> <li>Max. 5 defects between 1 and 2 mm</li> <li>No scratches, staining of the coating or clusters of pinholes &gt; 1 mm</li> <li>When compared with the reference test piece, in both reflection and transmission, no significant colour change</li> </ul>	<ul style="list-style-type: none"> <li>No defect &gt; 3 mm</li> <li>Number: 0</li> <li>Number: 0</li> <li>No scratches, staining of coating, clusters of pinholes &gt; 1 mm</li> <li>No significant colour change</li> </ul>	<p><b>Initial</b> pass</p> <p><b>Final</b> pass</p>
Abrasion resistance	No requirements other than to ensure that the abraded area is uniform	Abraded area is uniform	pass
<b>Spectrophoto-metric measurements</b>			

Description of the requirement	Required	Value of the test	Pass / fail
Condensation resistance Acid resistance Neutral salt spray resistance	Transmittance measured at 550 and 900 nm shall differ no more than $\pm 0,03$ from the corresponding measured value on the reference test piece.  For a glass claimed to have a low emissivity coating, the reflectance at 8 $\mu\text{m}$ shall decrease by no more than 0,02.	Difference $< \pm 0,03$  Decrease of reflectance at 8 $\mu\text{m}$ $< 0,02$	pass  not applicable
Abrasion resistance	Total (diffuse plus direct) transmittance measured at 550 and 900 nm shall differ no more than $\pm 0,05$ from the corresponding measured value on the reference test piece.	Difference $< \pm 0,05$	pass

#### Information relating to the tests

Number of tested samples	<ul style="list-style-type: none"> <li>• Condensation resistance: 4</li> <li>• Acid resistance: 4</li> <li>• Neutral salt spray resistance: 4</li> <li>• Abrasion resistance: 1</li> <li>• Spectrophotometric measurements: 4</li> </ul>
Condensation resistance test	<ul style="list-style-type: none"> <li>• Total area of pieces tested at the same time: 600 cm<sup>2</sup></li> <li>• Daily temperature: 40 °C</li> <li>• Weekly pH: week 1: 6.5;</li> <li>• Observation of condensation on reference glass piece: yes</li> </ul>
Acid resistance test	<ul style="list-style-type: none"> <li>• Total area of pieces tested at the same time: 600 cm<sup>2</sup></li> <li>• Daily temperature in high temp. phase of the test: 40 °C</li> <li>• pH at the end of the cycle: 1.5-2</li> <li>• Interruption time between tests: 8 hours</li> </ul>
Neutral salt spray resistance test	<ul style="list-style-type: none"> <li>• Total area of pieces tested at the same time: 600 cm<sup>2</sup></li> <li>• Daily temperature: 35 °C</li> </ul>
Abrasion resistance test	<ul style="list-style-type: none"> <li>• Uniformity of abraded area: yes</li> <li>• Number and frequency of strokes: 500, 55/min.</li> </ul>

#### Period of testing

The tests took place in the period July till October 2021.

**Condensation test for class A, total of 21 days**

Spectrophotometric measurements				
Sample 1	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6741	97,4988	0,1753	OK
Transmittance at 900 nm	73,2287	72,4009	0,8278	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 2	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6856	97,8233	-0,1377	OK
Transmittance at 900 nm	73,2224	71,9602	1,2622	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 3	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6805	97,9516	-0,2711	OK
Transmittance at 900 nm	73,2261	72,6108	0,6153	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 4	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6613	98,0870	-0,4275	OK
Transmittance at 900 nm	73,2280	72,4424	0,7856	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-

**Acid resistance test for class A, 5 cycle**

Spectrophotometric measurements				
Sample 1	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6741	97,3495	0,3246	OK
Transmittance at 900 nm	73,2287	73,8689	-0,6402	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 2	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6856	97,5693	0,1163	OK
Transmittance at 900 nm	73,2224	73,5380	-0,3156	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 3	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6805	97,5923	0,0882	OK
Transmittance at 900 nm	73,2261	74,2555	-1,0294	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 4	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6613	97,7487	-0,0874	OK
Transmittance at 900 nm	73,2280	72,8889	0,3391	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-



**Neutral Salt Spray test for class A, total of 21 days**

Spectrophotometric measurements				
Sample 1	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6741	97,5615	0,1126	OK
Transmittance at 900 nm	73,2287	73,3011	-0,0724	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 2	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6856	97,6942	-0,0086	OK
Transmittance at 900 nm	73,2224	73,1135	0,1105	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 3	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6805	97,6150	0,0655	OK
Transmittance at 900 nm	73,2261	73,7587	-0,5326	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Sample 4	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 3%)
Transmittance at 550 nm	97,6613	97,6705	-0,0092	OK
Transmittance at 900 nm	73,2280	73,8574	-0,6294	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-

**Abrasion test (P1)**

Spectrophotometric measurements				
Measurement 1 at 500 cycles	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 5%)
Transmittance at 550 nm	97,6741	97,6422	0,0319	OK
Transmittance at 900 nm	73,2287	73,3126	-0,0839	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-
Spectrophotometric measurements				
Measurement 2 at 500 cycles	Reference test piece (%)	Exposed test piece (%)	Difference (%)	Result within Limits (+/- 5%)
Transmittance at 550 nm	97,6856	97,6451	0,0405	OK
Transmittance at 900 nm	73,2224	73,3174	-0,0950	OK
Reflectance at 8 µm (low e glass)	n.a.	n.a.	-	-



### 3 Conclusion

The tested glass product, marked by the client or manufacturer as: Sapphire AR™ 4 mm, manufactured by: Groglass SIA, meets the applicable requirements as stated in the European standard EN 1096-4 [1].

The test results exclusively relate to the tested objects.

#### Remark 1

When and if changes are made in production method and/or equipment, assessment according to this standard shall be reconsidered and re-tests shall be performed when the changes can lead to different specifications of the glass. The decision and responsibility lies at the manufacturer.



#### Remark 2

It was to the manufacturer's responsibility that the samples delivered for initial type test are representative to the production and deviations from perfection were included in the delivered test samples.

## 4 References

- 1 European standard EN 1096-4:2018 (E),  
Glass in building – Coated glass – Part 4: Evaluation of conformity/Product standard,  
European Committee for Standardization, October 2004.
- 2 European standard EN 1096-2:2012 (E),  
Glass in building – Coated glass – Part 2: Requirements and test methods for class A, B and S  
coatings,  
European Committee for Standardization, January 2012.

## 5 Signatures

Author	Authorized by
<p>X </p>	<p>X </p>
<p>Sachverständige(r)/Expert Ondertekend door: Salah El Bardai</p>	<p>Sachverständige(r)/Expert Ondertekend door: Marc Schets</p>

(This is the end of this report).