# Test report

## Test report relating to a glass product according to European standard EN 12150-1, fragmentation and mechanical strength, concerning the product marked as: Low iron solar textured glass thickness 2.1, 2.5, 2.8 and 3.2mm, manufactured by: Borosil Renewables Limited

| | |
|---|---|
| Report number | 89219251-01 REV1 |
| Date | 17 January 2022 |
| Author(s) | S.el Bardai |
| Client | Borosil Renewables Limited<br>Govali, Ankleshwar Rajpipala Road<br>Jhagadia Taluka, Dist. : Bharuch<br>Gujarat, INDIA, 393001 |
| Project number | 89219251 |
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Headoffice:
Westervoortsedijk 73
NL - 6827 AV Arnhem
P.O. Box 2220
NL - 6802 CE Arnhem

Location Leek:
Eiberkamp 10
NL - 9351 VT Leek
P.O. Box 37
NL - 9350 AA Leek

info@nl.tuv.com
www.tuv.com/nl

Tel. +31 (0)88 888 7 888
Fax +31 (0)88 888 7 879

TÜV Rheinland Nederland B.V. is a registered company at the Dutch Chamber of Commerce under number 2728878

VAT number: NL815820380B01
IBAN: NL61DEUT0265155096

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## Contents

# 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 12150-1 [1].

A revision of this report was made, due to change the name of the company in the report.

## 1.2 Description of the test specimen

**General**

| | |
|---|---|
| Name of the manufacturer | Borosil Renewables Limited |
| Address of the manufacturer | Govali, Ankleshwar Rajpipala Road<br>Jhagadia Taluka, Dist. : Bharuch, Gujarat INDIA |
| Production plant of the samples | Govali, Ankleshwar Rajpipala Road<br>Jhagadia Taluka, Dist. : Bharuch, Gujarat INDIA |
| Line ID where the samples are made | Solar Glass manufacturing |
| Production date | May 2021 |
| Sampling date | May 2021 |
| The product was marked as | Low iron solar textured glass thickness 2.1, 2.5, 2.8 and 3.2mm |
| Dimensions of the samples | 1100 x 360 mm |

**Specific**

| | |
|---|---|
| Kind of glass | Thermally toughened safety glass |
| Nominal thickness | 2.1, 2.5, 2.8 and 3.2 mm |
| Number of samples, fragmentation | 5 per thickness |
| Number of samples, 4-point bending | ≥ 2 per thickness, in total minimum 10 |
| Edge work according to EN 12150-1 § 7.2 | Arrissed edge |

## 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 29rd June 2021.

## 1.4 Application

The request for testing was submitted by the manufacturer on 20th April 2021, order or reference number or name: -. Assignment Form number: 21.A132.

## 1.5 Method of testing

All applicable tests have been performed according to the European standards EN 12150-1 [1] and EN 1288-3 [2].

## 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 § 8, Fragmentation when tested according to EN 12150-1 [1] and § 9.4, Mechanical strength of the European standard EN 12150-1 [1] when tested according to EN 1288-3 [2].

Requirements fragmentation:

| **EN 12150-1[1] § 8.5 and 8.7** | |
|---|---|
| **Thickness of glass** | **Minimum number of particles** |
| 2 and 3 mm float | 15 |
| 4 mm up to and including 12 mm float | 40 |
| 15 mm up to and including 25 mm float | 30 |
| | |
| The length of the longest particle shall not exceed | 100 mm (all thicknesses) |

Requirements mechanical strength:

| **EN 12150-1 [1] § 9.4** | |
|---|---|
| **Type of glass** | **Minimum values mechanical strength (N/mm$^2$)** |
| Float: Clear, Tinted and Coated | 120 |
| Float: enamelled | 75 |
| Patterned glass and drawn sheet, others | 90 |

Test results Fragmentation test (number of particles and length of longest particles) according to EN 12150-1 [1]:

| **Thickness [mm]** | **2,1** | **2,5** | **2,8** | **3,2** |
|---|---|---|---|---|
| Minimum allowed number of particle within the gauge (25 $cm^2$) | **15** | **15** | **15** | **15** |
| Maximum allowed length of het longest particle after fragmentation ( in mm ) | **100** | **100** | **100** | **100** |
| | | | | |
| Test Specimen 1 | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| Number of fragments within the gauge (25 $cm^2$) | **+50** | **+50** | **+50** | **+50** |
| length of the longest particle in the body of the test specimen after fragmentation. | **9** | **17** | **36** | **39** |
| Assessment between 4 and 5 minutes [Y/N] | **y** | **y** | **y** | **y** |
| **Test Specimen 2** | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| Number of fragments within the gauge (25 $cm^2$) | **+50** | **+50** | **+50** | **+50** |
| length of the longest particle in the body of the test specimen after fragmentation. | **11** | **13** | **35** | **42** |
| Assessment between 4 and 5 minutes [Y/N] | **y** | **y** | **y** | **y** |
| **Test Specimen 3** | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| Number of fragments within the gauge (25 $cm^2$) | **+50** | **+50** | **+50** | **+50** |
| length of the longest particle in the body of the test specimen after fragmentation. | **8** | **11** | **31** | **34** |
| Assessment between 4 and 5 minutes [Y/N] | **y** | **y** | **y** | **y** |
| **Test Specimen 4** | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| Number of fragments within the gauge (25 $cm^2$) | **+50** | **+50** | **+50** | **+50** |
| length of the longest particle in the body of the test specimen after fragmentation. | **12** | **11** | **31** | **37** |
| Assessment between 4 and 5 minutes [Y/N] | **y** | **y** | **y** | **y** |
| **Test Specimen 5** | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| Number of fragments within the gauge (25 $cm^2$) | **+50** | **+50** | **+50** | **+50** |
| length of the longest particle in the body of the test specimen after fragmentation. | **8** | **10** | **29** | **39** |
| Assessment between 4 and 5 minutes [Y/N] | **y** | **y** | **y** | **y** |
| | | | | |
| Evaluation of Conformity | **"2,1"** | **"2,5"** | **"2,8"** | **"3,2"** |
| The mimimum required number of fragments is not exceeded | **OK** | **OK** | **OK** | **OK** |
| The maximum allowed length of het longest particle is not exceeded | **OK** | **OK** | **OK** | **OK** |

**+ = more than**

Test results Four point bending test according to EN 1288-3 [2]:

| Sample number | facing upwards ↑ or downwards ↓ | Thickness (mm) | Length (mm) | Width (mm) | Max. Force (N) | Mech. strength ($N/mm^2$) | Breakage between rollers [Yes/No] | Time to breakage (s) |
|---|---|---|---|---|---|---|---|---|
| 1 | ↑ | 2,14 | 1100 | 360 | 175 | 136,3 | No | 92 |
| 2 | ↓ | 2,13 | 1100 | 360 | 165 | 129,6 | No | 82 |
| 3 | ↓ | 2,14 | 1100 | 360 | 175 | 136,0 | No | 83 |
| 4 | ↑ | 2,50 | 1100 | 360 | 274 | 153,2 | Yes | 82 |
| 5 | ↑ | 2,51 | 1100 | 360 | 273 | 151,8 | Yes | 84 |
| 6 | ↓ | 2,74 | 1100 | 360 | 391 | 181,0 | Yes | 92 |
| 7 | ↓ | 2,76 | 1100 | 360 | 367 | 167,3 | Yes | 91 |
| 8 | ↓ | 3,08 | 1100 | 360 | 466 | 169,4 | Yes | 86 |
| 9 | ↑ | 3,08 | 1100 | 360 | 443 | 162,1 | Yes | 82 |
| 10 | ↑ | 3,10 | 1100 | 360 | 434 | 156,5 | Yes | 80 |

**Period of testing**

The fragmentation tests took place on 5-08-2021.

Other thicknesses were not tested regarding the bending strength because the standard describes the specific sample distribution over a range of thicknesses. This implies that when more than 5 thicknesses, not all thicknesses need to be tested. Not-tested thicknesses can be regarded as complying with the requirements.

# 3 Conclusion

The tested glass product, marked by the client or manufacturer as Low iron solar textured glass thickness 2.1, 2.5, 2.8 and 3.2mm, manufactured by: Borosil Renewables Limited, meets the applicable requirements concerning § 8, Fragmentation and § 9.4, Mechanical strength as stated in the European standard EN 12150-1 [1] when tested according to EN 12150-1 [1] and EN 1288-3 [2].

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**

If no reference of the product description was supplied by the manufacturer, than that document shall be added to this test report by the manufacturer. 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 12150-1:2015 (E),
Glass in building – Thermally toughened soda lime silicate safety glass – Part 1: Definition and description,
European Committee for Standardization, September 2015.

2 European standard EN 1288-3:2000 (E),
Glass in building – Determination of the bending strength of glass – Part 3: Test with specimen supported at two points (four point bending),
European Committee for Standardization, June 2000.

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## 5 Signatures

| Author | Authorized by |
| --- | --- |
| 17-1-2022<br>X  <br>Ondertekend door: Salah El Bardai | 17-1-2022<br>X  <br>Ondertekend door: Marc Schets |
| Expert | Senior Expert |

(This is the end of this report).