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Date: 21-05-2008

EN 12150
Thermally toughened soda lime silicate safety glass

Producer: Greaney Glass Products Ltd

Under responsibility of:
Greaney Glass Products Ltd.
Carnmore
Oranmore
Co. Galway
Ireland

Product:

Clear float
(4, 6, 8, 10, 12, 15 and 19 mm)

Test result:

Pass

The tested samples are **complying** with the requirements of EN12150.

Signature:

E.M. Maan
Project Leader

A.J. Piers, B.Sc.
Programme Leader

TNO Quality Services B.V.

Nederlandse Organisatie voor
toegepast-natuurwetenschappelijk
onderzoek/Netherlands Organisation
for Applied Scientific Research

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Summary

Product characteristics
TQS-SUM-08-4328/gge
Report: TQS-RAP-08-4328/gge
Valid until: -
Project number: E08.0291

Summary test report

Greaney Glass Products Ltd
EN12150: Thermally toughened soda lime silicate safety glass
Clear float
(4, 6, 8, 10, 12, 15 and 19 mm)

Sponsor:
Greaney Glass Products Ltd
Carnmore
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TNO report

TQS-RAP-08-4328/gge

Greaney Glass Products Ltd.
EN12150: Thermally toughened soda lime silicate safety glass
Clear float
(4, 6, 8, 10, 12, 15 and 19 mm)

Date	May 21, 2008
Author(s)	E.M. Maan
Assignor	Greaney Glass Products Ltd. Carnmore Oranmore Co. Galway Ireland
Project number	E08.0291
Number of pages	9 (incl. appendices)
Number of appendices	-

Contents

1 Introduction

Greaney Glass Products Ltd has commissioned TNO Quality Services B.V. with the assessment of the performance of *thermally toughened glass as defined in EN12150-1.*

According to EN12150-2:2004 'Evaluation of conformity' an initial type testing of a thermally toughened glass product is aimed to establish if a product conforms to the definition of thermally toughened soda lime silicate safety glass.
An initial type testing concerns the product aspects, as listed below:

1. Mechanical strength measurements in accordance with EN12150 (EN1288-3)
2. Fragmentation test in accordance with EN12150

The product description was supplied by the manufacturer and shall be added to this initial type 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 normal production deviations were included in the delivered test samples.

If any deviation of applied materials/process/machines is encountered (and a so-called major change), re-type testing or additional tests may be required. This decision and responsibility belongs to the manufacturer. The product description is the lead for determining the window of these rules.

The following paragraphs describe the tests, the results and the conclusions.

2 Experimental

2.1 Producer of the test samples

Production plant of the samples	***: Greaney Glass Products Ltd.***
Sampling date	***: February 20, 2008***

Under responsibility of:
Greaney Glass Products Ltd.
Carnmore
Oranmore
Co. Galway
Ireland

2.2 Product description

Product:	Clear float
Nominal thickness:	4, 6, 8, 10, 12, 15 and 19 mm
Dimensions of tested glass specimens:	1100 x 360 mm
Number of test specimens:	35 (5 samples per thickness) Fragmentation test 10 (2 samples per thickness for 4, 6, 10, 15 and 19 mm) EN1288-3

2.3 Tests

The executed type test consists of the following two tests:
- Mechanical strength measurement in accordance with EN12150 (EN1288-3)
- Fragmentation test in accordance with EN12150

The test samples are assumed to be float glass according to EN572 and manufactured in accordance of EN12150. The mechanical strength measurement requires a minimum of 10 samples and the fragmentation test requires 5 samples of a dimension of 360 by 1100 mm. The samples are tested according the requirements of EN12150 taking into account samples distribution schemes as specified in EN12150.

2.3.1 Mechanical strength measurement

The value of mechanical strength can only be given as a statistical value associated with a particular probability of breakage and with a particular type of loading. The mechanical strength values apply to quasi-static loading of the 95% confidence interval.

Type of glass	Values for mechanical strength (N/mm^2)
Float: Clear, Tinted and Coated	120
Enamelled float	75
Patterned glass and drawn sheet	90

The test is executed according EN1288 Part 3: Test with specimen supported at two points (four point bending).

2.3.2 *Fragmentation test*

The fragmentation test determines whether the glass breaks in the manner prescribed for a thermally toughened soda lime silicate safety glass. Each test specimen was impacted, using a pointed steel tool, at the prescribed position of the EN12150-1. Then, via a hammer and centre punch the glass is broken. In order to prevent scattering of the fragments the specimen is positioned in a frame. The frame is about 3-4 mm larger than the test specimen. The fragments remain interlocked after breakage yet extension of the specimen is not hindered. Between 4 and 5 minutes of the impact and within 1 minute the particle count has been done. The particle count is executed the region of coarsest fracture and outside the so-called excluded area like defined in the EN12150-1. The following table defines the minimal amount of the crack free within the mask of this assessment of 50 by 50 mm.

- 3 mm float shall result in minimal 15 particles.
- 4 mm up to and including 12 mm float shall result in minimal 40 particles.
- 15 mm up to and including 19 mm shall result in minimal 30 particles.

The following photos are examples of an assessment:

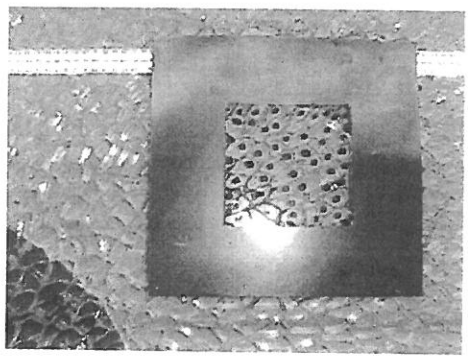

Photo 1: Typical example passing the requirements

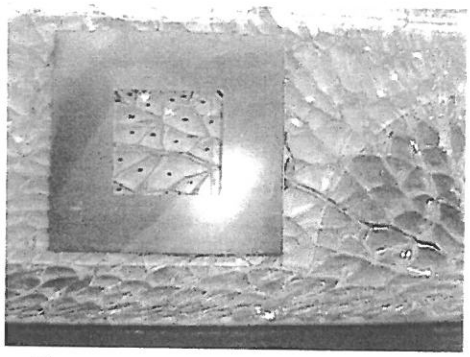

Photo 2: typical example failing the requirements

3 Results

3.1 General

The thicknesses of the tested samples were carried out using a calliper:

- TNO identification number: A15060
- Calibration certificate: GMER-RVA-040341
- Calibration valid until October 2008.
- Function check with NKO calibrated samples: Mitutoyo Cerablock, No. 41900402.
- Calibration certificate of the reference standards: 20200479AR.06
- Calibration valid until September 2008

3.2 Fragmentation test

The fragmentation test was carried out using:

- Fragmentation frame: A91259
- Centre punch: A91178
- Hammer: A91258
- Calliper: A15060

In the following table the results are given:

Limit values table: Fragmentation test EN12150							
Thickness [mm]	4	6	8	10	12	15	19
Minimum allowed number of particle within the gauge (25 cm^2)	40	40	40	40	40	30	30
Maximum allowed length of het longest particle after fragmentation (in mm)	100	100	100	100	100	100	100
Test Specimen 1	"4"	"6"	"8"	"10"	"12"	"15"	"19"
Number of fragments within the gauge (25 cm^2)	107	90	119	77	88	68	62
length of the longest particle in the body of the test specimen after fragm.	13	16	13	17	11	11	12
Assesment between 4 and 5 minutes [Y/N]	y	y	y	y	y	y	y
Test Specimen 2	"4"	"6"	"8"	"10"	"12"	"15"	"19"
Number of fragments within the gauge (25 cm^2)	109	75	125	72	90	57	55
length of the longest particle in the body of the test specimen after fragm.	12	13	14	17	10	12	10
Assesment between 4 and 5 minutes [Y/N]	y	y	y	y	y	y	y
Test Specimen 3	"4"	"6"	"8"	"10"	"12"	"15"	"19"
Number of fragments within the gauge (25 cm^2)	98	80	110	65	85	64	62
length of the longest particle in the body of the test specimen after fragm.	11	25	15	17	9	10	11
Assesment between 4 and 5 minutes [Y/N]	y	y	y	y	y	y	y
Test Specimen 4	"4"	"6"	"8"	"10"	"12"	"15"	"19"
Number of fragments within the gauge (25 cm^2)	101	87	117	70	87	72	58
length of the longest particle in the body of the test specimen after fragm.	12	18	12	13	11	11	13
Assesment between 4 and 5 minutes [Y/N]	y	y	y	y	y	y	y
Test Specimen 5	"4"	"6"	"8"	"10"	"12"	"15"	"19"
Number of fragments within the gauge (25 cm^2)	115	73	120	78	93	59	64
length of the longest particle in the body of the test specimen after fragm.	10	19	15	15	12	13	13
Assesment between 4 and 5 minutes [Y/N]	y	y	y	y	y	y	y
Evaluation of Conformity	"4"	"6"	"8"	"10"	"12"	"15"	"19"
The mimimum required number of fragments is not exceeded	OK	OK	OK	OK	OK	OK	OK
The maximum allowed length of het longest particle is not exceeded	OK	OK	OK	OK	OK	OK	OK

The conclusion is that the tested thicknesses are ***passing*** the requirements of the fragmentation test.

3.3 Bending strength

The bending test was carried out using:

- Calliper: A15060
- Four point bending tester: A91301
    - Calibration certificate: 04N155-B
        - MTS Hydraulic Power Unit Control: 0070090241
        - MTS 25 kN tester: 0070090243
        - MTS 407 Controller: 0070090192

In the following table the results are given:

Sample number	no layer 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)
4 mm	NA	3,80	1100	360	767	181,9	Yes	74
4 mm	NA	3,80	1100	360	716	170,1	Yes	69
6 mm	NA	5,80	1100	360	1632	164,9	Yes	79
6 mm	NA	5,80	1100	360	1712	172,8	Yes	84
10 mm	NA	9,80	1100	360	5614	196,7	Yes	95
10 mm	NA	9,80	1100	360	5829	204,2	Yes	98
15 mm	NA	15,10	1100	360	11604	170,9	Yes	91
15 mm	NA	15,20	1100	360	13686	198,7	Yes	107
19 mm	NA	18,60	1100	360	20649	199,9	Yes	119
19 mm	NA	18,60	1100	360	19764	191,4	Yes	97

The conclusion is that the results are ***passing*** the requirements of the mechanical strength.

4 Conclusion

All aspects are checked to establish if the Clear float glass product of Greaney Glass Products Ltd conforms to the definition of soda lime silicate glass.

The mechanical strength and the fragmentation test ***fulfil*** the requirements mentioned in EN12150 for soda lime silicate safety glass products.

When and if changes are made in production method and/or equipment, assessment according the EN12150 shall be reconsidered and re-test shall be done when the changes can lead to different toughening of the glass. The decision and responsibility lies at the producer.

5 Signature

Eindhoven, May 2008

E.M. Maan
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