



TEST REPORT

NO. 2022-555

Date: 04/05/2022

Order number: TUD 2022-EN356-555

Client: CONCO LTD.
130 Mado-ro
17382 Majang-myeon, Icheon-si, Gyeonggi-do
Republic of Korea

Product: Annealed glass with safety foil

Glass setup: 4 mm annealed glass / 100 µm safety film SF-100 CL

Test standard: DIN EN 12600:2003

Testing: Pendulum testing DIN EN 12600

Classification: Impact resistance

This test report consists of 12 pages.

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building regulations
Accredited laboratory according to DIN EN ISO/IEC
17025:2018



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1 Scope

1.1 Commission

CONCO LTD. had appointed Technische Universität Dresden, Friedrich-Siemens-Laboratory to carry out pendulum impact testing according to DIN EN 1200 on glass samples made of 4 mm annealed glass with a safety film type SF-100 CL applied on one side to classify the impact resistance to DIN EN 12600.

1.2 Standards

DIN EN 12600 DIN EN 12600, Ausgabe 2003-04; Glas im Bauwesen - Pendelschlagversuch – Verfahren für die Stoßprüfung und Klassifizierung von Flachglas; Deutsche Fassung EN 12600:2002. Deutsche Norm; Berlin: Beuth 2003.

DIN EN 572-9 DIN EN 572-9, Ausgabe 2005-01; Glas im Bauwesen - Basiserzeugnisse aus Kalk-Natronsilicatglas - Teil 9: Konformitätsbewertung/Produktnorm; Deutsche Fassung EN 572-9:2004. Deutsche Norm; Berlin: Beuth 2005.

2 Specimen

2.1 Sampling/Delivery

Manufacturer samples	Spezialfolienbau Machold GmbH, Dresden
Sampling by	Spezialfolienbau Machold GmbH, Dresden
Sampling date	21/04/2022 (specimen 1-4) 01/09/2021 (specimen 5)
Delivered by	Spezialfolienbau Machold GmbH, Dresden
Date of delivery	21/04/2022 (specimen 1-4) 01/09/2021 (specimen 5)
State of delivery	Delivered on glass rack

Specimen 1 till 4 were manufactured and delivered in 2022. Due to test results one additional specimen was necessary to reach classification 2(B)2. A identic remaining ample from a former test series, produced an delivered in 2021 was used as 5. specimen.

2.2 Technical specification

Product name	SF-100 CL
Glass build up	100 µm safety foil* 4 mm annealed glass** *Attack side **Tin bath side to safety film at all samples
Dimensions	875 mm x 1938 mm
Minimal drying time of foil	12 weeks

3 Test conditions

Date of testing:	09.11.2021		
Testing standard	DIN EN12600		
Procedure name	PrA-PP EN 12600		
Decision rule	PrA-PP EN 12600		
Deviations	keine		
Air pressure impactor	Target value (3,5±0,2) bar	Real value: 3,5 bar	
Usage of adhesive foil	<input checked="" type="checkbox"/> yes / <input type="checkbox"/> no	Clamping of foil into the test frame	<input checked="" type="checkbox"/> yes / <input checked="" type="checkbox"/> no
Test conditions target values:	Temperature: (20±5)° C	Humidity: none	
Test conditions real values:	Temperatur: 23,8° C	Luftfeuchte: 37 %	

4 Test Equipment

Test Equipment	Measurement range	Device number	Last calibration
Test frame EN 12600	0 m - 1,2 m	PM 800	09/2021
Double tire impactor 50 kg EN 12600	50 kg	PM 700	09/2021
Measuring rod	5000 mm	PM 191W	07/2021
Measuring rod telescope	0,91 m – 5 m	PM 103	07/2021
Ball tester Ø 76 mm EN 12600	25 N	PM 401	11/2021

5 Test results

Specimen	Drop height	Specimen broken	Fracture behavior according to DIN EN 12600, chapter 4a or 4b	Type of fracture A –annealed glass B – laminated glass C – prestressed glass	Comment
PK1	190 mm	No	-		
PK1	450 mm	No	-		
PK1	1200 mm	Yes	-	B	Impactor has penetrated the sample -> Classification 1(B)1 not possible anymore
PK2	190 mm	Yes	4a	B	Sample broken, no cracks in the safety film
PK3	190 mm	No	-	-	
PK3	450 mm	No	-	-	
PK4	190 mm	No	-	-	
PK4	450 mm	Yes	4a	B	Sample broken, one 15 cm crack in the safety film
PK4	Ball puncture test with 25 N force according to DIN EN 12600				Test passed
PK5	450 mm	Yes	4a	B	Sample broken, no cracks in the safety film

6 Summary

CONCO LTD. had appointed Technische Universität Dresden, Friedrich-Siemens-Laboratory to carry out pendulum impact testing according to DIN EN 1200 on glass samples made of 4 mm annealed glass with a safety film type SF-100 CL applied on one side to classify the impact resistance to DIN EN 12600.

Pendulum impact tests were carried out for a glass structure on four test specimens. The following classification according to DIN EN 12600 was achieved:

Glass setup	Classification Impact resistance
100 µm safety foil* 4 mm annealed glass** *Attack side **Tin bath side to safety film at all samples	2(B)2

Dresden, 04/05/2022

Dr.-Ing. Jan Ebert

Leader of test body

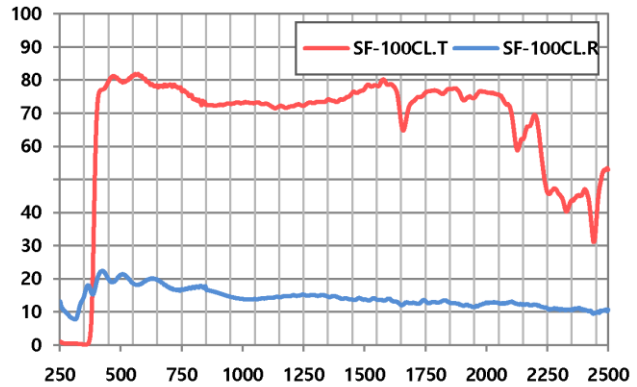
7 Appendix

7.1 Data sheet

SF-100 CL

Product description

- Safety film
- Application : Architecture
- Structure : 1ply 4mil
- Features :
 - High visibility and clear color
 - Safety effect for Personal life
 - Shatter-proof performance



Technical Data

Items	code	SF-100 CL	Test method
visible light transmittance	tv	80.50	ISO 9050
visible light reflectance	rv	19.42	ISO 9050
ultraviolet rejection	uvr	98.3	ISO 9050
infrared rejection	irr	11.3	ISO 9050
solar energy transmittance	te	73.19	ISO 9050
solar energy reflectance	re	17.16	ISO 9050
solar energy absorption	ae	9.65	ISO 9050
solar heat gain coefficient	shgc	0.78	JIS R3106
shading coefficient	sc	0.87	JIS A5759
total solar energy rejection	tser	24.25	ISO 9050

* All of the data were evaluated by attaching a 1/8" glass in the UV/VIS spectrometer.

Items		SF-100 CL
break strength (lbs)	T.D	158
	M.D	176
Tensile strength (kgf/mm ²)	T.D	12.3
	M.D	14.2
Peel strength (gr/inch)		>1800

7.2 Photo documentation

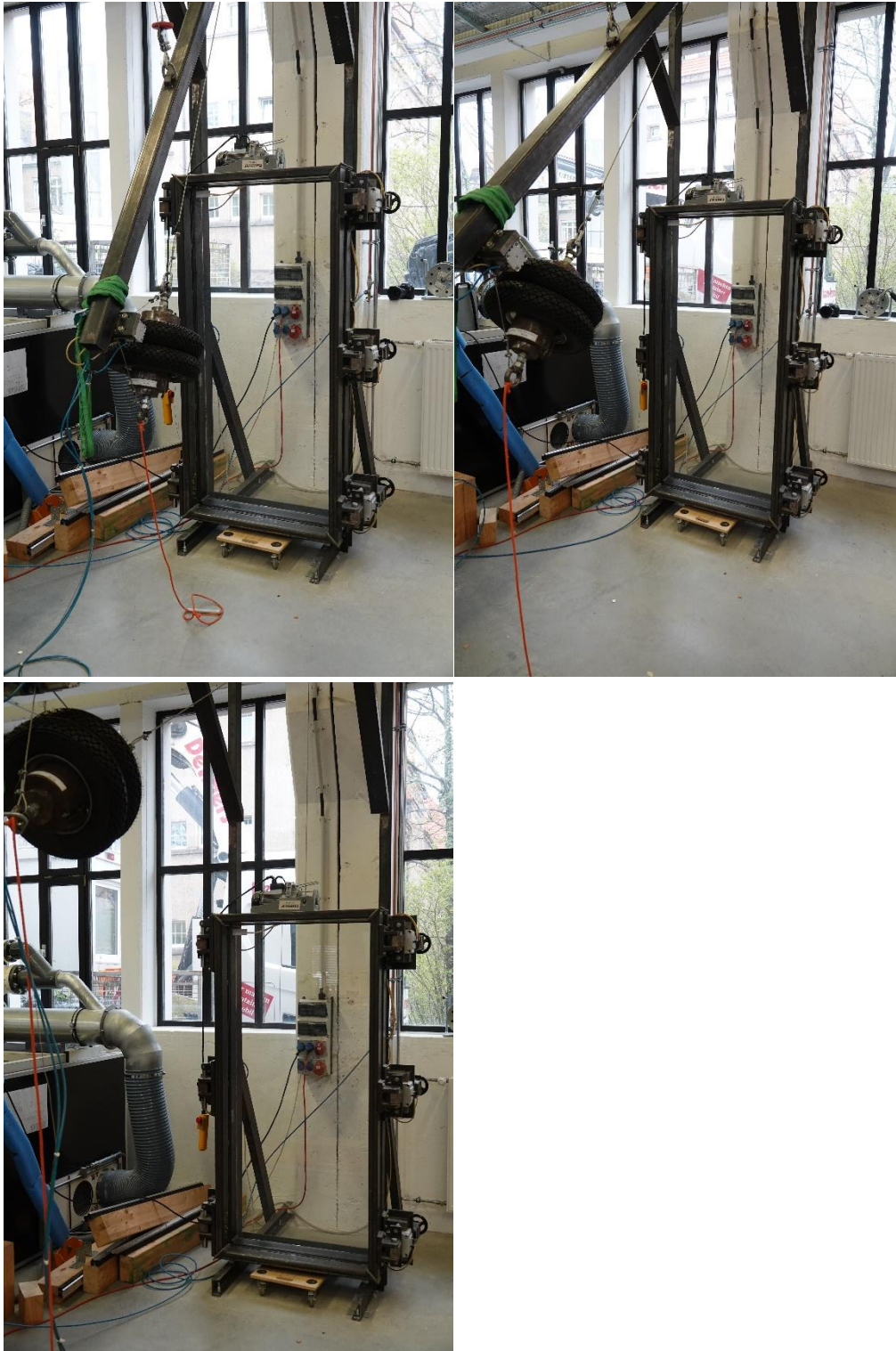


Figure 1 Specimen 1, drop height of pendulum impactor 190 mm, 450 mm and 1200 mm



Figure 2 Specimen 1, impactor has penetrated the sample at a drop height of 1200 mm



Figure 3 Specimen 2, sample fractured at a drop height of 190 mm



Figure 4 Specimen 4, sample fractured at a drop height of 450 mm, crack in the foil



Figure 5 Specimen 4, ball puncture test with 25 N force according to DIN EN 12600 – passed



Figure 6 specimen 5, sample fractured at a drop height of 450 mm