

Test report

**Test report relating to a glass product according to European standard EN 1279-3:2018, concerning the product marked as: Isicam
Manufactured by: BALABAN ISI ve CAM SAN. TİC.LTD. ŞTİ.**

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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 1279-3 [1].

1.2 Description of the test specimen

Insulating glass units – Declaration manufacturer	
Manufacturer	BALABAN ISI ve CAM SAN. TİC.LTD. ŞTİ.
Address of manufacturer	Karadenizliler Mh. Ordulu Cd. No:89 BAŞISKELE/KOCAELİ
Plant	Karadenizliler Mh. Ordulu Cd. No:89 BAŞISKELE/KOCAELİ
Line ID where the samples are made	Line 1
Date of production	01.10.2019
Product Name	Isicam
System description, file number	Balaban
Exterior dimensions	502 mm x 352 mm
Total thickness	20 mm
Construction	4 float / 12 / 4 float (mm)
Spacer	Nedex Nanobar
Spacer material	Plastic
Corner construction	with corner keys
Corner keys	None
Linear connector	None
Desiccant	Nedex Nanomol-C
Desiccant type	Calcium oxide
Standard Moisture adsorption capacity (T_C)	18.1±0.5 %
Desiccant amount	4 sides filled
Outer sealant	Nedex PS 018
Polymer type	Polysulfide
Average sealant depth on spacer back (u)	± 3 mm
Average sealant width on glass surface (s)	± 4 mm
Inner sealant:	Nedex PIB 996
Polymer type:	Polyisobutylene
Average sealant width (r):	± 4 mm
Mass of inner sealant per length and side (R)	2.5 – 3.5 g/m
Coating	None
Edge deletion	No
Gas filling	Argon
Nominal gas concentration	92% ±5%
Temperature during production	± 23°C

Pressure during production	1003.5 hPa
Altitude during production	50 m above sea level
Closing of gas filling holes	Plug and sealant
Special features	None

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 (15) within the sample were test-worthy and were received on 24 October 2019.

1.4 Application

The request for testing was submitted by the assignor on 18 November 2019, order or reference number or name: -/- . TRN quotation number / assignment number: 19.A367.

1.5 Method of testing

All applicable tests have been performed according to the European standard EN 1279-3 [1].

1.6 Put out to contract

No tests were performed at third parties.

1.7 Period of testing

The tests took place in the period week 47, 2019 till week 7, 2020.

1.8 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.

1.9 Remark concerning this TT report

For any other manufacturer this type test (TT) report is not automatically valid. The manufacturer for this TT report is defined at 1.2.

Reference to test report for moisture penetration index according to EN 1279-2 [2]: not known.

1.10 Notifications, accreditations, designations

TÜV Rheinland Nederland B.V. has been notified by the Dutch Ministry of Infrastructure and the Environment 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

2.1 Description of the test

At least six test specimens (insulating glass unit or IGU's) are conditioned for a minimum of one week at standard laboratory conditions i.e. (23±2) °C and (50±5) % relative humidity. Four random selected specimens are submitted to the specified climate test.

The climate test consists of two parts. The first part consists of 28 cycles of 12 hours from -18 °C to +53 °C with slopes of (14±4) °C/h where at -18 °C and at +53 °C the temperature is constant for 1 hour. The RH is maintained > 95% during the phase at 53 °C. This part is followed by a second part consisting of a period of 4 weeks at a constant temperature of 58 °C and RH > 95 %.

After the climate test the specimens are stored at standard laboratory conditions for at least 2 weeks and maximal 6 months. Of minimal two specimens (IGU's) the gas leakage is determined after the climate exposure. The specimens are placed in a container (frame) that encloses the unit with some space left between the IGU and the container.

After placing the IGU's in the test containers and closing the containers are purged with a helium flow of ± 150 ml/min for 1 hour. At the end of this purge time, the inlet and outlet valves are closed in succession to ensure an atmospheric pressure inside the container (start of standing time). Before and after a the standing time the gas in the container is measured for argon, oxygen and nitrogen concentration using a gas chromatograph (4900 Micro GC). This is repeated a number of times to reaches sufficient constancy of the values.

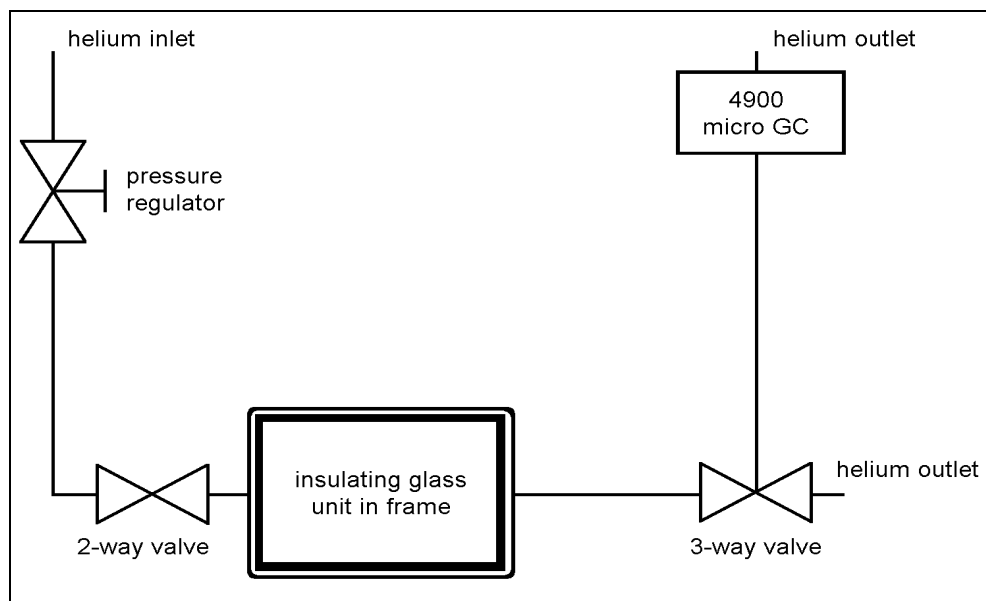
The amount of gas leakage (L_i) per time (year) of the IGU is calculated based on the measured leaked amount of argon gas per standing time (m_i), the internal gas volume of the IGU (V_{int}) and the argon gas concentration (c_i),.

$$L_i = 87,6 \cdot 10^6 \frac{m_i}{c_i \cdot V_{int} \cdot \rho_{o,i}} \cdot \frac{T}{T_o} \cdot \frac{P_o}{P} \text{ in } \% \cdot \text{a}^{-1}$$

With $\rho_{0,Ar} = 1,762$; $\rho_{0,Kr} = 3,690$; $\rho_{0,Xe} = 5,897 \text{ } \mu\text{g}/\text{mm}^3$ at $T_o = 293 \text{ K}$ (20 °C) and $P_o = 1000 \text{ hPa}$ (mbar)

The measurement uncertainty is estimated at 15 % or $0.05 \% \cdot \text{a}^{-1}$, whichever value is greater.

The schematic diagram of the equipment is as follows:



2.2 Detailed test results

Test results after performing all applicable tests according to European standard EN 1279-3 [1].

Gas leakage rate determination

Six insulating glass units were visually inspected. No special deviations above variations due to the production process were found. The test specimens were randomly numbered and four units were aged. After ageing the gas leakage rate was determined of minimal two insulating glass units.

For the calculation of the gas leakage rate of the IGU/specimen, the temperature (T) and the pressure (P) values during the sealing of the units are used or if no values are given/known a standard temperature of 293 K and pressure of 1013 hPa are used.

Evaluation of the gas leakage rate and gas concentration measured in accordance with EN1279-3:2018

Corner construction	corner keys
Average sealant depth on spacer back (u)	3.5 - 4.5 mm
Average sealant width on glass surface (s)	5 - 6.5 mm
Average inner sealant width (r)	5.5 - 6.5 mm
Closing of gas filling holes	plug with butyl
Edge deletion	N/A
Special features	None
Markings	None

Test specimen	Thickness [mm]	V _{int} [mm ³]	c _i [% Ar]	L _i [% a ⁻¹]	Pass / fail
1	19.8	1879580	97.0	0.65	pass
2	19.9	1889247	95.5	0.92	pass
3	-/-	-/-	-/-	-/-	not applicable
4	-/-	-/-	-/-	-/-	not applicable
Average				0.8	pass

Requirements	Pass / fail
EN1279-3:2018 §5.1 Gas leakage rate	
The average gas leakage rate, L_{iav} , for gases with concentrations higher than 15 %, shall be ≤ 1.0 in % a ⁻¹ (one year)	pass
Individual value $L_i \leq 1.20$ in % a ⁻¹	pass

3 Conclusion

The tested glass product, marked by the client or manufacturer as: Isicam, manufactured by: BALABAN ISI ve CAM SAN. TIC.LTD. ŞTİ., with inner sealant with trade mark/type: Nedex PIB 996 and outer sealant with trade mark/type: Nedex PS 018, meets the applicable requirements as stated in the European standard EN 1279-3 [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

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 type test are representative to the production and deviations from perfection were included in the delivered test samples.




4 References

- 1 European standard EN 1279-3:2018 (E),
Glass in building – Insulating glass units – Part 3: Long term test method and requirements for gas leakage rate and for gas concentration tolerances,
European Committee for Standardization, July 2018.
- 2 European standard EN 1279-2:2018 (E),
Glass in building – Insulating glass units – Part 2: Long term test method and requirements for moisture penetration,
European Committee for Standardization, July 2018.

5 Signatures

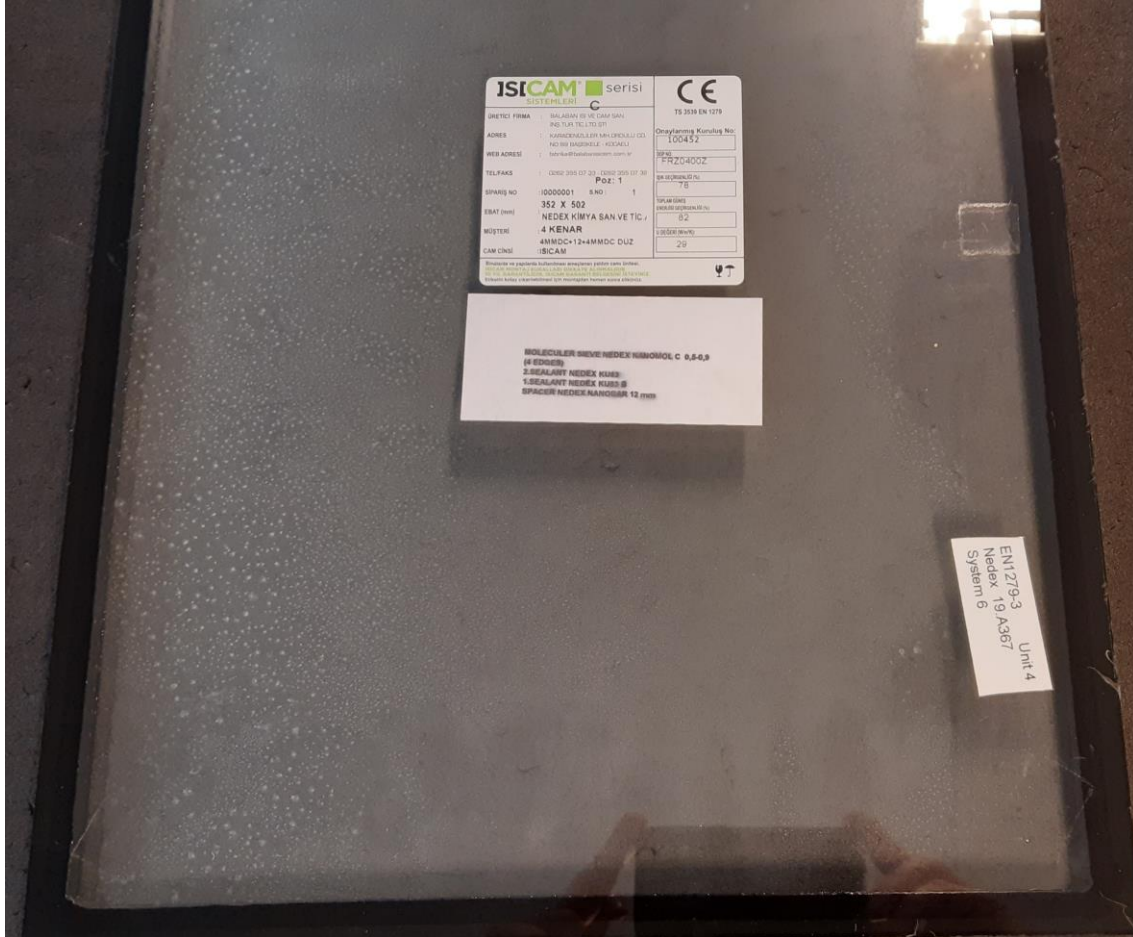
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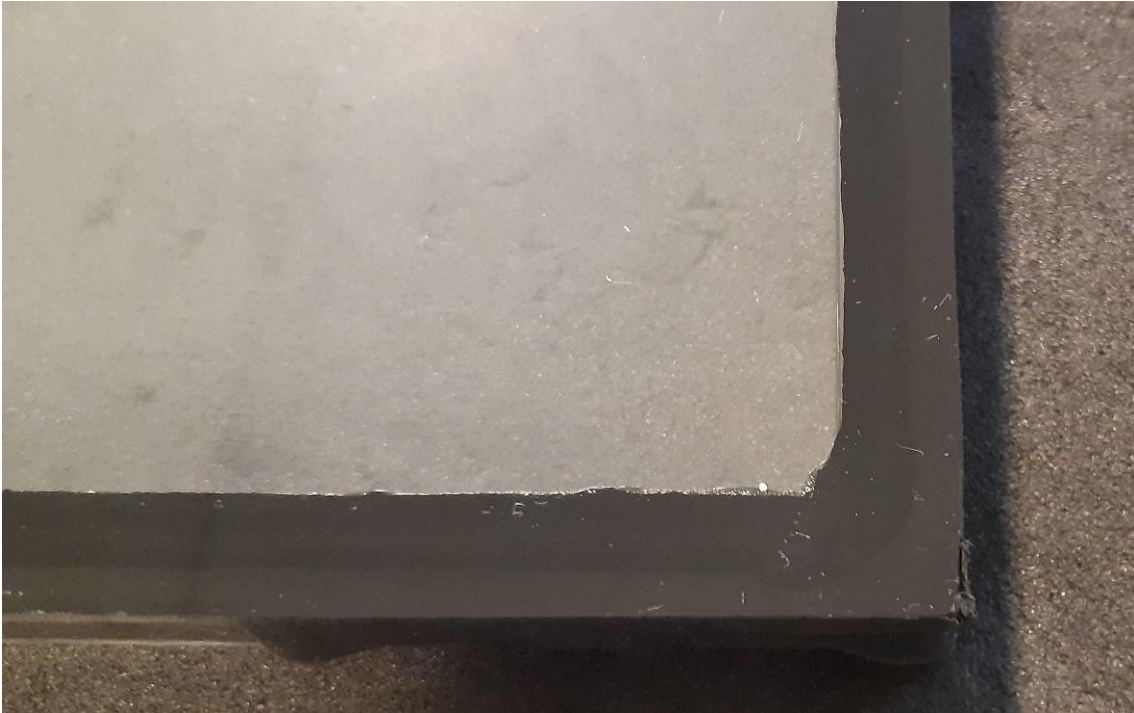
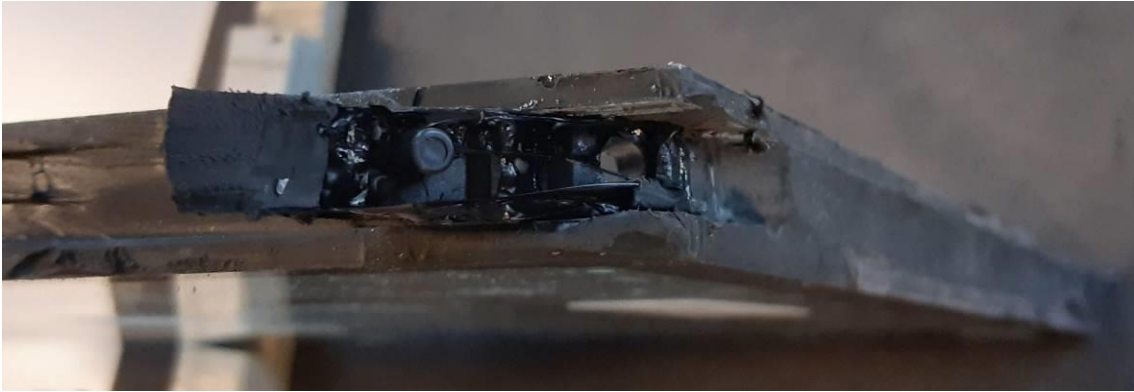
Appendix A, Summary of test results

 TÜVRheinland [®] Precisely Right. TÜV Rheinland Nederland B.V. P.O. Box 2220, 6802 CE Arnhem, The Netherlands, Notified Laboratory no. 1750				
Summary of report n°: 8926155-16			Date: 26 February 2020	
Insulating glass units - Evaluation of the gas leakage rate and gas concentration measured according to EN 1279-3:2018 For details is referred to the complete test report.				
Company :	Name :	BALABAN ISI ve CAM SAN. TİC.LTD. ŞTİ.		
	Address :	Karadenizliler Mh. Ordulu Cd. No:89 BAŞISKELE/KOCAELİ Turkey		
Plant :	Name :	BALABAN ISI ve CAM SAN. TİC.LTD. ŞTİ.		
	Address :	Karadenizliler Mh. Ordulu Cd. No:89 BAŞISKELE/KOCAELİ		
Date of production		01.10.2019		
Product name :		Isicam		
Edge seal composition:		inner sealant: Nedex PIB 996 outer sealant: Nedex PS 018 spacer: Nedex Nanobar		
Reference to test report for moisture penetration index according EN 1279-2 :		not known		
Applied gas(es) I :		Argon	Argon	Argon
Unit number :		1	2	3
Measured concentration c_i , (in %) :		97.0	95.5	-/-
Nominal concentration $c_{i,o}$, (in %) :		90	90	-/-
Gas leakage rate L_i , (in %·a ⁻¹) :		0.65	0.92	-/-
System conforms :		YES		
				
Signature: M.A.A.M. Schets Specialist		Signature: W. Notten Local Business Field manager		

NOTE: This Summary is not a certificate.

Appendix B, Pictures of the test specimen





- End of report -