

Report No. 371/7904507

This report consists of 6 pages

Licence/Certificate No. KM 578199

Client Super Sealed Units Ltd
35 Lovett Way
Woodside Industrial Estate
Dunstable
LU5 4TU

Authority & date BSI Service Management Order No. 7904507,
dated 14 September 2012. Equipment Record No. 10137275.

Items tested 6 off Insulating glass units
Cavity gas - Argon
Desiccant - Molecular sieve - UOP - Molsiv - XL8
Primary sealant - Butyl rubber - Evode 2900
Secondary sealant - Two part polyurethane - Tremco - JS442
Spacer bar - Aluminium - EWS
System description - KM 578199
Date of manufacture - 29 October 2012

Specification BS EN 1279-3:2002
Type test assessment

Results **Pass**

Prepared by B Bustin  (Senior Technician Engineer)

Authorized by S Ginger  (Senior Engineer)

Issue Date 22 January 2013

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0135

TEST AND EXAMINATION OF INSULATING GLASS UNITS TO BS EN 1279-3:2002 SUBMITTED FOR TYPE TEST ASSESSMENT

INTRODUCTION

At the request of BSI the insulating glass units (IGU's), detailed below and submitted by Super Sealed Units Ltd were tested and assessed to the applicable requirements of BS EN 1279-3:2002, as indicated on the following pages of this report.

This request was made on Service Management Order no. 7904507, dated 14 September 2012.

The test items were received on 30 October 2012 and identified under Equipment Record No. 10137275. The relevant units were subjected to the climatic test commencing on 7 November 2012.

TEST ITEMS

6 off insulating glass units each nominally 502mm x 352mm with a 16mm cavity between the two panes of 4mm glass. The components used in the construction were declared by the manufacturer as follows: -

Cavity gas -	Argon
Declared concentration -	90%
Temperature and pressure at which the IGU's were sealed -	19°C and 1013mbar
Primary sealant -	Butyl rubber - Evode 2900
Secondary sealant -	Two part polyurethane - Tremco - JS442
Desiccant -	Molecular sieve - UOP - Molsiv - XL8
Spacer bar -	Aluminium - EWS
Corner keys -	Nylon - EWS
System description -	KM 578199
Date of manufacture -	29 October 2012

SUMMARY OF RESULTS

The insulating glass units subject to test exhibited the following characteristics:

Characteristic	IGU reference		Specified	Assessment
	A	B		
Declared concentration $c_{i,o}$ (%):	90.00	90.00	-	
Measured concentration c_i (%):	94.50	93.50	-5%, +10% of $c_{i,o}$	PASS
Gas leakage rate L_i (%a ⁻¹):	0.69	0.75	1.00 Max	PASS

The insulating glass units supplied by Super Sealed Units Ltd and detailed in the system description reference KM 578199, met the requirements of the specification.

TEST PROCEDURE

Conditioning and dimensional measurement

The IGU's were received at BSI and stored in standard laboratory conditions of $(23 \pm 2)^\circ\text{C}$ and $(50 \pm 5)\%$ relative humidity for a period of not less than 14 days. The variation in temperature and relative humidity did not fall outside these parameters for the 14 day conditioning period. During this period the IGU's were randomly identified as A through F, and the length and width of each unit was then measured. The results are shown below: -

IGU	Length (mm)	Width (mm)	Assessment
A	502	352	Pass
B	502	352	Pass
C	502	352	Pass
D	501	352	Pass
E	501	353	Pass
F	502	351	Pass
Specified	$(502 \pm 2)\text{mm}$	$(352 \pm 2)\text{mm}$	

Construction and appearance

Upon completion of the conditioning period two IGU's were visually examined for the following criteria and/or defects: -

Observation	IGU A	IGU B
General construction	Satisfactory	Satisfactory
Edge damage and cracks	None	None
Fractures	None	None
Specking in the cavity	None	None
Congruence of panes	Satisfactory	Satisfactory
Other visible defects	None	None

Determination of the internal cavity volume

The two IGU's intended for test were measured to establish the internal volume. The clear distance between opposite spacers and the clear distance between the inner surfaces of the panes were measured and recorded.

Dimensions (mm)	IGU A	IGU B
Internal cavity length	473	472
Internal cavity width	323	323
Internal cavity thickness (1)	12.1	11.8
Internal cavity thickness (2)	11.9	12.1
Internal cavity thickness (3)	12.0	11.9
Internal cavity thickness (4)	12.0	11.9
Average internal cavity thickness	15.80	11.93
Calculated internal cavity volume (cm^3)	2414	1818

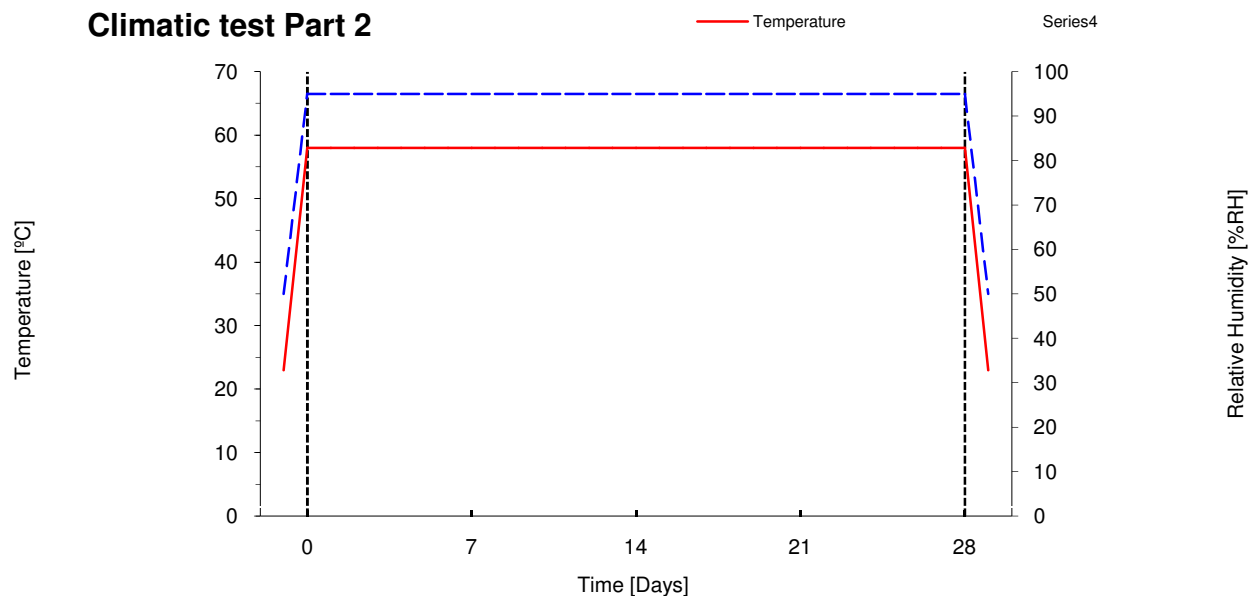
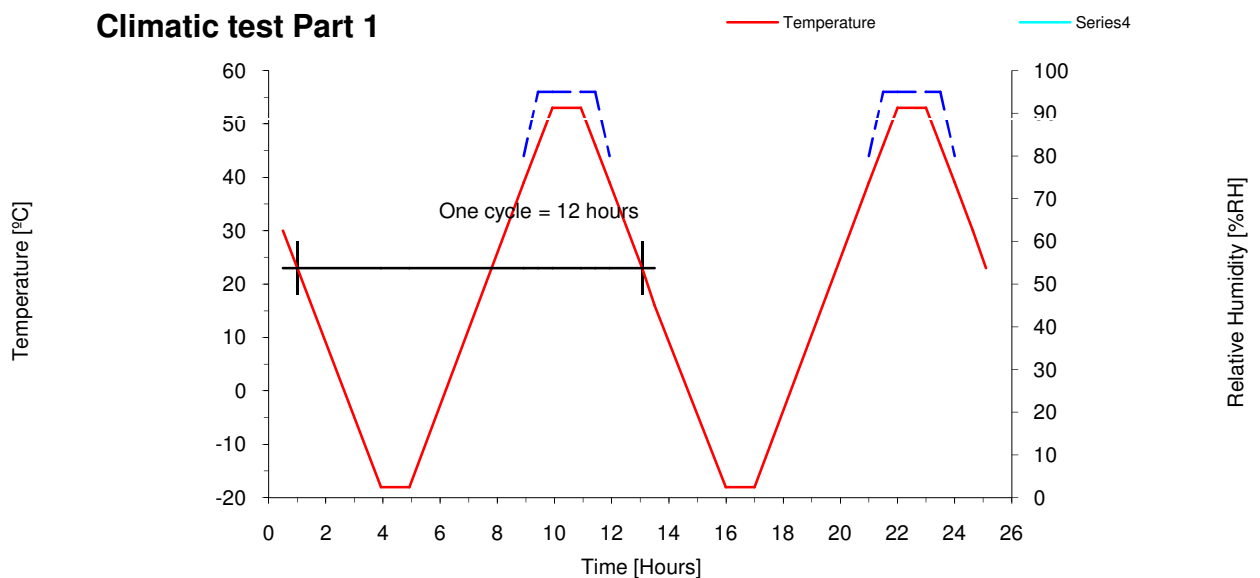
TEST PROCEDURE (continued)

Climatic test

The two IGU's intended for leakage testing and two others were placed in a climatic test chamber. The remaining IGU's were stored in standard laboratory conditions as spare samples. The climatic test consisted of two parts. The first part was 28 cycles each of 12 hours. The temperature dwells were for 1 hour at -18°C and +53°C with ramps of 14°C/hour between the dwells, the humidity was maintained at 95%RH or greater for the upper temperatures. The second part was a period of four weeks (28 days) at a constant +58°C/395%RH.

NOTE: BSI's environmental chambers are calibrated and programmed to produce the conditions required by the specification. However, due to the uncertainty of measurement associated with environmental chamber calibration, it cannot be guaranteed that the tolerances specified in the standard for the conditions within the chamber were maintained throughout the whole of the conditioning period.

The graphs shown below detail the two parts of this climatic test.



TEST PROCEDURE (continued)

Upon completion of the climatic test the 4 IGU's were again conditioned at standard laboratory conditions of $(23 \pm 2)^{\circ}\text{C}$ and $(50 \pm 5)\%$ relative humidity for a minimum of 28 days and a maximum of 49 days before commencing the gas leakage test. Occasionally it may be necessary to use a non standard test method (NSTM) and change the minimum conditioning period after climate exposure from 28 days to 21 days or to change the maximum conditioning period from 49 days to 182 days. This NSTM was agreed and accepted at the CEN TC 129 WG4 committee meeting on 20 February 2007.

Gas Leakage test

IGU A and B were subjected to the gas leakage test in accordance with the requirements of the standard using a full container.

The principal of the test is that the container creates a chamber around the edge of the IGU in which the air can be replaced with Helium. A steady flow of Helium is passed through the container, for several days, until all the air has been purged. The container is then isolated from the Helium supply. Throughout this test the container (and thus the IGU) are maintained at a temperature of $(20 \pm 1)^{\circ}\text{C}$.

After an isolation period of at least 20 hours, Helium is again purged through the container and any gasses that have escaped from within the IGU cavity are collected and measured using a gas chromatograph. The isolation and measurement processes are repeated until the standard deviation of at least four successive measurements is less than 0.25 micrograms/hour and at least one result is higher than the result immediately preceding it.

Gas concentration test

Following the gas leakage test a sample of gas was taken directly from the cavity of each IGU and the level of Argon was established as a percentage of the total gas sampled.

To collect the cavity gas the IGU was held in a special test rig that allowed a drill bit and pipe assembly to be sealed to the IGU's outer edge. A hole was made in the edge of the IGU with a drill bit and a sample of the cavity gas extracted from the IGU via the flutes of the drill. The gas sample was then analysed using the gas chromatograph.

TEST RESULTS**Gas leakage Unit A**

Measurement	Isolation period (hours:minutes)	Measured argon (μl)	Calculated argon ($\mu\text{g/h}$)	Standard deviation
1	3:00	2.82	1.54	-
2	3:00	3.93	2.15	-
3	3:00	4.72	2.58	-
4	3:00	5.10	2.79	0.48
5	3:00	5.68	3.11	0.35
6	3:00	5.37	2.94	0.19
7	3:00	5.61	3.07	0.13
8	3:00	5.38	2.95	0.08
9	3:00	5.38	2.95	0.06

	Actual	Specified
Declared concentration (%):	90	-
Measured gas concentration (%):	94.5	- 5%, +10% of Declared
Calculated gas leakage rate (% per annum):	0.69	1.00 % per annum

Gas leakage Unit B

Measurement	Isolation period (hours:minutes)	Measured argon (μl)	Calculated argon ($\mu\text{g/h}$)	Standard deviation
1	3:00	3.75	2.05	-
2	3:00	4.38	2.40	-
3	3:00	4.42	2.42	-
4	3:00	4.42	2.42	0.16
5	3:00	4.46	2.44	0.02
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-

	Actual	Specified
Declared concentration (%):	90	-
Measured gas concentration (%):	93.5	- 5%, +10% of Declared
Calculated gas leakage rate (% per annum):	0.75	1.00 % per annum

Note: For each sample, the calculated gas leakage is based on the mean of the last four results.

End of Report

Appendix A**BSI**

Kitemark House
 Maylands Avenue
 Hemel Hempstead
 Herts
 HP2 4SQ

**Summary of Report No. 371/7904507****Date: 22 January 2013**

Insulating glass units
 Measurement of gas leakage and gas concentration
 according to BS EN 1279-3:2002
 For details, see the test report

Company name: **Super Sealed Units Ltd**
 Address: **35 Lovett Way**
Woodside Industrial Estate
Dunstable
LU5 4TU

Plant name: **Super Sealed Units Ltd**
 Address: **35 Lovett Way**
Woodside Industrial Estate
Dunstable
LU5 4TU

System description reference: KM 578199
 Product Name: Argon filled units
 Test report for moisture penetration index : 371/7719966

Applied gas :	Argon	
Unit number :	A	B
Measured concentration c_i (%) :	95	94
Declared concentration $c_{i,o}$ (%) :	90	90
Gas leakage rate L_i (%a ⁻¹) :	0.69	0.75

The insulating glass units submitted by
Super Sealed Units Ltd
met the requirements of BS EN 1279-3:2002

S Ginger
 Senior Engineer