TNO Quality Services BV

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

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TNO report

TQS-RAP-07-270

Truseal Technologies, Inc. EN1279 part 2: long term test method and requirements for moisture penetration: IGU with Duralite™

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1 Introduction

Truseal Technologies, Inc. (demonstrator) has commissioned TNO Quality Services BV with initial type testing according the EN1279-2.

It is to the manufacturer's responsibility that the samples delivered for initial type test are representative to the production and that normal production variations are included in the test samples. If any changes in applied materials or other deviation of the system description are introduced, the validity of this initial type test report shall be evaluated on validity. This could mean new tests or additional tests. According the rules this decision and full responsibility belongs to the manufacturer. The system description is the base document for this evaluation.

For any other manufacturer this initial type test (ITT) report is not automatically valid. The manufacturer for this ITT report is defined as **Truseal Technologies, Inc.**.

TNO is a fully Notified Test Laboratory for EN tests for the CPD guideline 89/106/EEG under Lab.no.1750 at the Technical Committee of the European Commission in Brussels. This report has been issued under this reference.

The following chapters describe the tested configuration(s), the results and the conclusions.

2 Experimental

2.1 Delivered samples and materials

The following materials and insulating glass units (IGU's) were delivered for the durability assessment according to EN1279-2: version 2003.

In the system description all information can be found concerning the used materials and parameters during production of the samples.

Production plant of the samples : Truseal Technologies Inc.
Sampling date : May 9, 2006

The following materials were used for preparation of the samples:

Number of IGU's	Type of glass	Configuration [mm]	Inner Sealant	Outer Sealant
15	Clear float	4-12-4	Duralite™	N.A.

- Production date : May 9, 2006
- Spacer/Sealant system : Duralite™ (12.7 mm) sealed with passby method
- Desiccant : Molecular sieve incorporated in butyl sealant
- Corner : Bend
- Gas filling : Argon

The following process parameters were applicable:

- Temperature production hall: 22.2 °C
- Barometric pressure production hall: 1014 hPa

2.2 Tests

2.2.1 Moisture penetration according to EN1279-2:2003

Insulating glass units (IGU's) shall fulfil their functions during an economical reasonable working life. Therefore the following requirements were verified on test specimens submitted to the long-term climate test as specified in the EN1279-2.
The average moisture penetration index I_{av} over five test specimens shall not exceed 20% and the highest moisture penetration index on the individual test specimens shall not exceed 25%. For the determination of the moisture penetration index I_{av} a set of insulating glass units was exposed to a long-term climate test. One set of insulating glass consists of 15 test pieces. The test specimens should be representative of the system description and consist of two panes of 4 mm clear float glass in accordance to the EN572-1 and EN572-2. The length should be (502 ± 2) mm and the width (352 ± 2) mm. The gap should be 12 mm or as near as possible. The cavity should be filled with air (however other gas fillings are allowed). Construction details of the edges and corners should correspond to the edge and corner details in IGU's supplied to the market.

The 15 test specimens were conditioned for a minimum of two weeks at standard laboratory conditions. After this period the dew points were measured. Dew point temperatures less than -60°C are passing the minimum requirement for random usage of the IGU's. When dew-point temperatures are found above -60 °C then the IGU's must be ranked, commencing with the highest dew point value as number 1 and ending the lowest dew point as number 15. IGU's with dew point values below -60°C are numbered randomly.

The initial moisture content T_i was measured on four pre-selected samples. At least five pre-selected samples were submitted to the long-term climate test.

The long-term climate test consists of two parts. The first part consists of 56 cycles of 12 hours from -18°C to +53°C with slopes of 14°C where at -18°C and at +53°C the temperature is constant for 1 hour. The cycle is followed by a second part consisting of a period of seven weeks at a constant temperature of 58°C. For both parts a relative humidity of > 95% is applied in case the temperature is above 0°C. The exact specification of the temperature, humidity and time, and their tolerances, is given in the EN1279-2 standard.

After submitting the selected IGU's to the full climate test, these IGU's are stored for two weeks under standard laboratory conditions and then the final moisture content T_i of five IGU's is determined.

The calculation of the individual penetration index was based on the average initial moisture content $T_{i,av}$, the fixed value T_c and the individual measured T_f of each of the five test specimens subjected to the long-term climate exposure.

3 Results

3.1 Results

3.1.1 Moisture penetration test according to EN1279-2: 2003

The 15 IGU's were visually inspected. No special deviations above variations due to the production process were found. After the visual inspection the test specimens were analysed on dew points. All IGU's showed dew points lower then -60°C. The test specimens were randomly numbered and the moisture contents (T_i & T_f) were determined. From these results the individual penetration indices I and I_{av} were calculated. The results are as follows:

IGU with Duralite™				
				T_c [%]
Initial values				7.84
Test specimen no.	Sample [mg]	KF-titration [ml]	Ti [%]	Ti,av [%]
1	2117.7	1.791	0.28	0.41
2	2027.3	2.113	0.41	
3	2182.8	2.591	0.55	
4	1964.0	2.004	0.38	
After climate exposure				
Test specimen no.	Sample [mg]	KF-titration [ml]	Tf [%]	I
1	2058.1	5.280	1.61	0.16
2	2084.0	5.593	1.70	0.17
3	2025.6	2.422	0.53	0.02
4	2066.5	1.864	0.31	-0.01
5	2032.6	1.945	0.35	-0.01
			I_{av}	0.07

* Tc is based on the TNO report TQS-BRF-07-732

The conclusion is that the insulating glass units in this configuration are **complying** with the requirements of durability according to the EN1279-2.

4 Conclusion

The following summary demonstrates the consistence of the ITT and other measurements towards the requirements of the product standard EN1279:2003.

Tested IGU system: IGU with Duralite™	
EN 1279-2:2003, Moisture penetration	**PASS**

5 Signature

Eindhoven, March 2007

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