

# Classification Report

Durability of Class A, B and S coatings as specified in EN 1096-2

Test Report 603 30373/3e



Client **Pilkington plc**  
**Technical Centre**  
Hall Lane Lathom Ormskirk

Lancashire L40 5UF  
United Kingdom

## Basis

EN 1096-2 : 2001-05  
Glass in Building; Coated glass;  
Requirements and test methods for class A, B and S coatings

## Instructions for use

This test report helps in assessing whether, over an extended period of time, the loading from solar radiation leads to major changes in the transmission of light and sun by the coated glass and, with coatings with a low emission capacity, to a reduction in the infrared reflection.

## Validity

The data and results given relate solely to the tested and described test specimen.

Testing the durability of coatings does not allow any statement to be made on further characteristics regarding performance and quality.

Product	Glass coating as spec. in EN 1096-2, Class B
Designation	Energy Advantage™
Ext. dimensions (W x H)	300 mm x 300 mm
Total thickness	4 mm
Position of coating	2 alternatively 4



**The coating Energy Advantage™ meets the requirements of EN 1096-2, Class B**

## Notes on Publication

The ift – Guidance Sheet “Conditions and Guidance for the Use of ift Test Documents” applies.

The cover sheet can be used as abstract.

## Contents

The test report comprises a total of 3 pages

- 1 Object
- 2 Procedure
- 3 Detailed results
- 4 Evaluation

ift Rosenheim  
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## 1 Object

### 1.1 Description of test specimen

Product	Class B coating as specified in EN 1096-2 on float glass
Manufacturer	Pilkington plc, Lancashire L40 5UF
Manufacture date	July 2005
Product designation	Low E Energy Advantage™, Run 1310 M 944
Layer composition	is deposited at ift Rosenheim
External dimensions (w x h)	300 mm x 300 mm
Total thickness	4 mm
Coating level	Position 2, alternatively Position 4

The description is based on inspection of the test specimen at ift. Article designations/numbers as well as material specification were given by the customer.

## 2 Procedure

### 2.1 Sampling

The samples were selected and prepared by the customer

Quantity	6
Delivered	16 August 2005 by the customer
Registration No.	18742

### 2.2 Process

Technical basics:

EN 1096-2 : 2001-05	Glass in building; Coated glass; Requirements and test methods for class A, B and S coatings
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Boundary conditions As specified by the standard requirements

Deviations There are no deviations from the test procedure and/or test conditions.



## 2.3 Test equipment

Hot water container	Appliance number 22446
Temperature measurement	Appliance number 22863
Testing device for abrasion test	Appliance number 22623
IR Spectrometer	Appliance number 22143
UV/VIS Spectrometer	Appliance number 22133

Artificial sky as specified in EN 1096-1 for visual check.

The testing devices for the acid resistance test and neutral salt spray test have been provided by the company FEM, Schwäbisch Gmünd.

## 2.4 Testing

Date/Period	23 August to 26 September 2005
Testing personnel	Irina Hausstetter

Description of tests:

### Condensation resistance test

Storage of the test specimens at 100 % humidity and at a temperature of  $(40 \pm 1,5) ^\circ\text{C}$ ;  
Period: 4 days

### Acid resistance test

The test was carried out according to Annex C of EN 1096-2. The test specimen were stored in an atmosphere saturated with  $\text{SO}_2$  at constant high temperature with condensation at the surface and an ambient temperature without condensation on the surface. The test consists of one cycle of 24h.

### Neutral salt spray test

The stress in NaCl-atmosphere  $(50 \pm 5)\text{g/l}$  and a temperature of  $(25 \pm 2) ^\circ\text{C}$  was applied according to EN 1096, Part 2, Annex D. The total time of stress is 10 days.

### Abrasion resistance test

The coating will be stressed in a device with a felt pad. The felt pad describes a linear movement overlaid by a rotation. After 50 strokes the surface will be checked on visible changes.

After these tests the coatings will be evaluated visually and photometric according to EN 1096-2. The photometric measurements will be carried out at 550 nm and 900 nm in transmission, the reflexion will be measured at 8  $\mu\text{m}$ .

### 3 Detailed results

#### 3.1 Measurement of Transmission

The results of transmission at 550 nm and 900 nm, measured on a reference sample and an exposed sample, will be compared for the evaluation according to EN 1096-2.

Table 1 shows the results of the transmission measurements.

**Table 1** Transmission

Type of stress	Sample- No.	Transmission			
		Reference samples		Exposed samples	
		550 nm	900 nm	550 nm	900 nm
Condensation resistance	1.1	-	-	0,82	0,67
	1.2	-	-	0,82	0,68
	1.3	-	-	0,82	0,68
	1.4	-	-	0,82	0,68
	1.5	0,82	0,67	-	-
	1.6	0,82	0,67	-	-
	<b>Average</b>	<b>0,82</b>	<b>0,67</b>	<b>0,82</b>	<b>0,68</b>
Acid resistance	2.1	-	-	0,82	0,67
	2.2	-	-	0,82	0,67
	2.3	-	-	0,82	0,67
	2.4	-	-	0,82	0,67
	2.5	0,82	0,67	-	-
	2.6	0,82	0,67	-	-
	<b>Average</b>	<b>0,82</b>	<b>0,67</b>	<b>0,82</b>	<b>0,67</b>
Neutral salt spray test	3.1	-	-	0,82	0,67
	3.2	-	-	0,82	0,68
	3.3	-	-	0,82	0,67
	3.4	-	-	0,82	0,68
	3.5	0,82	0,68	-	-
	3.6	0,82	0,67	-	-
	<b>Average</b>	<b>0,82</b>	<b>0,68</b>	<b>0,82</b>	<b>0,68</b>
Abrasion resistance	4.1	-	-	0,83	0,67
	4.2	-	-	0,82	0,68
	4.3	-	-	0,82	0,67
	4.4	-	-	0,83	0,68
	4.5	0,82	0,68	-	-
	4.6	0,82	0,67	-	-
	<b>Average</b>	<b>0,82</b>	<b>0,68</b>	<b>0,83</b>	<b>0,68</b>

### 3.2 Emissivity

The results of the emissivity at 8  $\mu\text{m}$ , measured on a reference sample and an exposed sample, will be compared for the evaluation according to EN 1096-2.

Table 2 shows the results of the emissivity measurements.

**Table 2** Emissivity

Type of stress	Sample-No.	Reflection at 8 $\mu\text{m}$	
		Reference samples	Exposed samples
Condensation resistance	1.1	-	0,84
	1.2	-	0,84
	1.3	-	0,84
	1.4	-	0,84
	1.5	0,84	-
	1.6	0,84	-
	<b>Average</b>	<b>0,84</b>	<b>0,84</b>
Acid resistance	2.1	-	0,84
	2.2	-	0,84
	2.3	-	0,84
	2.4	-	0,84
	2.5	0,84	-
	2.6	0,84	-
	<b>Average</b>	<b>0,84</b>	<b>0,84</b>
Neutral salt spray test	3.1	-	0,84
	3.2	-	0,84
	3.3	-	0,84
	3.4	-	0,84
	3.5	0,84	-
	3.6	0,84	-
	<b>Average</b>	<b>0,84</b>	<b>0,84</b>

### 3.3 Visual Check

The visual check was made from a distance of 600 mm against a diffuse illuminated background (artificial sky). On the coatings no visual changes, rifts, scratches or discolourations were identifiable.

## 4 Evaluation

A summary of the results, determined according to EN 1096-2, is presented in Table 3.

**Table 3** Overview of the results

Measurements	Reference sample (1)	Average value of the exposed samples (2)	Deviation (3) = (1) – (2)	Limit value for deviation
<b>Condensation resistance</b>				
Transmission at 550 nm	0,82	0,82	0	± 0,03
Transmission at 900 nm	0,67	0,68	- 0,01	± 0,03
Reflection at 8 µm	0,84	0,84	0	≤ 0,02
Visual check	no changes detected			-
<b>Acid resistance</b>				
Transmission at 550 nm	0,82	0,82	0	± 0,03
Transmission at 900 nm	0,67	0,67	0	± 0,03
Reflection at 8 µm	0,84	0,84	0	≤ 0,02
Visual check	no changes detected			-
<b>Neutral salt spray test</b>				
Transmission at 550 nm	0,82	0,82	0	± 0,03
Transmission at 900 nm	0,68	0,68	0	± 0,03
Reflection at 8 µm	0,84	0,84	0	≤ 0,02
Visual check	no changes detected			-
<b>Abrasion resistance</b>				
Transmission at 550 nm	0,82	0,83	-0,01	± 0,05
Transmission at 900 nm	0,68	0,68	0	± 0,05
Visual check	uniform abrasion on the coating			-

In evaluation of the results given in Table 3 the coating

**Energy Advantage™**

meets the requirements of EN 1096-2, class B.

ift Rosenheim  
11 October 2005