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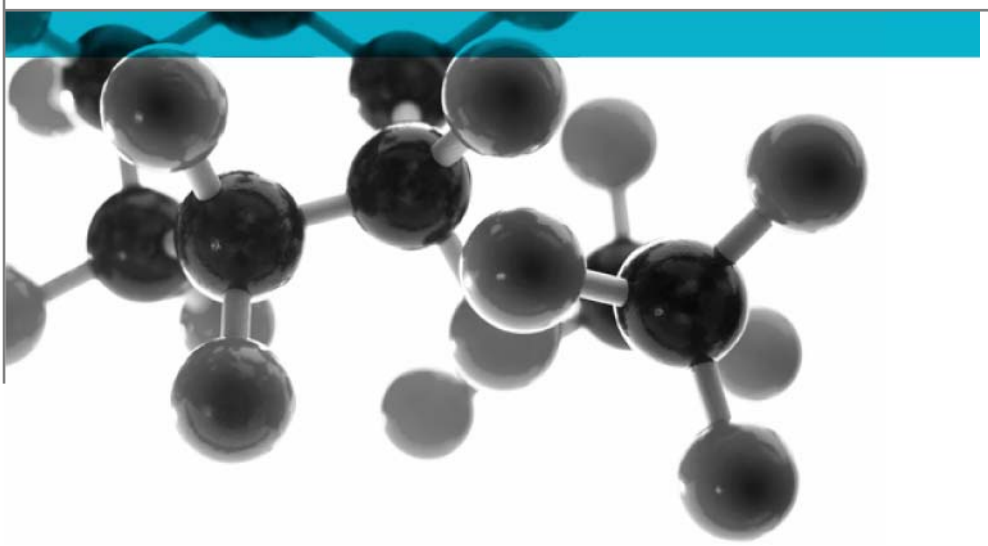
BS EN ISO 4589-2: 1999



Determination of Burning Behaviour By Oxygen Index

A Report To: Xiamen Wain Electrical Co., Ltd

Document Reference: 308705

Date: 2nd September 2011

Issue No.: 1

Testing
Advising
Assuring

Laboratory approved by CERTIFER Railway Certification Agency

UKAS TESTING
0249

Executive Summary

Objective To determine the oxygen index of the following product when tested in accordance with BS EN ISO 4589-2: 1999

Generic Description	Product reference	Thickness	Density
Fibre glass reinforced polycarbonate material	Material used to produce "Heavy Duty Connector"	6mm	1.33g/cm³
Individual components used to manufacture composite:			
Polycarbonate	"PC"	Not stated	Not stated
Glass fibre	"GF20"	Not stated	Not stated
Please see page 5 of this test report for the full description of the product tested			

Test Sponsor Xiamen Wain Electrical Co., Ltd, 759-3 Chengbei Industrial Zone, Chaoyuan Road, Tongan District, Xiamen, China

Test Results: **When tested in accordance with the procedure specified in BS EN ISO 4589 - 2: 1999 the material shows an oxygen index of 40.0%**

Date of Test 12th July 2011

Signatories

Responsible Officer
T. Mort *
Senior Technical Officer

Authorised
S. Deeming *
Senior Technical Officer

* For and on behalf of **Exova Warringtonfire**.

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Test Details

Purpose of test

To assess the performance of a material when it is tested in accordance with BS EN ISO 4589 - 2: 1999 "Plastics - Determination of burning behaviour by oxygen index".

The test was performed in accordance with the procedure specified in BS EN ISO 4589-2:1999 - Plastics - Determination of burning behaviour by oxygen index, and this report should be read in conjunction with that BS EN ISO Standard.

Scope of test

BS EN ISO 4589 – 2: 1999 specifies test methods for determining the minimum concentration of oxygen, in a mixture with nitrogen that will support combustion of small vertical test specimens under specified test conditions. The results are defined as oxygen index values.

Instruction to test

The test was conducted on the 12th July 2011 at the request of Xiamen Wain Electrical Co., Ltd, the sponsor of the test.

Provision of test specimens

The specimens were supplied by the sponsor of the test. **Exova Warringtonfire** was not involved in any selection or sampling procedure.

Conditioning of specimens

The specimens were received on the 20th June 2011.

Prior to test the specimens were conditioned to equilibrium with air at 23 ± 2^{0}C and a relative humidity of 50 ± 5 per cent for at least 88 hours.

Method of testing

Specimens measuring nominally 93mm long by 10.5mm wide by 3.87mm thick were used. The thickness of the specimens used conforms with the requirements specified in Table 2 of the standard for test specimen Form I for moulding materials. The specimens were tested in accordance with the test procedure specified in Clause 8 of the Standard using the Stanton Redcroft Limiting Oxygen Index apparatus.

Ignition procedure

Ignition procedure A - top surface ignition, was used to initiate burning on the top surface of the upper end of the specimen.

Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

General description		Fibre glass reinforced polycarbonate material
Product reference		Material used to produce "Heavy Duty Connector"
Name of manufacturer		Xiamen Wain Electrical Co., Ltd
Colour reference		"Grey"
Overall thickness		6mm (stated by sponsor) 5.96mm (determined by **Exova Warringtonfire**)
Overall density		1.36g/cm^3 (stated by sponsor) 1.33g/cm^3 (determined by **Exova Warringtonfire**)
Polycarbonate	Generic type	Polycarbonate (PC)
	Product reference	"PC"
	Name of manufacturer	**See Note 1 below**
	Trade name of flame retardant	**See Note 1 below**
	Generic type of flame retardant	Non-halogen flame retardant **See Note 1 below**
	Amount of flame retardant	0.5 to 5%
Glass fibre	Type	Fibrous glass
	Product reference	"CAS Number - 65997-17-3"
	Name of manufacturer	**See Note 1 below**
Resin to glass ratio (by weight)		4 : 1
Percentage glass reinforcement (by weight)		20%
Brief description of manufacturing process		Design mould → Injection moulding → Deburring → Semi-finished products (reinforced PC body in practice)

Note 1. The sponsor of the test was unable to provide this, or further information, as their supplier is unwilling to provide this information.

Test Results

Applicability of test results

The test results relate only to the behaviour of the specimens under the particular conditions of this test, they should not be used to infer the fire hazards of the material in other forms or under other fire conditions.

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product which is supplied or used is fully represented by the specimens which were tested.

In accordance with Sections 8 and 9 of the Standard, the results obtained are given in appendix A.

Conclusion

When tested in accordance with the procedure specified in BS EN ISO 4589 - 2: 1999 the material shows an oxygen index of 40.0%

Validity

The specification and interpretation of fire test methods is the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Appendix A

MATERIAL TESTED

Part 1 - Preliminary oxygen concentration

Oxygen Concentration (%)	30.0	36.0	40.0	44.0	42.0	41.0
Burning Period (s)	<1	10	48	60	60	75
Length Burnt (mm)	<1	6	20	>50	>50	>50
Response ('X' or 'O')	O	O	O	X	X	X

Part 2 - Determination of the oxygen index value

N_T series measurements											
N_L series measurements (8.5.1 - 8.5.2)							(8.6.2)				C_f
Oxygen Concentration (%)	40	40.2					40.2	40.0	40.2	40.0	40.2
Burning Period (s)	50	120					118	80	67	66	100
Length Burnt (mm)	20	>50					>50	10	25	25	>50
Response ("X" or "O")	O	X					X	O	O	O	X
Column (2,3,4 or 5) 2							Row (1 to 16) 2				
k value from table 4 -1.25											

Hence k = -1.25

Oxygen index value OI = C_F + kd
d is oxygen concentration increment

OI = 40.2 + (-1.25 x 0.2)

Oxygen index value = 40.0 (to one decimal place for reporting)

= 39.95 (to two decimal places, for calculation of and verification of *d* as required in Part 3)

Standard Deviation = 0.20 Therefore, the test result is valid.

Revision History

Issue No :	Issue Date:
Revised By:	Approved By:
Reason for Revision:	

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