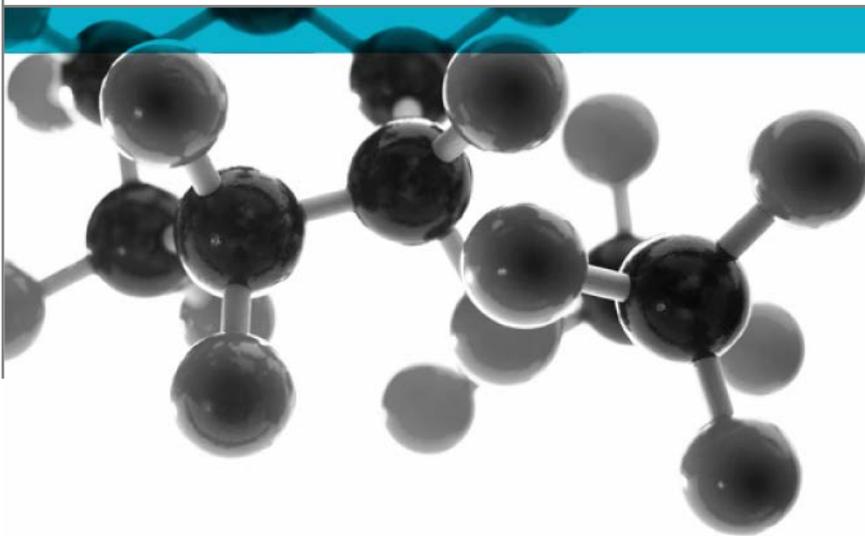


Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655116
F : +44 (0) 1925 655419
E : warrington@exova.com
W: www.exova.com



BS EN ISO 1716: 2010



Determination Of The Heat Of Combustion For Building Products

A Report To: The International Glassfibre Reinforced Concrete Association (GRCA)

Document Reference: 384330

Date: 13th June 2017

Issue No.: 1

Page 1

Testing
Advising
Assuring



Executive Summary

Objective To determine the performance of the following material when tested in accordance with BS EN ISO 1716: 2010.

Generic Description	Product reference	Thickness	Density
Glass fibre reinforced concrete	"Non-Polymer GRC"	45.95mm*	2133kg/m ³ *
Please see page 5 of this test report for the full description of the product tested			
*determined by Exova Warringtonfire			

Test Sponsor The International Glassfibre Reinforced Concrete Association (GRCA), PO Box 1454, Northampton, NN2 1DZ

Test Results: **Gross Calorific Value** = **-0.3877MJ/kg**

Date of Test 7th June 2017

Signatories



Responsible Officer
C Jacques*
Technical Officer



Approved
T. Mort *
Senior Technical Officer



Authorised
S. Deeming *
Business Unit Head

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

Report Issued: 13th June 2017

This version of the report has been produced from a .pdf format electronic file that has been provided by **Exova Warringtonfire** to the sponsor of the report and must only be reproduced in full. Extracts or abridgements of reports must not be published without permission of **Exova Warringtonfire**.

CONTENTS	PAGE NO.
EXECUTIVE SUMMARY	2
SIGNATORIES.....	2
TEST DETAILS.....	4
DESCRIPTION OF TEST SPECIMENS.....	5
TEST RESULTS	6
TABLE 1	7
REVISION HISTORY	8



Test Details

Purpose of test	<p>To determine the calorific potential of a building material during combustion when it is tested in accordance with the test specified in BS EN ISO 1716:2010 "Reaction To Fire Tests For Building Products – Determination Of The Heat Of Combustion".</p> <p>The test was performed in accordance with the procedure specified in BS EN ISO 1716:2010 and this test report should be read in conjunction with that European Standard.</p>
Scope of test	<p>BS EN ISO 1716 specifies a method of test for determining the heat of combustion of building materials at constant volume in a bomb calorimeter. Results are reported as individual values which may be interpreted by reference to other documents; e.g. EN 13501-1:2007 + A1: 2009 "Fire Classification of Construction Products and Building Elements Part 1 Classification using Test Data from Reaction to Fire Tests.</p> <p>The test is intended for materials or products whether composite products or coated products. The results reported here relate to one individual component of a composite product and can be used in combination with other results to provide the classification in accordance with BS EN 13501, within a classification report.</p>
Fire test study group/EGOLF	<p>Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.</p>
Instruction to test	<p>The test was conducted on the 7th June 2017 at the request of The International Glassfibre Reinforced Concrete Association, the sponsor of the test.</p>
Provision of test specimens	<p>The specimens were supplied by the sponsor of the test. Exova Warringtonfire was not involved in any selection or sampling procedure.</p>
Conditioning of specimens	<p>The specimens were received on the 26th May 2017 Prior to test the prepared specimens were conditioned for at least 48 hours at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$, in accordance with BS EN 13238:2010</p>
Test procedure	<p>The specimens were tested using an additional combustible substance of known and high calorific value which for this test was paraffin oil. The specimens were tested using the crucible method in an isoperibol bomb calorimeter.</p> <p>The water equivalent (E) of the bomb calorimeter was 0.00967MJ/K.</p>

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	Glass fibre reinforced concrete (GRC) product
Product reference	"Non-Polymer GRC"
Name of manufacturer	See Note 1 Below
Thickness tested	45.95mm (determined by Exova Warringtonfire)
Density tested	2133kg/m ³ (determined by Exova Warringtonfire)
Colour reference	"Natural" "Dark Grey" (observed by Exova Warringtonfire)
Flame retardant details	See Note 3 Below
Brief description of manufacturing process	See Note 2 Below

Note 1: The sponsor was unwilling to provide this information.

Note 2: The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component.

Note 3: The sponsor was unable to provide this information.

The description of the specimens as given above is not as detailed as would usually be the case for descriptions included in **Exova Warringtonfire** test reports and the description may not fully comply with the requirements of the test standard. In all other respects however the tests were conducted fully in accordance with the requirements of the test standard and the test results are valid.

Specimen preparation

The specimens were homogeneous and were prepared by selecting portions of the material from the sample submitted for test to give a total mass of 50g. These were then ground and reduced to a fine powder prior to conditioning for test.

Document No.: 384330

Author: C Jacques

Client: The International Glassfibre Reinforced Concrete Association (GRCA)

Page No.: 5 of 8

Issue Date: 13th June 2017

Issue No.: 1



0249

Test Results

Results of test

The results are detailed in Table 1.

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition 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.

The test results relate to the behaviour of the test specimen of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

For the product tested, the following results relating to the gross calorific potential were obtained.

Gross Calorific Value per Unit Mass MJ/kg	Gross Calorific Value per Unit Area MJ/m ²
-0.3877	--

Validity

The specification and interpretation of fire test methods are 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.

This report may only be reproduced in full. Extracts or abridgements shall not be published without permission of **Exova Warringtonfire**.

Table 1

Bomb Calorimeter Calculations

The specimen, "Non-Polymer GRC", is homogeneous

Gross Calorific Potential Per Unit Mass

<u>Test 1:-</u>	sample weight =	0.7105	g			
	calorific value =	-0.5141	MJ/kg	=		-514.1 kJ/kg
	temperature rise =	2.1917	°C			
<u>Test 2:-</u>	sample weight =	0.7059	g			
	calorific value =	-0.3034	MJ/kg	=		-303.4 kJ/kg
	temperature rise =	1.4597	°C			
<u>Test 3:-</u>	sample weight =	0.7088	g			
	calorific value =	-0.3456	MJ/kg	=		-345.6 kJ/kg
	temperature rise =	1.5708	°C			
				Average =		-387.7 kJ/kg
						<u>-0.3877 MJ/kg</u>

Revision History

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	