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Testing. Advising. Assuring.

Title:

A Fire Resistance Test
Generally In
Accordance with BS EN
1634-1: 2014 On A Pressure
Relief Damper in an Aerated
Blockwork Wall

Report No:

359639



Prepared for:

AFP Air Tech Limited

Morden Lodge
Morden Hall Road
Morden
Kent
SM4 5JD

Date:

03rd August 2016

Notified Body No:

0833

Summary

Objective	To determine the fire resistance performance of a pressure relief damper, when tested generally in accordance with BS EN 1634-1: 2014.
Test Sponsor	AFP Air Tech Limited Morden Lodge, Morden Hall Road, Morden, Kent, SM4 5JD
Summary of Tested Specimen	Briefly, the specimen pressure relief damper was of overall size 1120mm wide by 1120mm wide by 122mm deep; having an internal opening of nominally 1000mm wide by 1025mm high. It was fitted into an aperture in an aerated concrete blockwork wall, 150mm thick. The pressure relief damper comprised ten pivoted blades formed from 1mm powder coated Zintec steel. The vent incorporated a wall liner/mounting flange formed from 1.5mm thick powder coated Zintec steel.

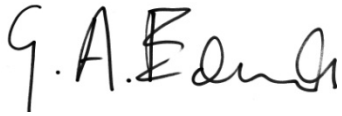
Test Results:

Integrity performance	Sustained flaming	245 minutes*			
	Gap gauge	245 minutes*			
	Cotton Pad	65 minutes			
Radiation Performance	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
	26 minutes	79 minutes	183 minutes	Not reached	Not reached
Date of Test	6 th January 2016				

* The test duration. The test was discontinued after a period of 245 minutes.

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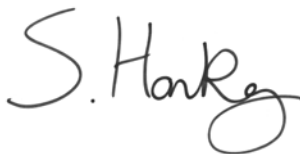
Signatories



Responsible Officer
G. Edmonds*
Senior Testing Officer



Approved
Dave Yates*
Certification Engineer



Head of Department
S. Hankey*
Business Unit Head – Fire Resistance

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

Report Issued

Date : 3rd August 2016

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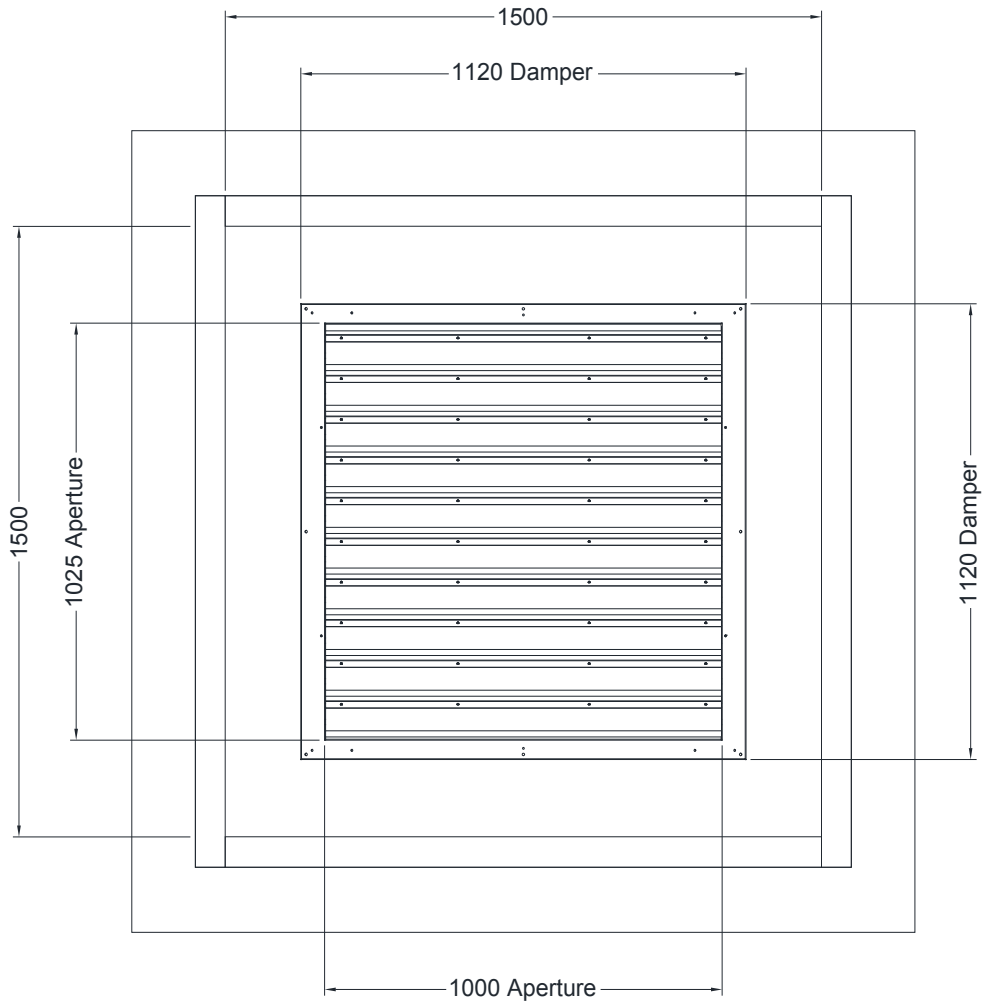
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Test Procedure

Introduction	<p>Because of the absence of a specific fire test method for pressure relief dampers, the test utilised BS EN 1634-1: 2014 'Fire resistance tests for doors and shutter assemblies and openable windows - Part 1 as a basis for the test. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 2012, 'Fire resistance tests - Part 1: General requirements' and BS EN 1363-2: 1999, 'Fire resistance tests - Part 2: Alternative and additional procedures'.</p> <p>The specimen was judged on its ability to comply with the performance criteria for integrity and heat radiation, as determined in BS EN 1363-1: 2012 and BS EN 1363-2: 1999.</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 9th June 2015, at the request of AFP Air Tech Limited, the sponsor of the test.</p> <p>Mr. C. Coxon, a representative of the test sponsor, witnessed the test.</p>
Test Specimen Construction	<p>A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimen and information supplied by the sponsor of the test.</p>
Installation	<p>The pressure relief damper was mounted into an aperture within an aerated concrete blockwork wall by representative of the test sponsor on the day of test.</p>
Sampling	<p>Exova Warringtonfire was not involved in any selection or sampling procedures of the specimen or any of the components.</p>
Conditioning	<p>The specimen's storage, construction, and test preparation took place in the test laboratory over a total combined time of 2 days. Throughout this period both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 13°C to 18°C and 40.5% to 65.5% respectively.</p>

Test Specimen

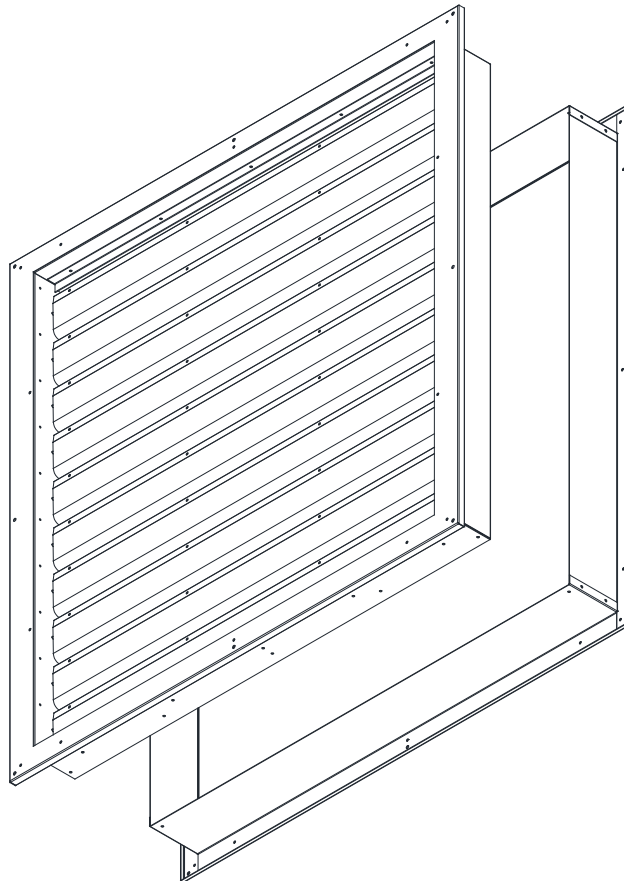
Figure 1- General Elevation of Test Construction



Do not scale. All dimensions are in mm

Figure 2 – Isometric View of Damper Sections

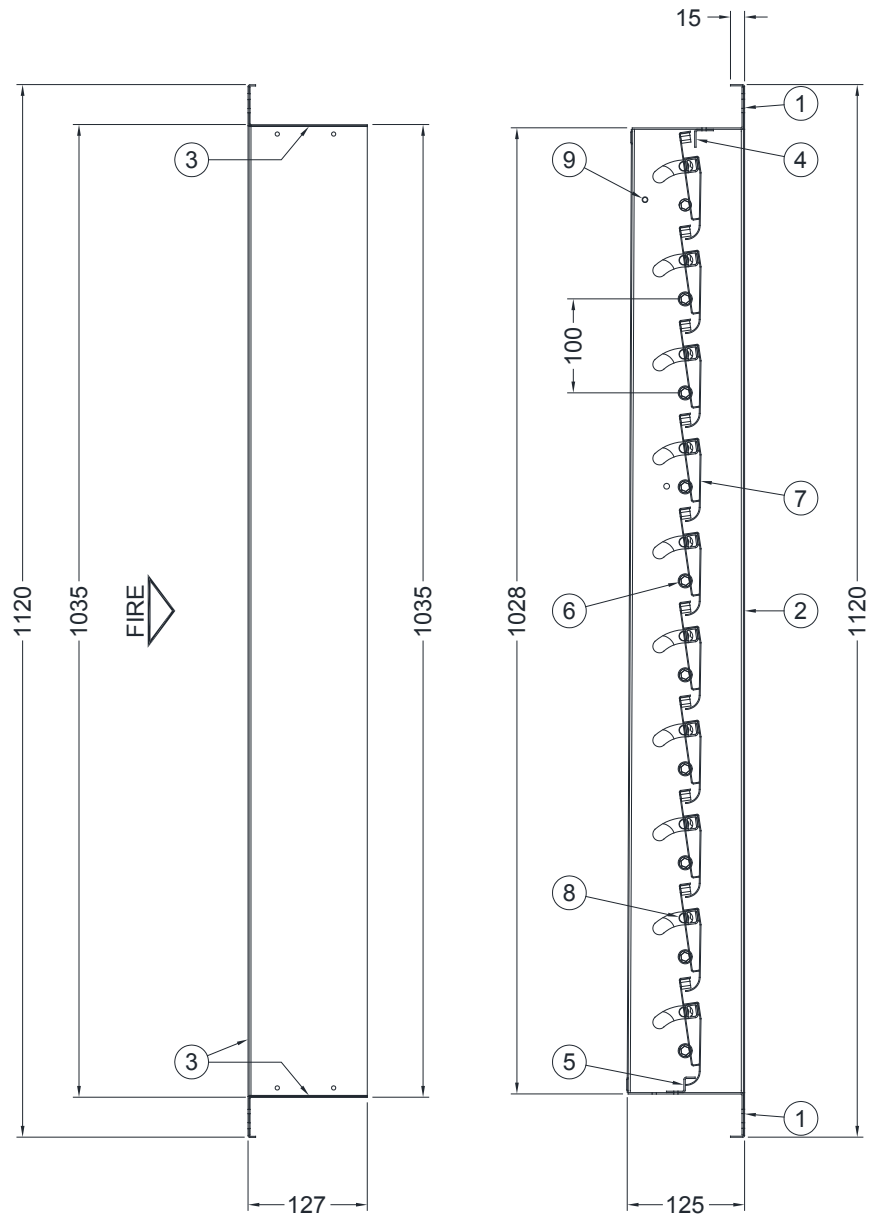
WALL CUT OUT SIZE
1060 Wide x 1050 High



All undimensioned holes 4.5mm diameter
All dimensions $\pm 0.2\text{mm}$

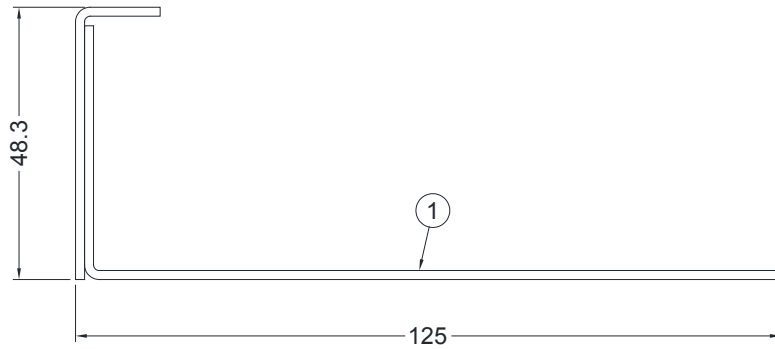
Do not scale. All dimensions are in mm

Figure 3 – Details of Damper

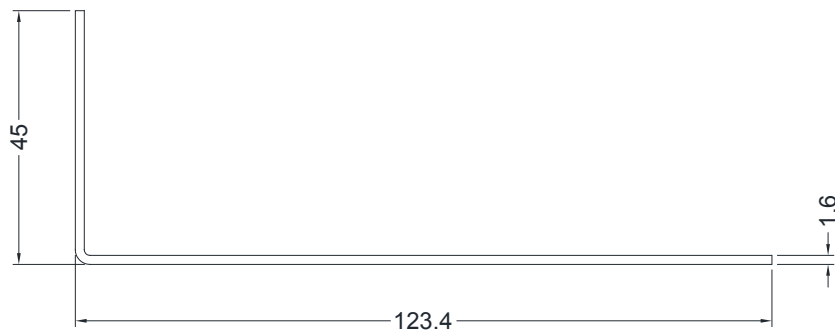
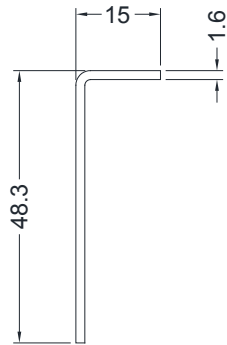


Do not scale. All dimensions are in mm

Figure 4 – Details of Damper Frame

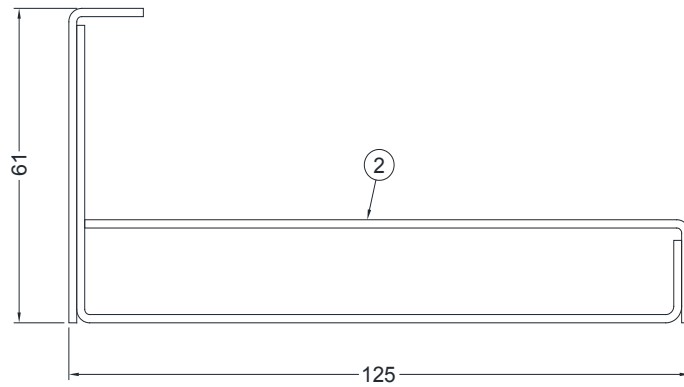


TYPICAL SECTION THROUGH
CASING TOP & BOTTOM ASSEMBLY

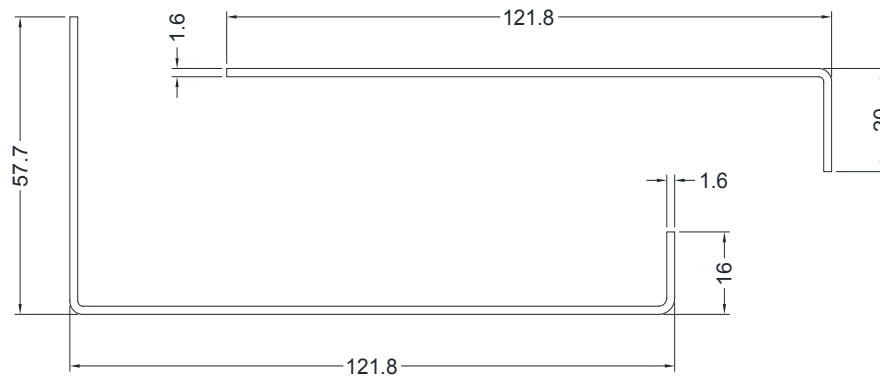
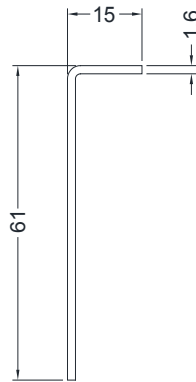


Do not scale. All dimensions are in mm

Figure 5 – Details of Damper Frame

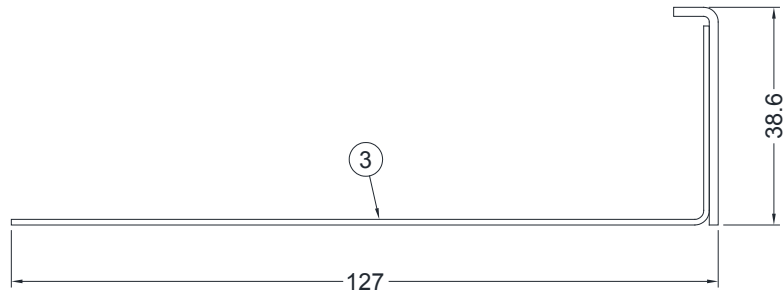


TYPICAL SECTION THROUGH
CASING SIDE ASSEMBLY

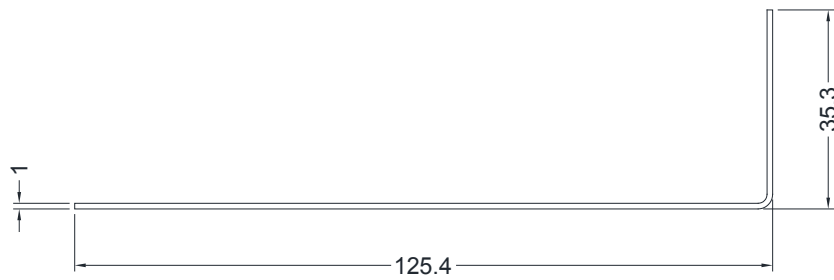
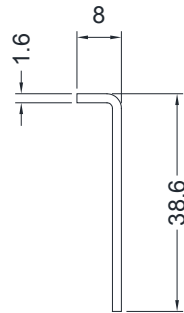


Do not scale. All dimensions are in mm

Figure 6 – Details of Liner Frame

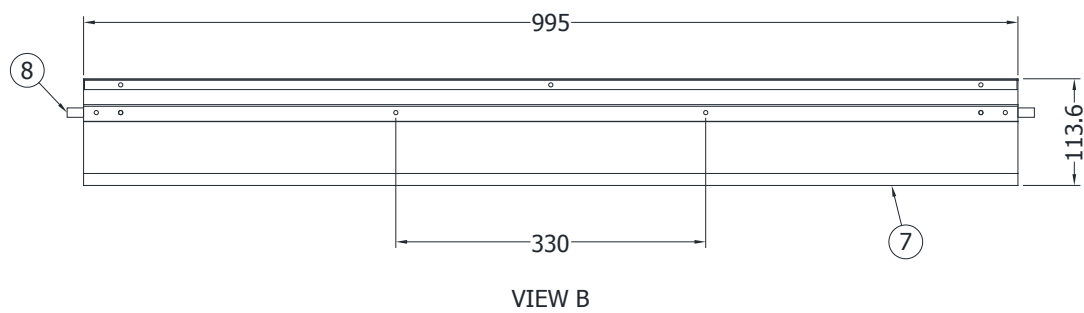
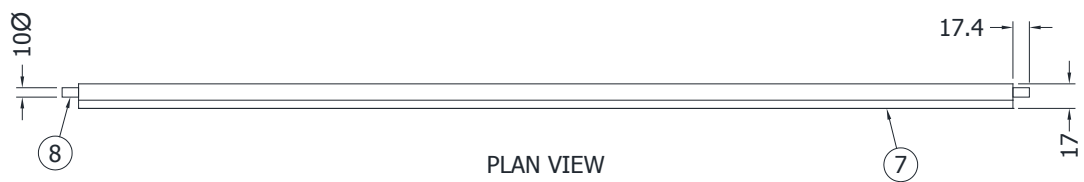
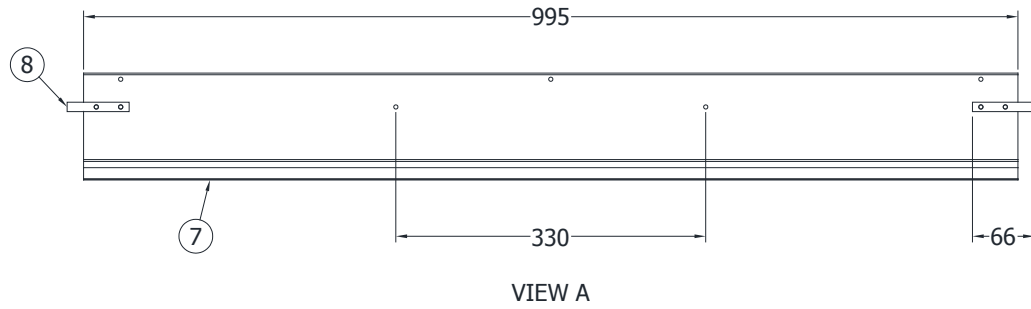


TYPICAL SECTION THROUGH
LINER FRAME ASSEMBLY



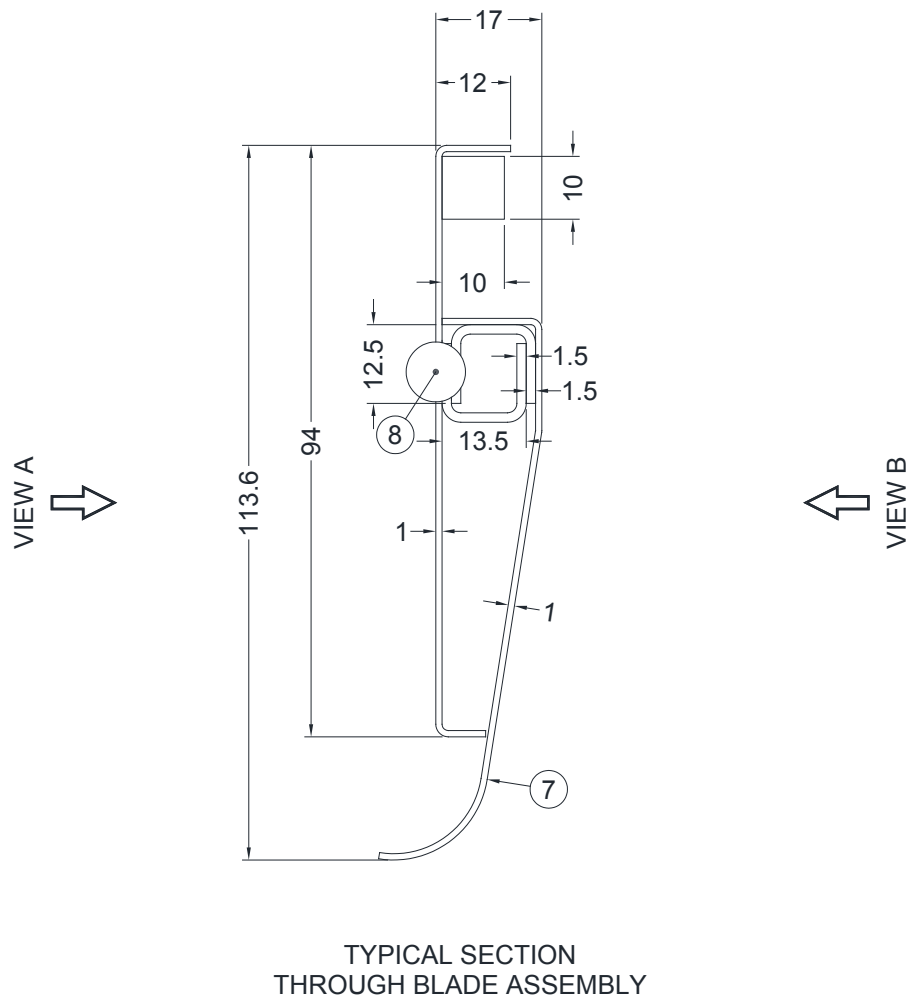
Do not scale. All dimensions are in mm

Figure 7 – Details of Blades



Do not scale. All dimensions are in mm

Figure 8 – Details of Blades



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 3 to 8)
 (All values are nominal unless stated otherwise)
 (All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Damper Frame Head & Base Assembly	
Material	: Mild steel
Thickness	: 1.6 mm
Overall size	: 126.6 mm x 48.3 mm, please see Figure 4 for more dimensions
Jambs to head jointing method	: 4 mm steel rivets
Fixing methods	
i. components together	: Pop riveted
ii. to supporting construction	: 63 mm long x 4.2 mm diameter countersunk head screws, 2 off per length
2. Damper Frame Side Assembly	
Material	: Mild steel
Thickness	: 1.6 mm
Overall size	: 126.6 mm x 48.3 mm, please see Figure 5 for more dimensions
Jambs to head jointing method	: Please see item 1
Fixing methods	
i. components together	: Pop riveted
ii. to supporting construction	: 63 mm long x 4.2 mm diameter countersunk head screws, 2 off per length
3. Liner Frame Assembly	
Material	: Mild steel
Thickness	
i. inner angle	: 1 mm
ii. outer angle	: 1.6 mm
Overall size	: 127 mm x 38.6 mm, please see Figure 6 for more dimensions
Jambs to head jointing method	: 4 mm steel rivets
Fixing methods	
i. components together	: Pop riveted
ii. to supporting construction	: 63 mm long x 4.2 mm diameter countersunk head screws, 2 off per side
4. Blade Stop Angle	
Material	: Mild steel
Thickness	: 1.2 mm
Overall size	: 19 mm x 20 mm x 1000 mm long
Fixing method	: Pop rivet fixed with the 20 mm leg to the damper frame base assembly, item 1, 3 off per length one nominally 50 mm from each end and one in the centre

<u>Item</u>	<u>Description</u>
5. Blade Stop Profile	
Material	: Mild steel
Thickness	: 1.2 mm
Overall size	: 19 mm x 20 mm x 1000 mm long
Fixing method	: Pop rivet fixed with the 20 mm leg to the damper frame base assembly, item 1, 3 off per length one nominally 50 mm from each end and one in the centre
6. Blade Stop Stud	
Material	: Steel
Overall size	: 12.8 mm diameter with 6.2 mm projection
Fixing method	: Through screwed into damper frame side assemblies, item 2, at 100 mm centres, please see Figure 3 for positions
7. Blade Assembly	
Materials	
i. internal stiffener channel	: Steel
ii. inner blade facing	: Steel
iii. outer blade facing	: Steel
iv. blade counter balance	: Steel
Thickness'	
i. internal stiffener channel	: 1.5 mm
ii. inner blade facing	: 1 mm
iii. outer blade facing	: 1 mm
Overall sizes	
i. assembled blade	: 113.6 mm high x 17 mm deep x 995 mm long
ii. internal stiffener channel	: 13.5 mm wide x 12.5 mm deep
iii. inner blade facing	: 12 mm x 94 mm x 8 mm
iv. outer blade facing	: 86 mm x 16 mm
iv. blade counter balance	: 10 mm x 10 mm
Fixing methods	
i. assembled blade	: Supported at each end by a pivot, item 8
ii. internal stiffener channel	: Fitted within each other and riveted with blades
iii. inner blade facing	: 4 mm steel rivets into internal stiffener channel
iv. outer blade facing	: 4 mm steel rivets into internal stiffener channel
iv. blade counter balance	: Riveted through inner blade facing with 4 mm steel rivets
8. Blade End Pivot Pin	
Material	: Steel
Overall size	: 66 mm long x 10 mm diameter
Fixing method	: Cut through half of its diameter for a distance of 48.5 mm to form a rebated flat surface for fitting to and through fixed via the inner blade facing to the internal stiffener angles of the blade assembly, item 7 by 2 off rivets 26 mm apart per pivot pin

<u>Item</u>	<u>Description</u>
8. Thermal Link & Blade Closer Mechanism	
Materials	
i. thermal link	: Plastics
ii. blade closer mechanism	: Steel
Thickness	
i. blade closer mechanism	: 1.5 mm
Overall sizes	
i. thermal link	: 5 mm long x 8.7 mm
ii. blade closer mechanism	: 1.5 mm
Fixing methods	
i. thermal link	: Fitted through the damper frame side assembly, item 2 65 mm down from the damper frame head assembly, item 1
ii. blade closer mechanism	: Suspended from the thermal link allowing it to drop when it melts thus closing the blades

Instrumentation

General	The instrumentation was provided in accordance with the requirements of the Standard.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2012 Clause 5.1 using four plate thermometers, distributed over a plane 100 mm from the surface of the test construction.
Integrity criteria	Cotton pads and gap gauges were available to evaluate the integrity of the specimen.
Radiation	A water-cooled foil heat-flux meter was used to record the heat radiation from the specimen. The heat flux meter was positioned at a distance of 1 m from the unexposed surface of the specimen.

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	The ambient air temperature in the vicinity of the test construction was 9°C at the start of the test with a maximum variation of 17°C during the test.
00	00	The test commences.
05	00	There is a slight amount of smoke release from the surface of the blades due to the paint coating burning away.
15	00	Specimen vent is radiating slightly.
40	00	The vent blades have deflected slightly towards the furnace.
60	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming and cotton pad ignition on the unexposed face.
65	00	A cotton wool pad is applied to the unexposed face of the vent. The pad ignites. The specimen has deemed to fail the cotton wool pad test.
70	00	The blades of the damper are radiating an orange colour.
80	00	There are no visible significant changes to the vent.
90	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming on the unexposed face.
100	00	There are no visible significant changes to the vent.
120	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming on the unexposed face.
150	00	The vent continues to radiate on the unexposed face.
180	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming on the unexposed face.
210	00	There are no visible significant changes to the vent.
240	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming on the unexposed face.
245	00	The vent is satisfying the specified performance criteria with regards to through gaps, sustained flaming on the unexposed face. The test is discontinued at the client request.

Photographs

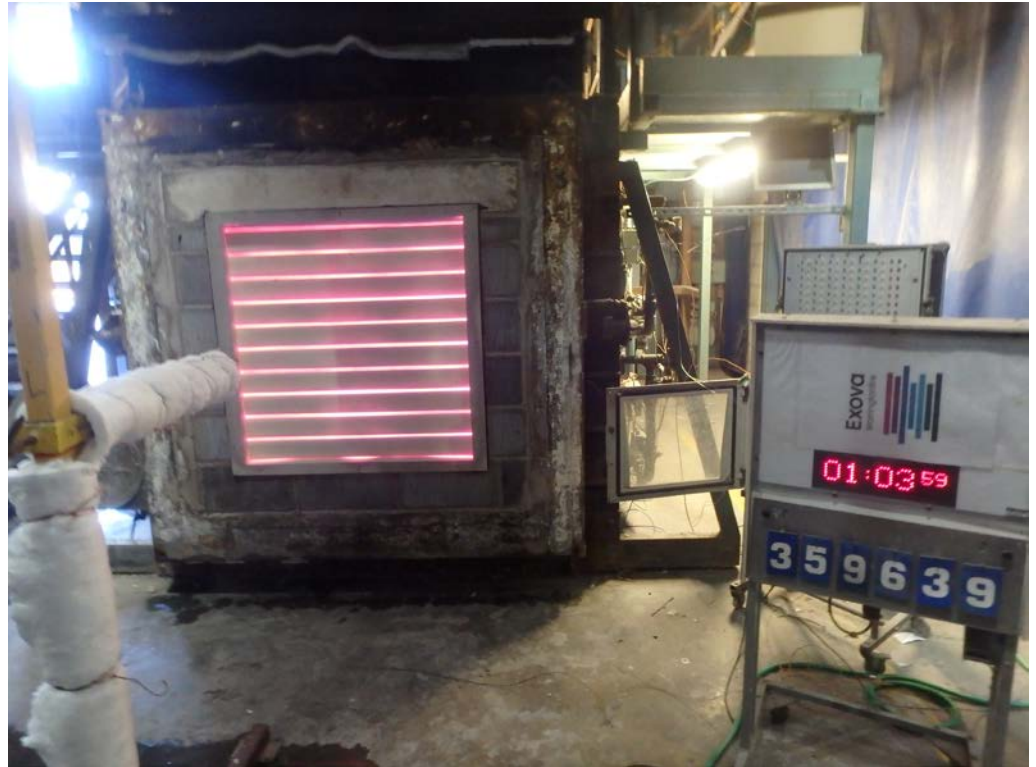
The exposed face of the specimen prior to testing



The unexposed face of the specimen after 30 minutes of testing



The unexposed face of the specimen after 63 minutes of testing



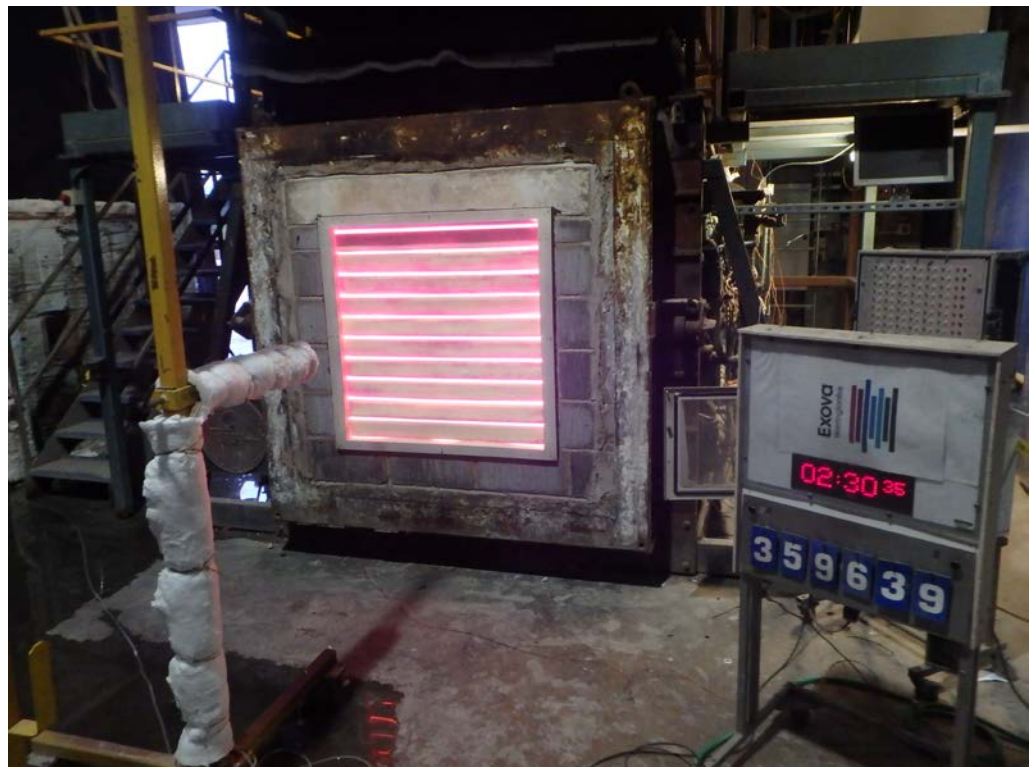
The unexposed face of the specimen after 93 minutes of testing



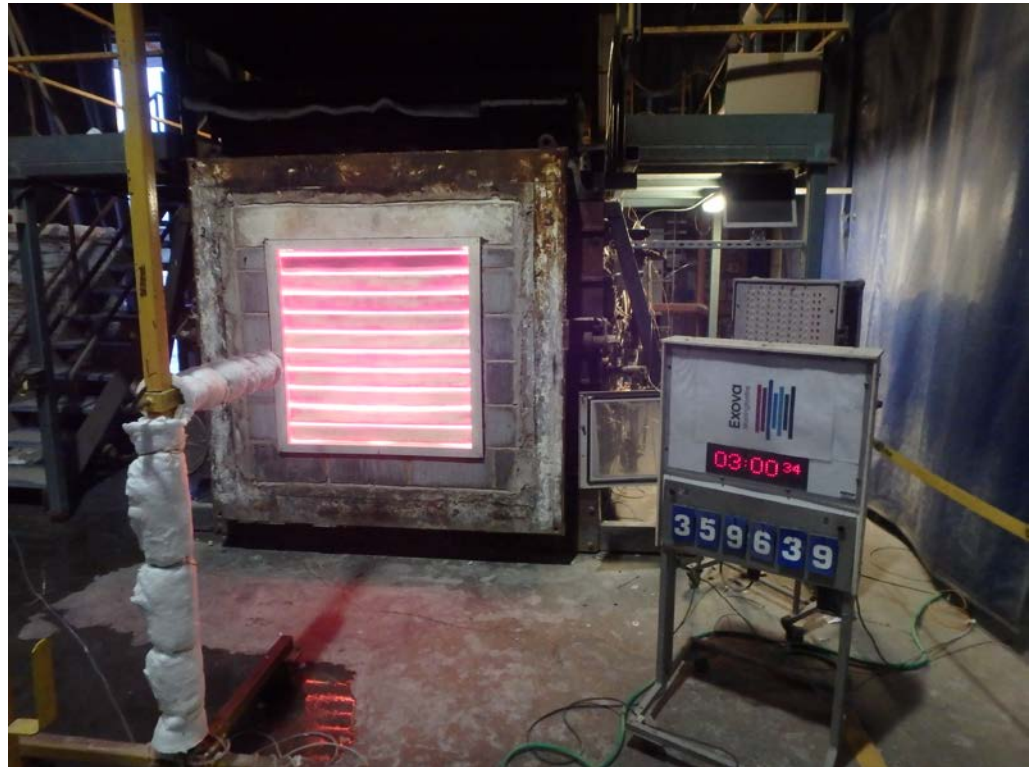
The unexposed face of the specimen after 120 minutes of testing



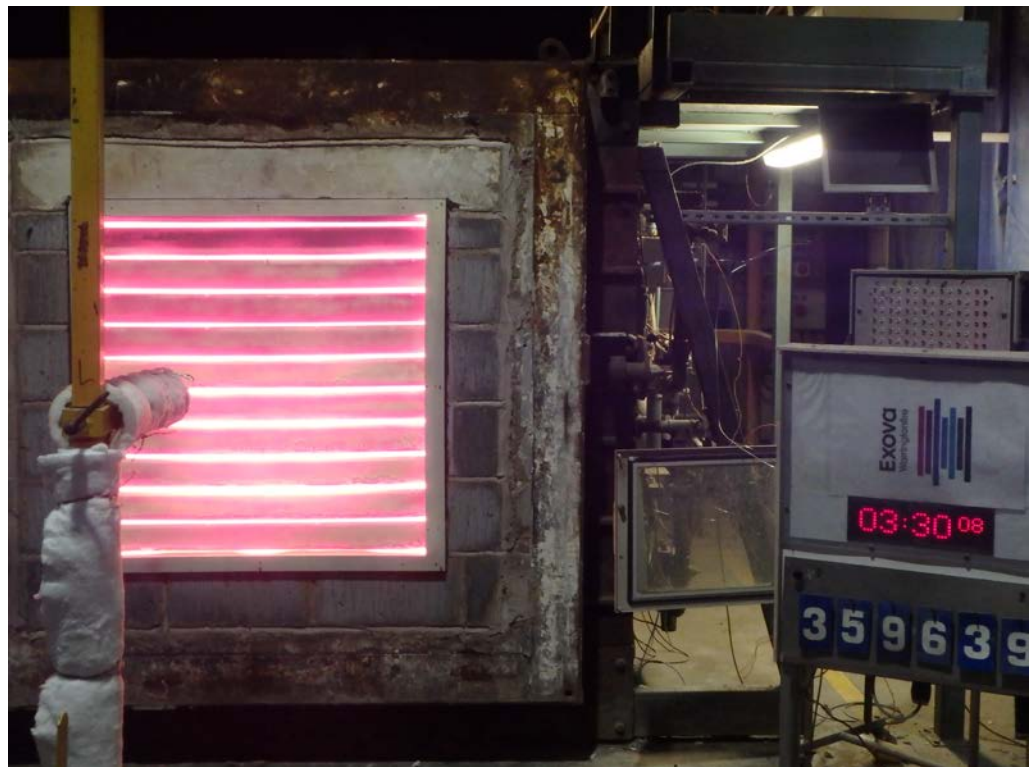
The unexposed face of the specimen after 150 minutes testing



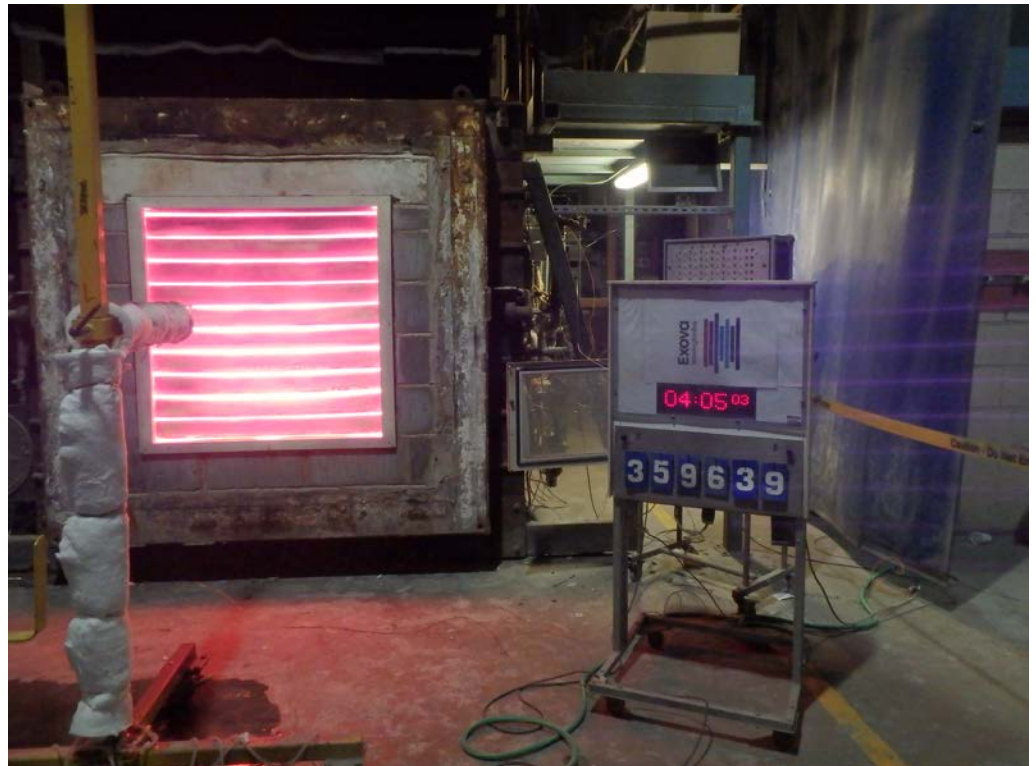
The unexposed face of the specimen after 180 minutes of testing



The unexposed face of the specimen after 210 minutes of testing



The unexposed face of the specimen after 245 minutes of testing



The exposed face of the specimen shortly after the test



Temperature and Radiation Data

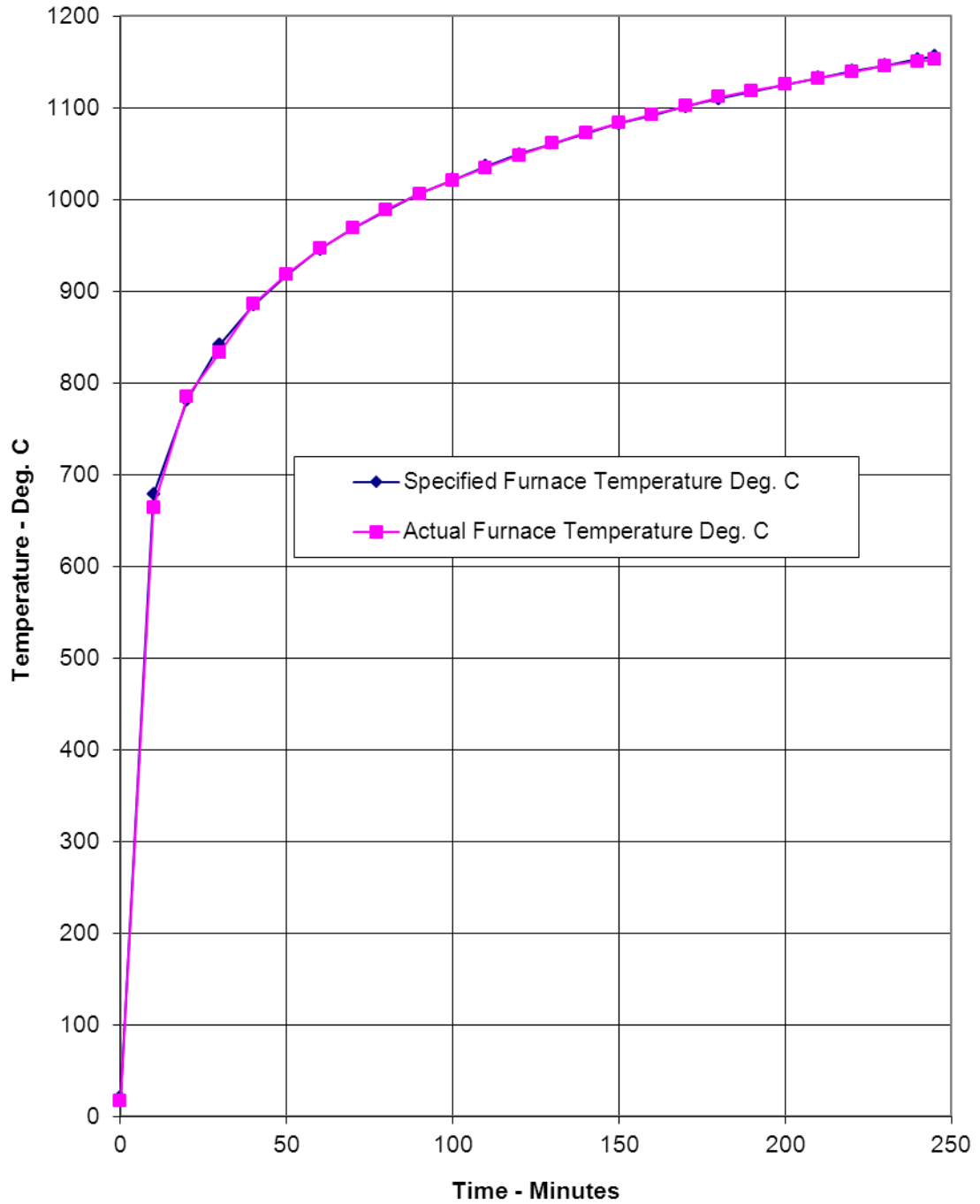
Mean furnace temperature, together with the temperature/time relationship specified in the Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	17
10	678	664
20	781	785
30	842	833
40	885	886
50	918	918
60	945	946
70	968	968
80	988	989
90	1006	1006
100	1022	1021
110	1036	1035
120	1049	1048
130	1061	1061
140	1072	1073
150	1082	1083
160	1092	1093
170	1101	1102
180	1110	1111
190	1118	1118
200	1126	1125
210	1133	1132
220	1140	1139
230	1146	1146
240	1153	1151
245	1156	1153

Recorded Radiation Intensity

Time Mins	Radiation Intensity kW/m ²
0	0.0
10	2.9
20	4.4
30	5.5
40	6.6
50	7.7
60	8.4
70	9.3
80	10.2
90	10.8
100	11.3
110	11.8
120	12.6
130	12.8
140	13.3
150	13.3
160	14.0
170	14.4
180	14.3
190	15.5
200	16.0
210	16.7
220	16.8
230	17.8
240	17.6
245	17.9

Graph Showing Mean Furnace Temperature, Together with the Temperature/Time Relationship Specified in the Standard



Ongoing Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the pressure relief damper described herein was tested generally in accordance with, and following the procedure outlined in BS EN 1634-1: 2014 and BS EN 1363-1: 2012, and where appropriate BS EN 1363-2:1999. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

Conclusions

Evaluation against objective

A specimen of a pressure relief damper has been subjected to a fire resistance test conducted generally in accordance with BS EN 1634-1: 2014, Fire resistance tests for door and shutter assemblies and openable windows, BS EN 1363-1: 2012, General requirements, and BS EN 1363-2: 1999, Alternative and additional procedures.

The evaluation of the gas vent against the requirements of BS EN 1634-1: 2014 showed that it satisfied these requirements for the periods stated below.

Test Results:

Integrity performance	Sustained flaming	245 minutes*			
	Gap gauge	245 minutes*			
	Cotton Pad	65 minutes			
Radiation Performance	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
	26 minutes	79 minutes	183 minutes	Not reached	Not reached

* The test duration. The test was discontinued after a period of 245 minutes.