test report

Title:

Fire Resistance Test Utilising The General Principles of BS 476: Part 22: 1987 on a Specimen of a Loft Access Hatch

WF Report No:

157180

Test sponsor:

Manthorpe Building Products
Condor Gate Business Park
Ripley
Derbyshire
DE5 3ND

Date :

28th September 2006

Notified Body No:

0833

UKAS TESTING
0249

warringtonfire
global safety
TESTING

Summary

Objective

To determine the fire resistance of a single specimen of an insulated, loft access hatch, when tested utilising the general principles of BS 476: Part 22: 1987.

Test Sponsor

Manthorpe Building Products. Condor Gate Business Park, Ripley, Derbyshire DE5 3ND

Summary of Tested Specimen

The test construction had nominal overall dimensions of 1200 mm by 1200 mm and comprised a timber joist floor and plasterboard ceiling construction into which was installed a loft hatch assembly of overall nominal dimensions 580 mm wide by 745 mm long by 102 mm thick, providing an opening size of 528 mm by 688 mm. The loft hatch assembly was constructed using a steel frame; into which was positioned two pieces of nominally 50 mm thick Rockwool 'RW45' Mineral fibre insulation with a black non-woven glass tissue with urea formaldehyde binder, which was laid loose onto the loft hatch tray and retained by a reinforcing strut.

The specimen was mounted within the test construction such that the access hatch opened towards the heating conditions of the test.

Test Results:

Integrity	70 minutes*
Insulation	45 minutes

*The test duration. The test was discontinued after a period of 70 minutes.

Date of Test

15th August 2006

Signatories

Responsible Officer
D. Yates*
Testing Officer

Approved
C. Johnson*
Technical Consultant

* For and on behalf of warringtonfire.

Report Issued

Date : 28th September 2006

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Test Procedure

Introduction

BS 476: Part 22: 1987 'Methods for determination of the fire resistance of non-loadbearing elements of construction'; details test methods for evaluating the fire resistance performance of doorsets. However the standard primarily details the testing of vertical, wall mounted doorsets and although the general testing principles may be applied to a horizontal, floor mounted doorset, a test of this type could not be considered to be fully in accordance with the standard. This test was therefore conducted utilising the general principles of BS 476: Part 20: 1987, 'Method for determination of the fire resistance of elements of construction (general principles)'.

The loft access hatch incorporated a single hinged panel and was mounted within a timber joist floor and plasterboard, ceiling construction such that its panel opened towards the heating conditions of the test. The test results therefore may not be appropriate to alternative orientations.

Fire Test Study Group/EGOLF

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.

Instruction to test

The test was conducted on the 15th August 2006 at the request of Manthorpe Building Products Limited, the sponsor of the test.

Mr. M. Challinor and Mr. D. Lennox both representatives of the test sponsor witnessed the test.

Test Specimen Construction

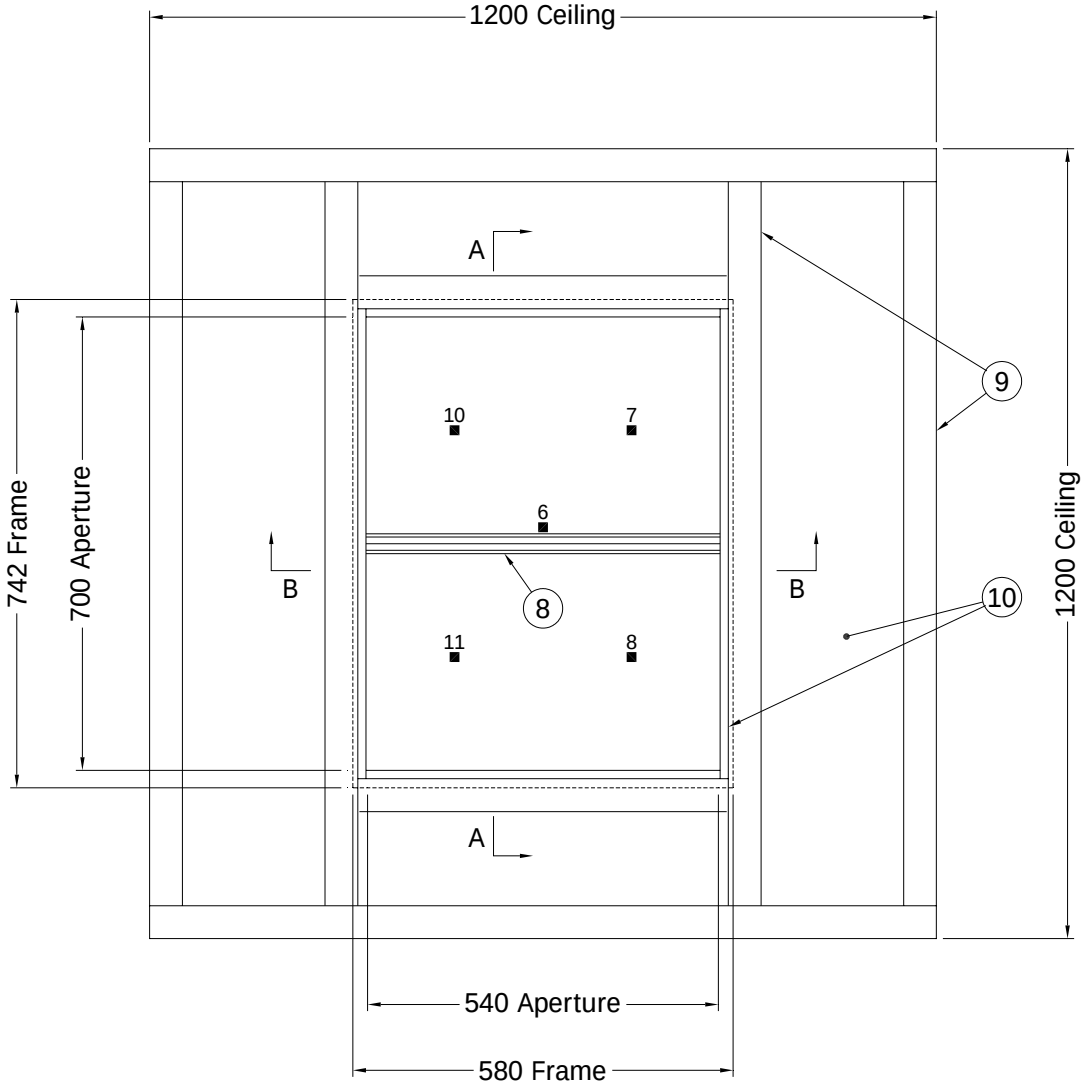
A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimen and information supplied by the sponsor of the test.

Installation

The doorset was mounted within an aperture provided in a timber joist and plasterboard construction such that the door leaf opened towards the heating conditions of the test. A representative of warringtonfire conducted the installation of the floor construction and doorset on the 14th August 2006.

Test Specimen

Figure 1- Plan of Unexposed Face of Ceiling and Loft Hatch

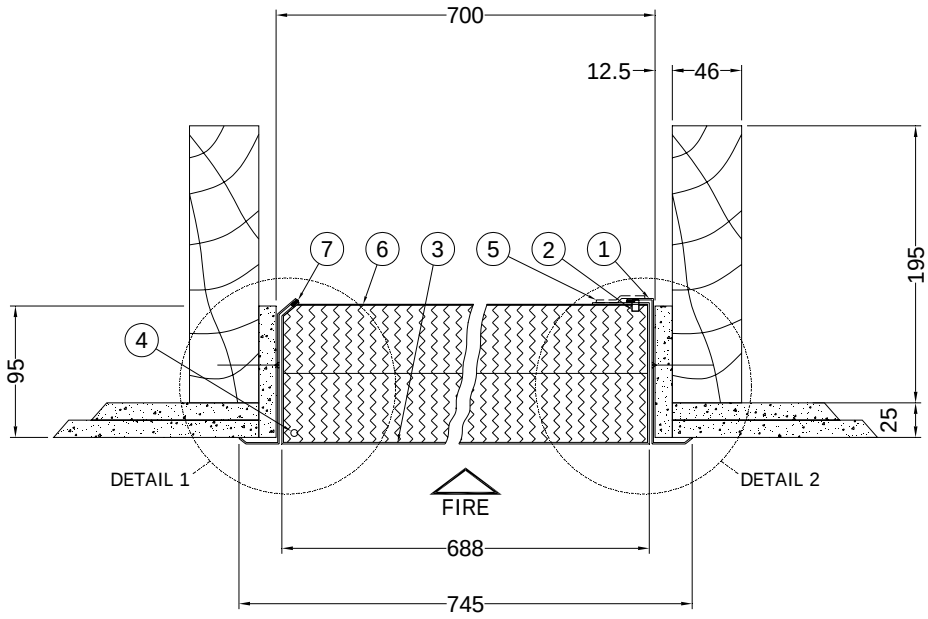


■ Positions of thermocouples

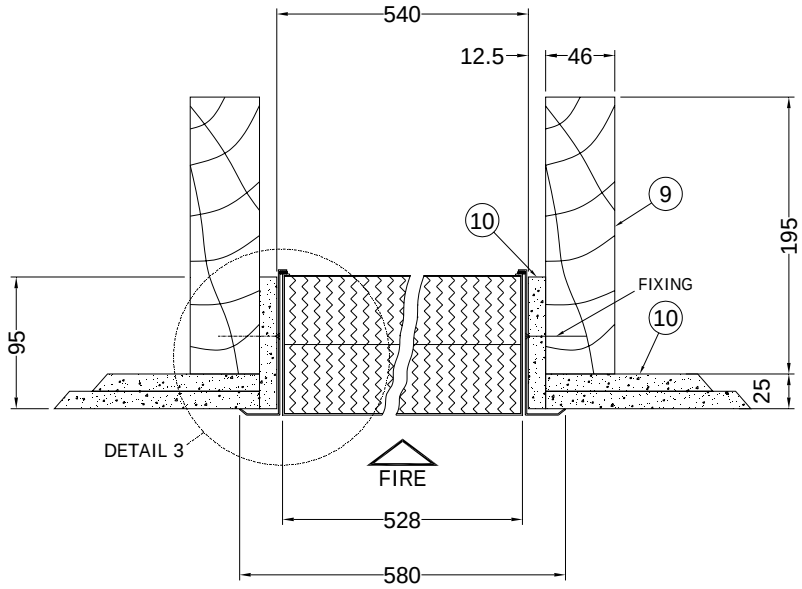
PLAN VIEW OF CEILING

Do not scale. All dimensions are in mm

Figure 2 – Sections Through Ceiling and Loft Hatch



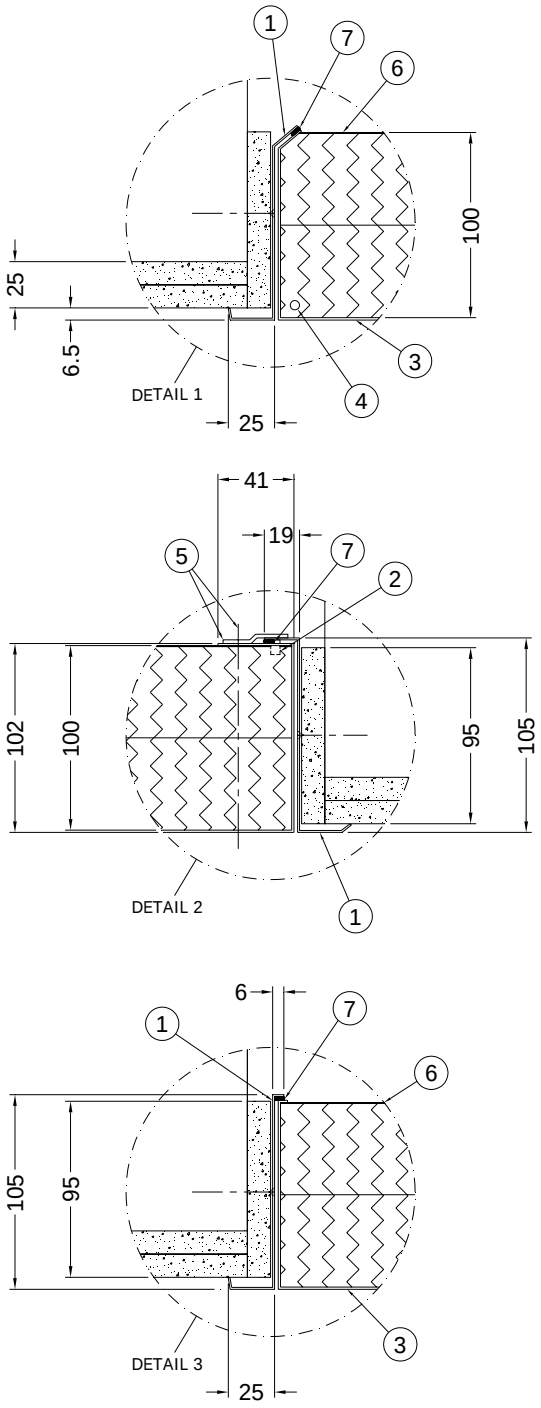
VERTICAL SECTION
THROUGH A-A



VERTICAL SECTION
THROUGH B-B

Do not scale. All dimensions are in mm

Figure 3 – Details of Loft Hatch



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 3)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item		Description
1. Loft Hatch Frame		
Material	:	Mild steel, with powder coated finish
Thickness	:	1.0 mm
Depth	:	105 mm
Overall size	:	580 mm x 742 mm
Fixing	:	Steel countersunk head Spax woodscrews 50 mm long x 5.2 mm diameter into ceiling joists
Screw centres		
i. latch and hinge sides (short sides)	:	4 off at 140 mm centres
ii. jamb sides (long sides)	:	4 off at 190 mm centres
2. Locating Studs for Loft Hatch Tray		
Material	:	Mild steel round bar
Diameter	:	5 mm
Length	:	8 mm
Frequency	:	2 off at 280 mm centres
Fixing	:	Welded to latch side of frame. Studs locate into holes in loft hatch tray in closed position
3. Loft Hatch Tray		
Material	:	Mild steel, with powder coated finish
Thickness	:	1.2 mm
Depth	:	102 mm
Overall size	:	528 mm x 690 mm
Fixing	:	Supported by hinge, latch and locating studs in frame
4. Hinge		
Material	:	Stainless steel bar
Diameter	:	5 mm
Fixing	:	Continuous length of bar fitted through loft hatch tray and frame
5. Latch		
Type	:	'Z' shaped cam operated by an Allen head bolt with key on the exposed face
Material	:	Stainless steel cam plate with mild steel bolt
Cam size	:	36 mm x 20 mm wide x 1.6 mm thick
Operation	:	Cam locks over the returned edge of the frame

Item		Description
6. Insulation to Loft Hatch Tray		
Manufacturer	:	Rockwool
Reference	:	RW45
Material	:	Mineral fibre insulation with black non-woven glass tissue with urea formaldehyde binder. Area weight between 60 and 75g/m². Applied to Rockwool during production of insulation to the upper face
Thickness	:	100 mm, 2 off layers 50 mm thick
Density	:	45 kg/m^3, stated
Size	:	525 mm x 685 mm
Fixing	:	Laid loose onto the loft hatch tray and retained by reinforcing strut, item 8
7. Perimeter Edge Seal		
Material	:	Polyvinyl chloride, PVC, foam, white colour
Size	:	5 mm x 3 mm thick
Fixing	:	Self adhesive to loft hatch tray, item 3
8. Reinforcing Strut		
Material	:	Galvanised mild steel
Thickness	:	1 mm
Overall size	:	30 mm wide x 5.5 mm high x 512 mm long
Fixing method	:	Profile fitted into notches in returned edges of loft hatch tray, item 3
9. Ceiling Joists		
Material	:	British home grown rough sawn softwood; kiln dried, grade C16
Overall size	:	200 mm x 50 mm
Fixing	:	Screw fixed together
10. Ceiling Board & Aperture Lining		
Manufacturer	:	Knauf
Reference	:	Type F board
Material	:	Type 1 natural gypsum
Thickness		
i. ceiling boards	:	25 mm (two layers at 12.5 mm)
ii. aperture lining	:	12.5 mm (one layer at 12.5 mm)
Fixing	:	Countersunk steel ‘Drywall’ screws, 3.5mm diameter
Centres	:	200 mm

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 476: Part 20: 1987, Clause 3.1. using four mineral insulated thermocouples distributed over a plane 100 mm from the surface of the test construction.

Thermocouple Allocation

Thermocouples were provided to monitor the unexposed surface of the specimen, and the output of all instrumentation was recorded at no less than one minute intervals as follows:

Thermocouples 6 to 10

At five positions on the doorset insulation, one approximately at the centre and one at approximately the centre of each quarter section of the doorset.

The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.

Roving Thermocouple

A roving thermocouple was available to measure temperatures on the unexposed surface of the specimen at any position, which might appear to be hotter than the temperatures indicated by the fixed thermocouples.

Integrity criteria

Cotton pads and gap gauges were available to evaluate the integrity of the specimen.

Furnace Pressure

After the first five minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that it complied with the requirements of BS 476: Part 20: 1987, Clause 3.2.2. The calculated pressure differential relative to the laboratory atmosphere at 100 mm below the soffit of the loft access hatch was 18 (±2) Pa.

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 18ºC at the start of the test with no variation during the test.
00	00	**The test commences.**
05	00	The exposed face of the specimen begins to discolour slightly.
08	00	Slight smoke release is visible from the perimeter edge of the specimen.
11	00	Smoke release intensifies from the perimeter edge of the specimen.
14	00	The exposed face of the specimen has discoloured black.
15	00	Slight distortion is visible to the frame member of the specimen. Smoke release intensifies from the hinged, perimeter edge.
21	30	Smoke release continues to intensify throughout the perimeter edge of the specimen.
23	00	The specimen is radiating a dull red on the exposed face.
25	00	Black discolouration is visible to the perimeter edge. The PVC expanding foam has reacted and charred and the outer tissue layer appears to have peeled away.
28	00	The specimen has distorted slightly at its approximate centre, towards the furnace chamber.
30	00	The PVC expanding foam continues to react causing more of the outer tissue layer to peel away.
32	45	The specimen is radiating red on the exposed face.
36	00	Dark grey discolouration is visible along the perimeter edge of the specimen.
42	00	The insulation begins to drop slightly along the latched edge.
45	30	A mean temperature rise in excess of that allowed in the standard is recorded. Insulation failure is deemed to occur.
47	30	The insulation continues to drop slightly to the hinged edge.
48	30	The exposed face of the specimen is radiating orange in colour.
50	00	The insulation continues to drop towards the furnace chamber and is now approximately 10-12 mm away from the resilient bar.
53	30	No significant changes to the exposed face.

Time		
mins	**secs**	
54	**00**	The insulation continues to drop towards the furnace chamber and is now approximately 15-20 mm away from the resilient bar.
59	**00**	Smoke release has lessoned throughout the specimen, but continues.
60	**00**	The specimen continues to satisfy the criteria of integrity.
62	**00**	The insulation continues to drop towards the furnace chamber and is now approximately 20-25 mm away from the resilient bar.
65	**00**	The perimeter edges of the frame member have distorted away from the furnace at both the latched edge and the hinged edge.
69	**30**	The specimen continues to satisfy requirements of integrity.
70	**00**	The specimen continues to satisfy requirements of integrity. The test is discontinued.

Temperature Data

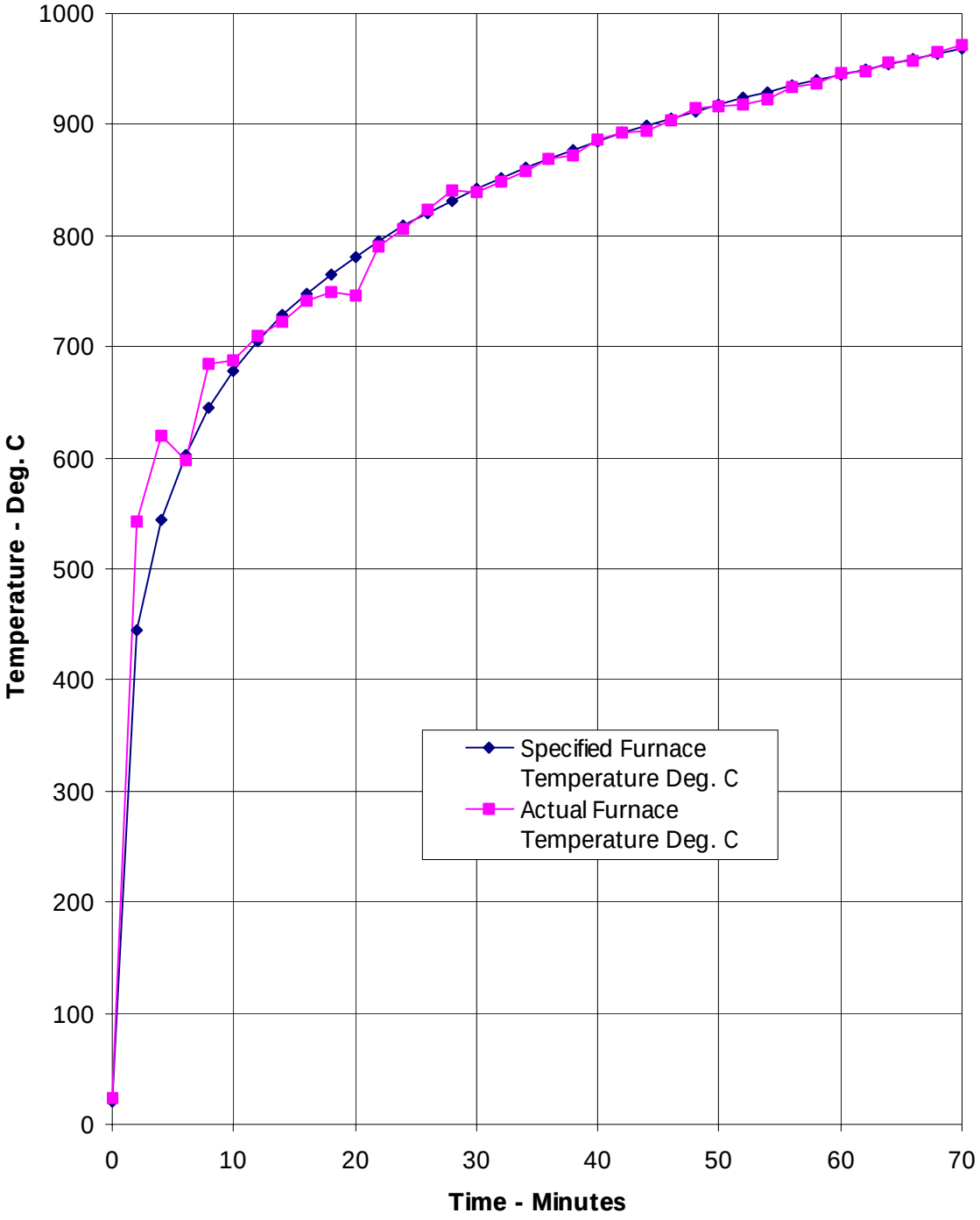
Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	24
2	445	543
4	544	619
6	603	597
8	645	684
10	678	687
12	705	710
14	728	723
16	748	741
18	766	749
20	781	746
22	796	789
24	809	806
26	820	823
28	832	840
30	842	839
32	851	849
34	860	858
36	869	868
38	877	873
40	885	886
42	892	892
44	899	894
46	906	903
48	912	914
50	918	916
52	924	918
54	930	923
56	935	934
58	940	937
60	945	946
62	950	949
64	955	956
66	960	957
68	964	966
70	968	972

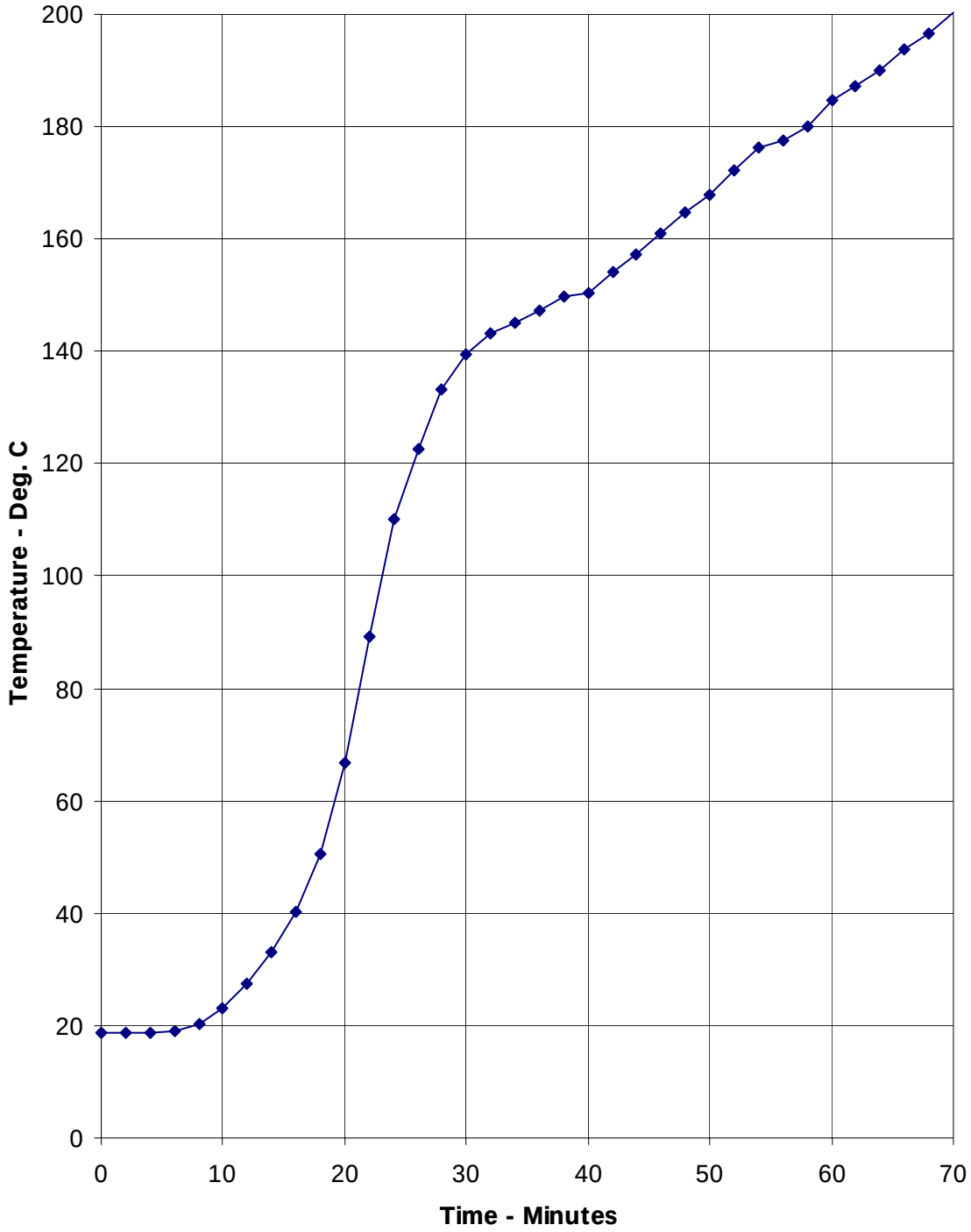
Individual and Mean Temperatures Recorded On The Unexposed Surface Of The Specimen

Time Mins	T/C Number 6 Deg. C	T/C Number 7 Deg. C	T/C Number 8 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	Mean Temp Deg. C
0	18	18	19	19	19	19
2	18	18	19	19	19	19
4	18	18	19	19	19	19
6	18	19	19	19	19	19
8	20	20	20	21	20	20
10	23	23	23	23	23	23
12	28	29	26	28	27	28
14	32	35	31	36	32	33
16	40	43	35	46	38	40
18	51	53	44	58	46	50
20	68	68	56	79	62	67
22	93	88	78	101	86	89
24	114	111	102	115	109	110
26	121	132	120	122	119	122
28	128	144	132	129	133	133
30	130	149	140	137	142	140
32	134	151	142	144	146	143
34	135	151	142	148	149	145
36	138	153	142	151	153	147
38	140	155	142	154	157	150
40	143	153	141	159	156	150
42	145	156	143	163	164	154
44	148	159	145	167	167	157
46	151	163	148	171	171	161
48	156	167	152	174	174	165
50	160	171	155	178	176	168
52	165	176	159	181	180	172
54	169	182	164	185	182	176
56	168	182	165	188	185	178
58	173	185	165	192	185	180
60	177	193	170	195	189	185
62	178	195	175	197	193	187
64	181	200	177	199	194	190
66	184	204	180	203	198	194
68	187	206	182	208	200	197
70	191	211	186	210	202	200

Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard



Graph Showing Mean Temperatures Recorded On The Unexposed Surface Of The Specimen



Performance Criteria and Test Results

Integrity

It is required that there is no collapse of the specimen, no sustained flaming on the unexposed surface and no loss of impermeability. These requirements were satisfied for a period of 70 minutes, The test duration.

Insulation

It is required that the mean temperature rise of the unexposed surface shall not be greater than 140°C and that the maximum temperature rise shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure. These requirements were satisfied for a period of 45 minutes after which time the mean temperature rise was exceeded.

Ongoing Implications

Limitations

The results relate only to the behaviour of the specimen of the element of construction under the particular conditions of test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, nor do they reflect the actual behaviour in fires.

The test results relate only to the specimen tested. Appendix A of BS 476: Part 20: 1987 provides guidance information on the application of fire resistance tests and the interpretation of test data. Application of the result to a doorsets of different dimensions or supported other than by a masonry wall or incorporating different components should be the subject of a design appraisal.

Care should be taken with respect to the application of loft hatch doors to floor constructions. Floor constructions are normally tested in accordance with BS 476: Part 21: 1987, at dimensions of 3 metres by 4 metres and supporting an appropriate design load. Where the installation of loft hatch access doors into such constructions is proposed, due consideration should be given to the additional distortion that may occur in the floor construction and the effect on the fire resistance performance of the hatch and overall construction that this will have. The tested assembly was asymmetric and was tested such that the door panel opened towards the heating conditions of the test. The test results may not be appropriate to alternative orientations.

Review

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.

Conclusions

Evaluation Against Objective

A single specimen of an insulated, loft access hatch has been subjected to a fire resistance test utilising the general principles of BS 476: Part 22: 1987.

If the specimen was judged against the criteria for integrity and insulation in accordance with BS 476: Part 22: 1987, then the results would be as follows:

Test Results:

Integrity	70 minutes*
Insulation	45 minutes

The test duration. The test was discontinued after a period of 70 minutes.

Bodycote warringtonfire • Head Office • Holmesfield Road • Warrington • Cheshire • WA1 2DS • United Kingdom
Tel: +44 (0) 1925 655 116 • Fax: +44 (0) 1925 655 419 • Email: Info@warringtonfire.net • Website: www.warringtonfire.net