

**GRENFELL TOWER
PUBLIC ENQUIRY**

**EXHIBITS TO
WITNESS STATEMENT OF ROY JONES**

EXHIBIT RJ2

To... hm@psbuk.com

Cc...

Subject P69649 / Q247111/J

Hi Hugh

Please find attached as requested

regards

Mark Griffiths
Senior Sales Office Assistant



GILBERTS

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Testing. Advising. Assuring.

Title:

A fire resistance test conducted generally in accordance with BS EN 1366-2:1999 on a multi blade damper assembly.

WF Report No:

309850



Prepared for:

**Gilberts (Blackpool)
Ltd**

Clifton Road,
Blackpool,
Lancashire,
FY4 4QT.

Date: 6th October 2011

Notified Body No:

0833



0249

Summary

Objective	To determine the fire resistance performance of a multi bladed fire damper mounted within a standard flexible wall construction, when tested generally in accordance with BS EN 1366-2: 1999.
Test Sponsor	Gilberts (Blackpool) Ltd
Address	Clifton Road, Blackpool, Lancashire, FY4 4QT.
Summary of Tested Specimen	<p>The damper had an internal opening of 910 mm wide by 1910 mm high. The damper was formed from 1.5 mm thick galvanised mild steel casing incorporating seven; twin skinned galvanised mild steel damper blades, formed from 1 mm thick galvanised mild steel. The blades were nominally 909 mm in length by 308 mm high, with the exception of the small top blade which was nominally 108 mm high. The damper assembly incorporated a single electric actuator, referenced BLE 24, supplied by Belimo Ltd.</p> <p>The damper was fitted into a 2000 mm high by 1000 mm wide aperture within a standard flexible wall construction and secured with self tapping screws at 500 mm centres along each damper face</p> <p>The damper assembly was connected via a plenum and various piping sections to an extractor fan capable of maintaining an under pressure of 300 Pa between the furnace chamber and the duct plenum. At the request of the sponsor the test was started with the damper in the closed position.</p>

Test Results:

The specimen damper assembly satisfied the performance requirements of the Standard for the periods in the following table:

PERFORMANCE CRITERIA	TEST RESULTS
Integrity (Leakage)	74 minutes
Smoke Leakage	0 minutes
Integrity (Cotton Pad)	*92 minutes
Integrity (Gap Gauge)	*92 minutes
Integrity (Sustained Flaming)	*92 minutes
Insulation	3 minutes
Leakage During Ambient Temperature Test (Clause 10.3)	256.8 m ³ /hr

*The test duration. The test was discontinued after a period of 92 minutes.

Date of Test

23rd August 2011

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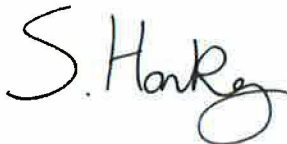
Signatories



Responsible Officer
S. Gilfedder*
Testing Officer



Approved
A. Kearns*
Technical Manager



Head of Department
S. Hankey *
Operations Manager

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

Report Issued

Date : 6th October 2011

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Test Procedure

Introduction

Fire dampers are required to maintain compartmentation at fire boundaries and protect means of escape in case of fire. It was therefore tested generally in accordance with BS EN 1366-2: 1999 'Fire resistance tests for service installations - Part 2: Fire dampers'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 1999, 'Fire resistance tests - Part 1: General requirements' and BS EN 1363-2: 1999, 'Fire resistance tests - Part 2: Alternative and additional procedures'.

The specimen was judged on its ability to comply with the performance criteria for integrity, insulation and smoke leakage, as required by BS EN 1366-2: 1999. At request of the test sponsor the damper was in closed position at the commencement of fire test (Clause 10.4), and therefore the test was not conducted fully in accordance with the standard.

Prior to the ambient leakage test (Clause 10.3) and the fire test (Clause 10.4) being conducted, the system leakage (comprising leakage associated with the connecting duct and measuring station) was evaluated. A series of system leakage measurements were recorded (with the inlet of the damper sealed) over a range of specified underpressures measured within the connecting duct. A maximum system leakage limit of 12 m³/hr is specified by the Standard. The system leakage was found to be within the limit specified by the Standard.

Prior to the fire test (Clause 10.4) being conducted, and after establishing that the system leakage was lower than 12 m³/hr, the ambient temperature leakage of the damper was determined. In addition, the damper was subjected to 50 opening and closing cycles, after which the damper showed no signs of mechanical damage, which could affect its operation.

The test rig exhaust fan was adjusted to maintain an under pressure of 300 (+/- 15) Pa in the connecting duct, relative to the pressure in the laboratory, and the ambient temperature leakage after 20 minutes was recorded. The value for the system leakage was deducted to give the actual ambient temperature leakage.

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

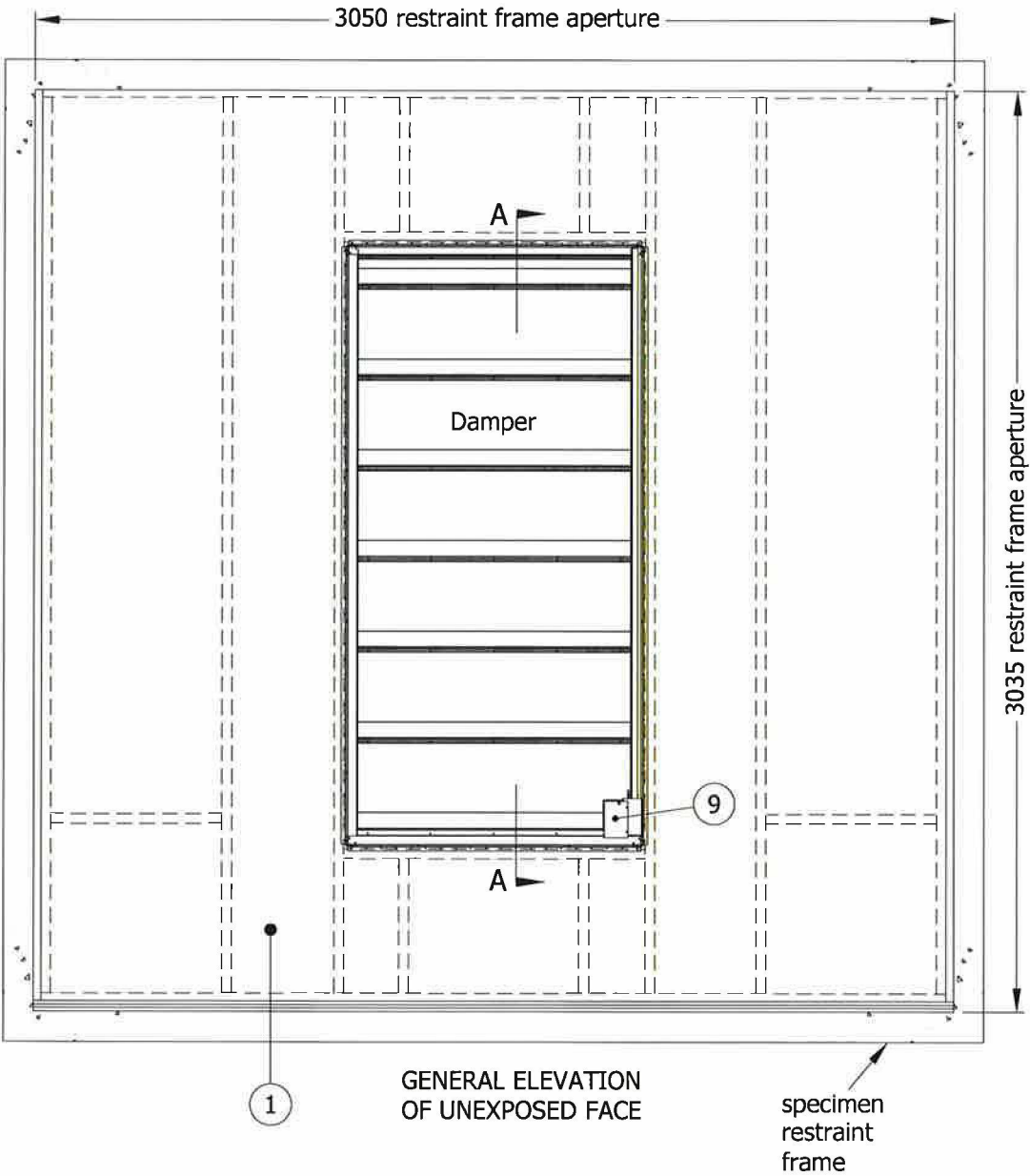
The test was conducted on the 23rd August 2011 at the request of Gilberts (Blackpool) Ltd the test sponsor.

Mr. R. Jones, Mr. C. Pendleton and MR. I. Brown representatives of the 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 standard flexible wall assembly was installed into a refractory concrete lined steel restraint frame. Representative of Exova Warringtonfire installed the wall assembly between the 18 and 19 th of August 2011, and the test sponsor conducted the installation of the damper assembly on the 22 nd August 2011.
Sampling	Exova Warringtonfire was not involved in any selection or sampling procedures of the specimen or any of the components.
Conditioning	The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 6 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 12°C to 23°C and 40% to 78% respectively.

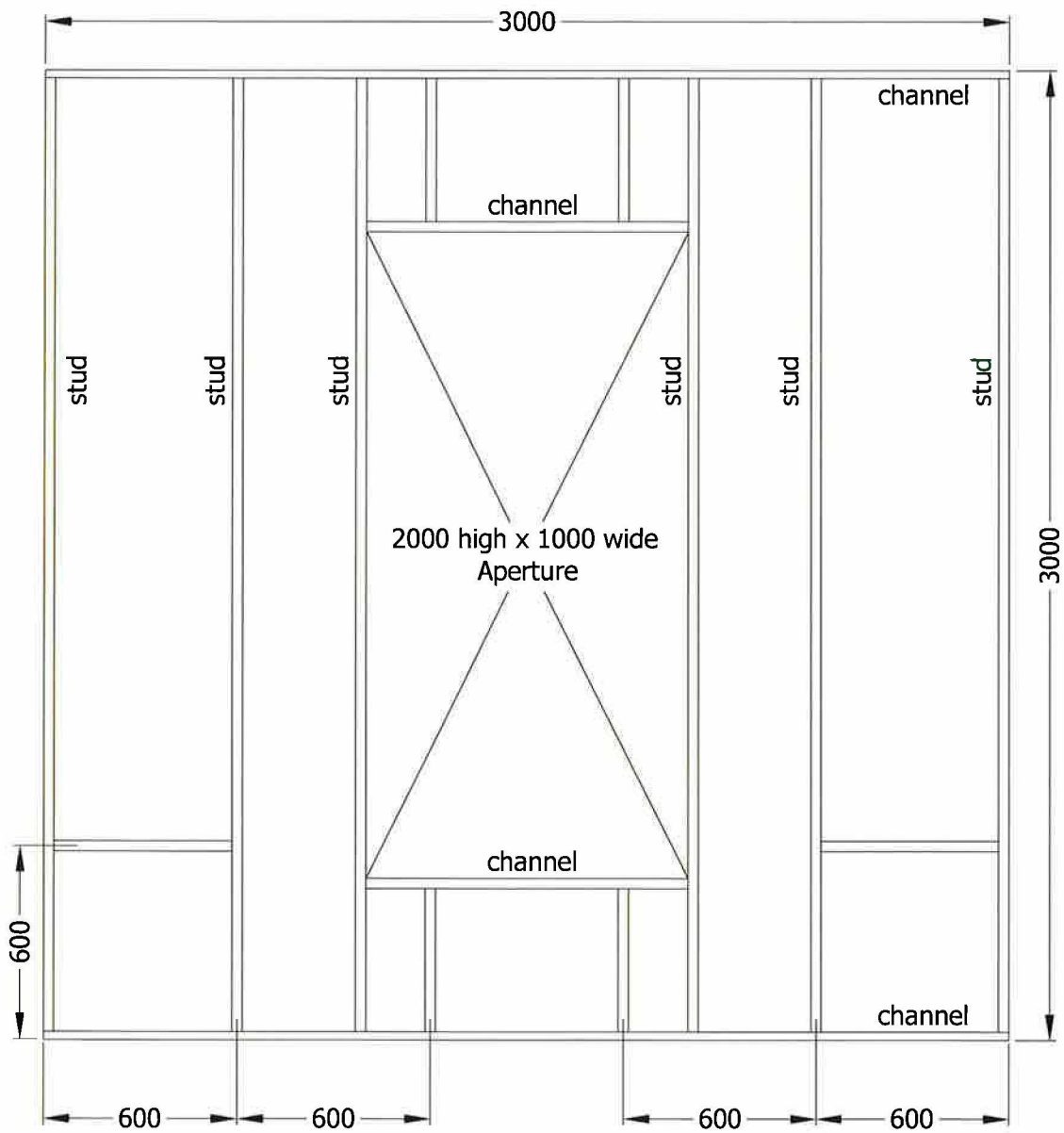
Test Specimens

Figure 1- General Elevation of Test Specimen



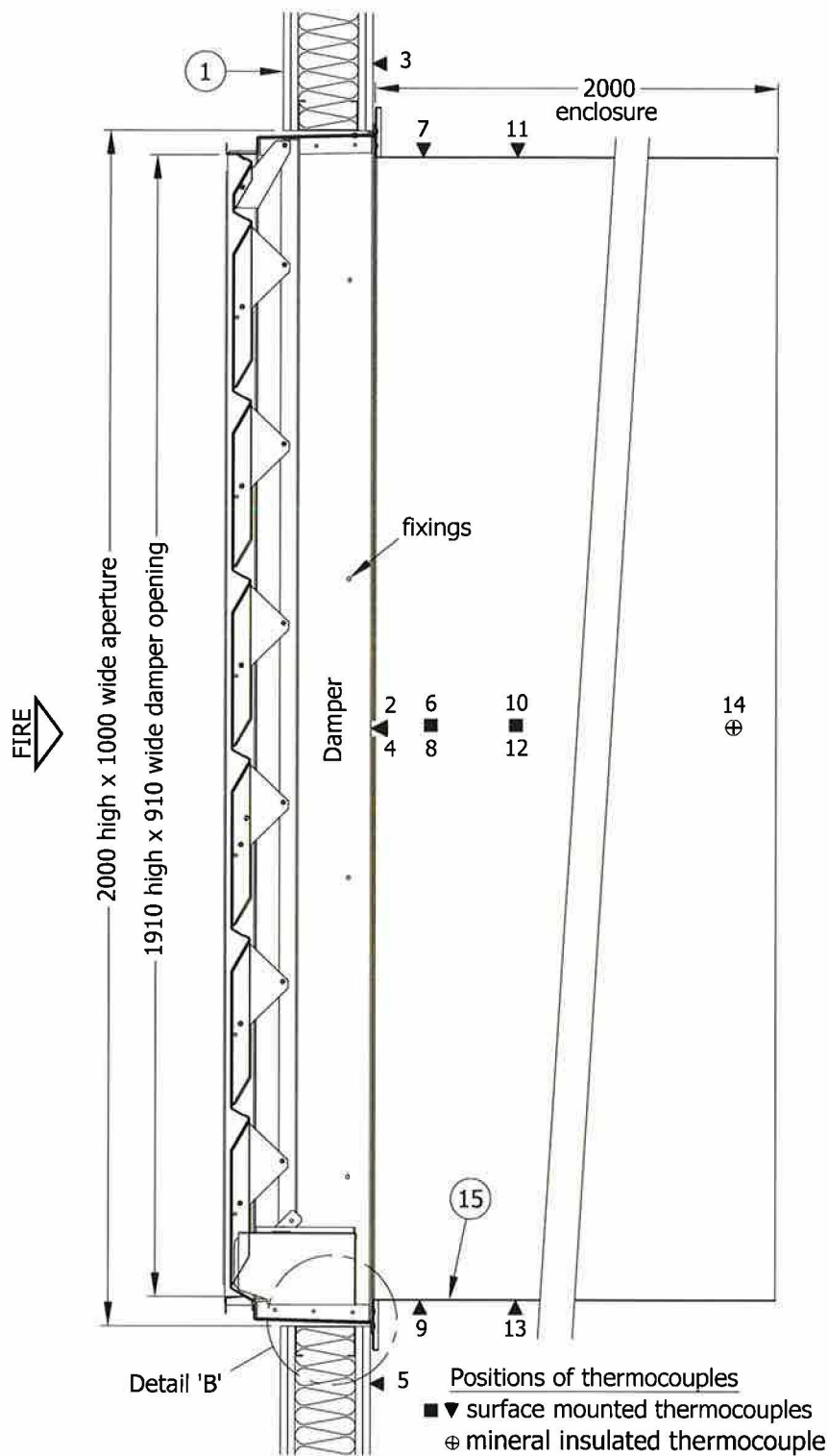
Do not scale. All dimensions are in mm

Figure 2 – Details of Partition Framework



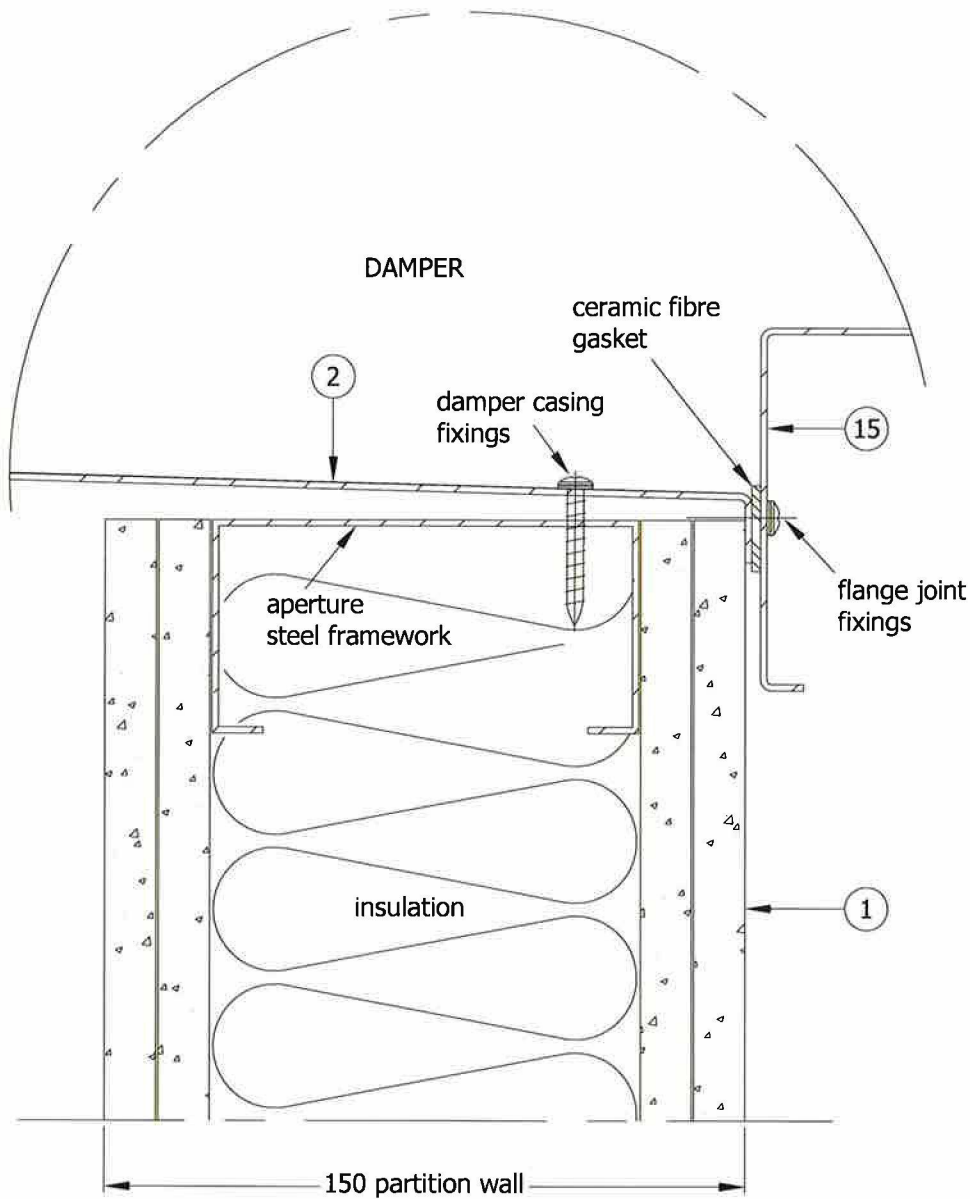
Do not scale. All dimensions are in mm

Figure 3 – Vertical Section A-A Through Test Specimen



Do not scale. All dimensions are in mm

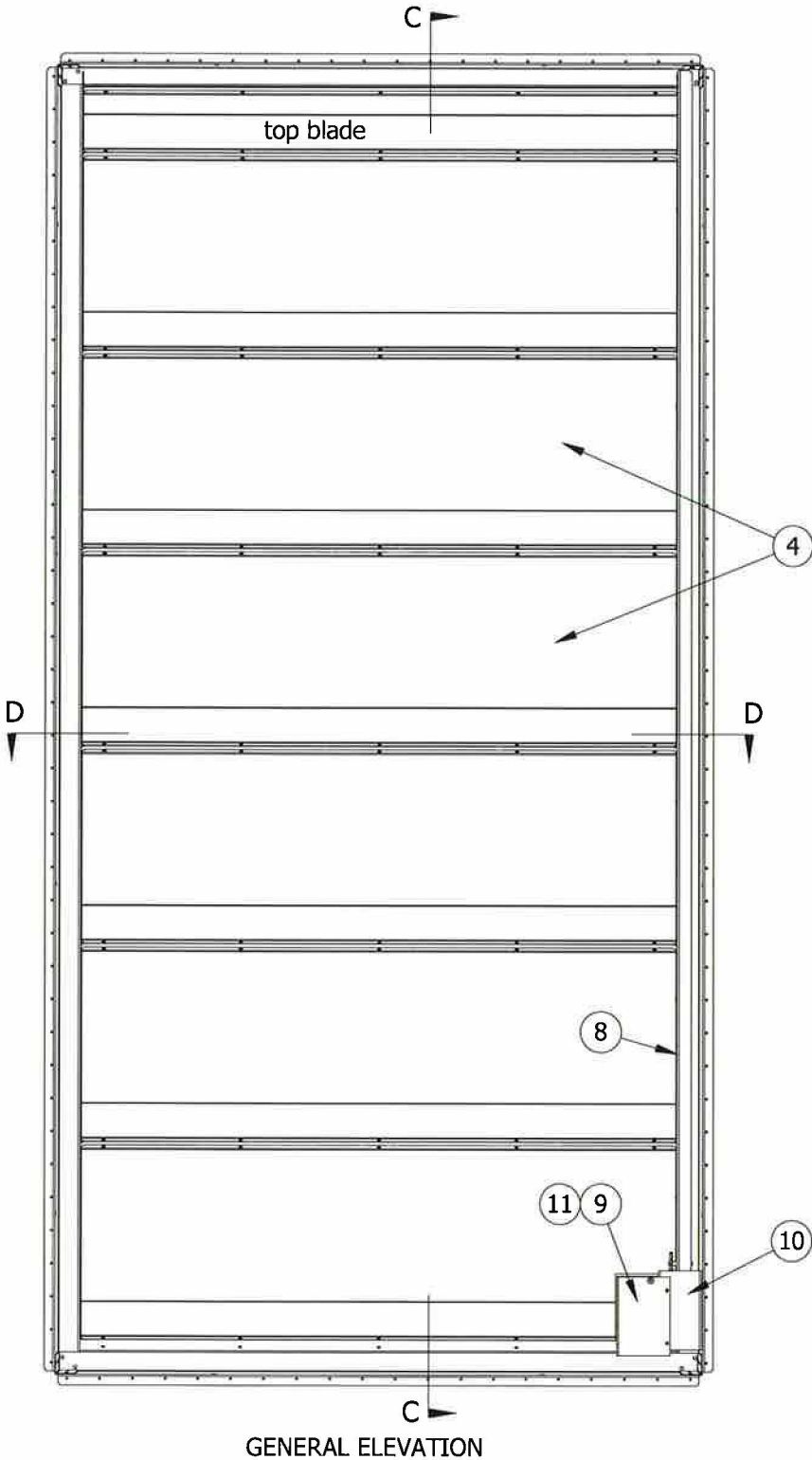
Figure 4 – Detail 'B'



Typical fixing details all around aperture

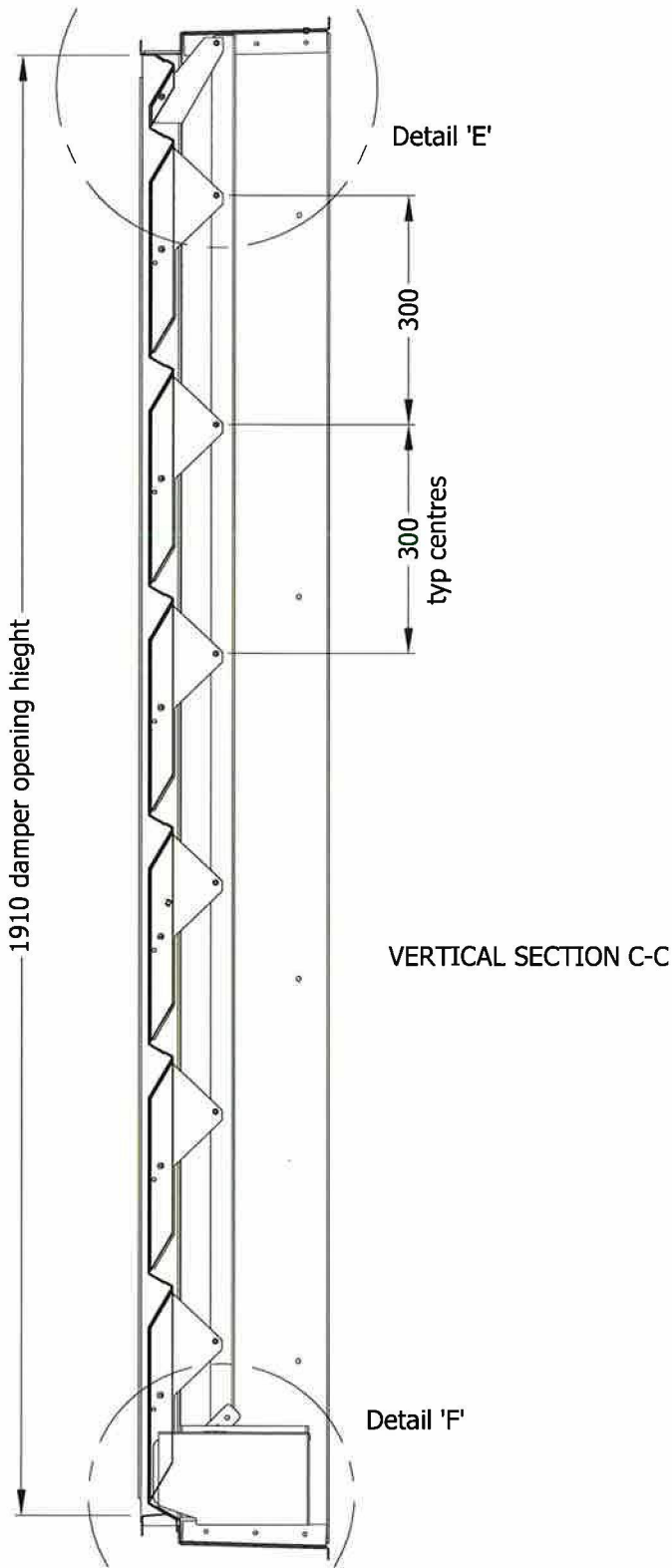
Do not scale. All dimensions are in mm

Figure 5 – Details of Damper



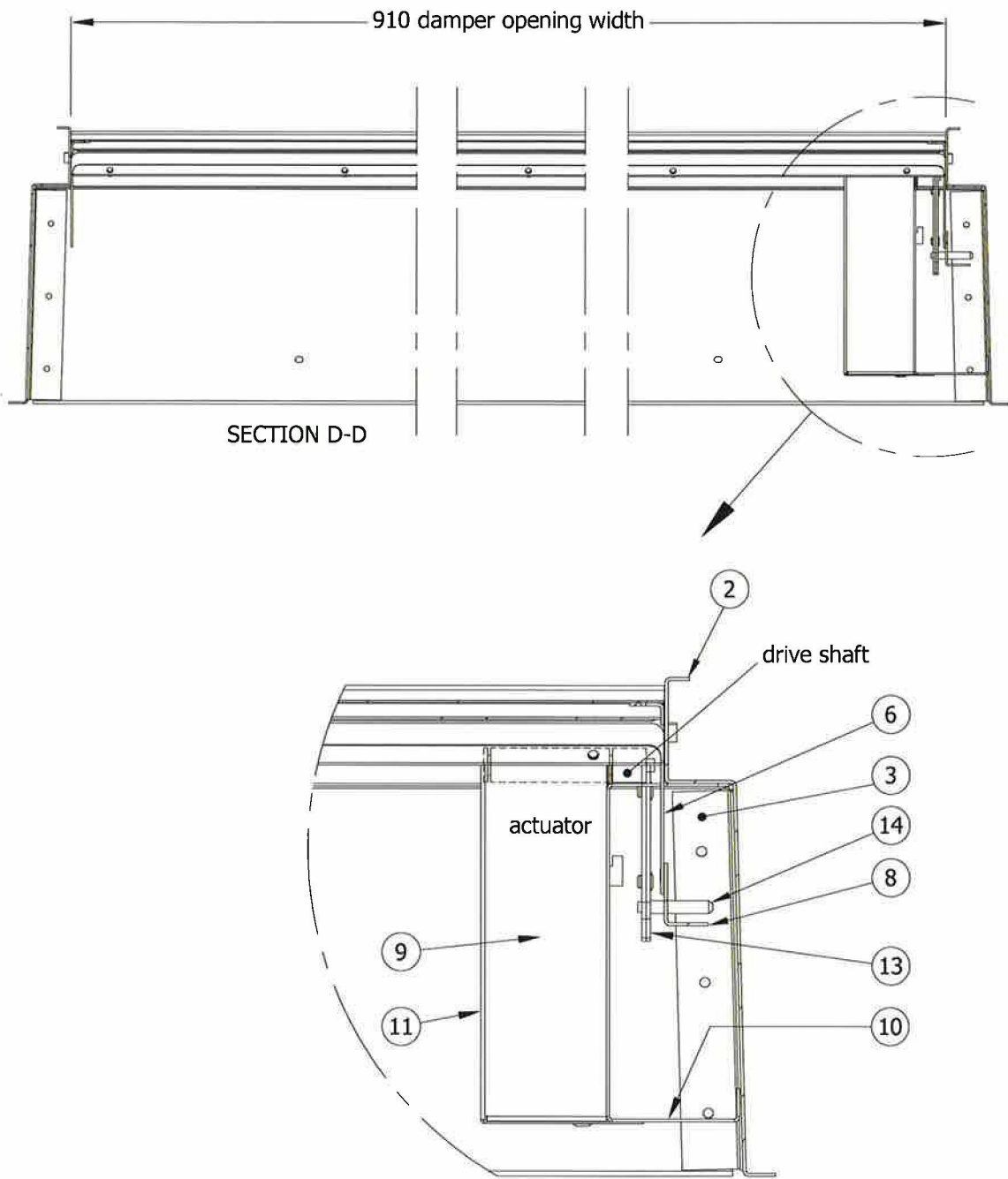
Do not scale. All dimensions are in mm

Figure 6 – Details of Damper



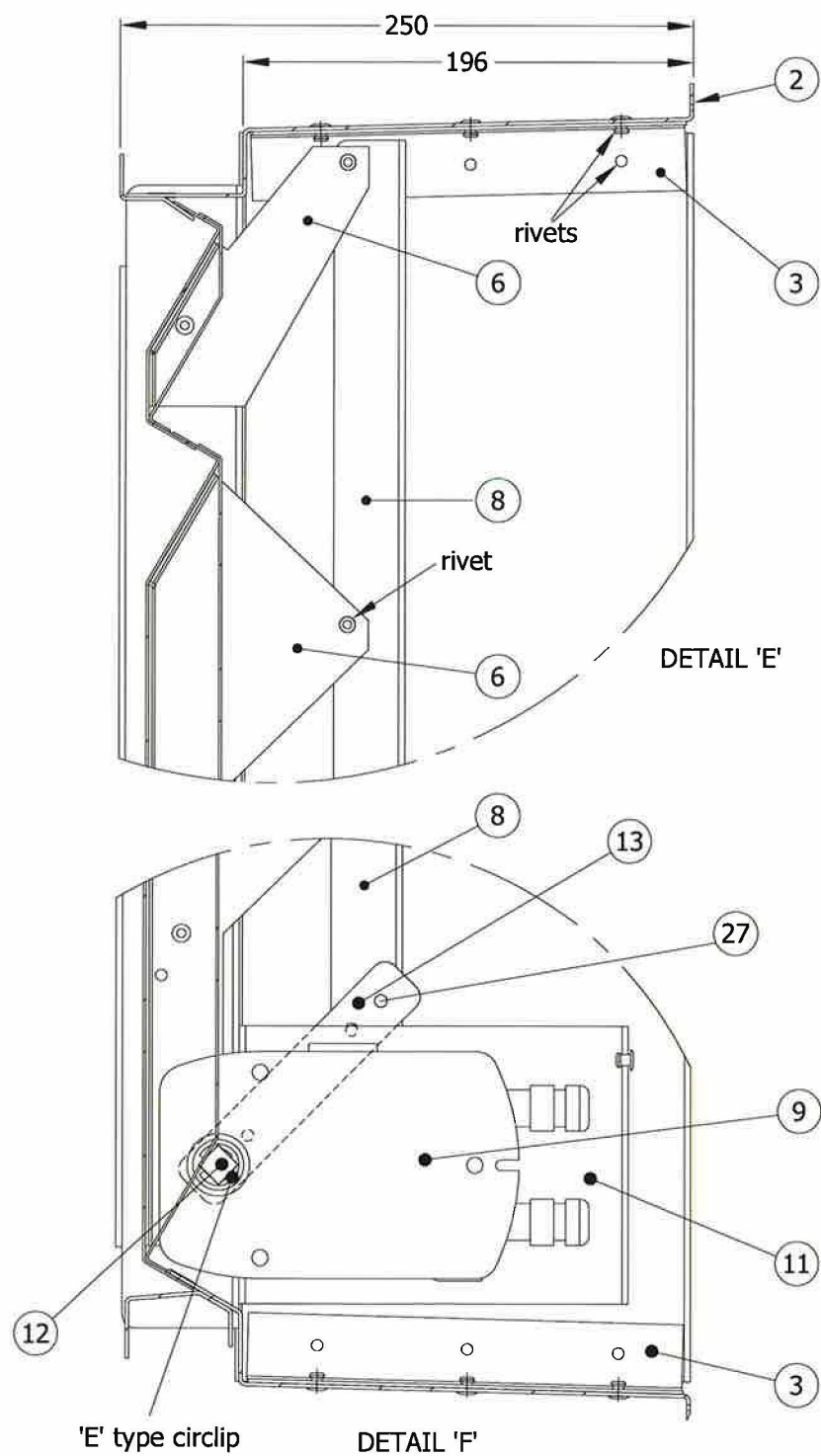
Do not scale. All dimensions are in mm

Figure 7 – Details of Damper



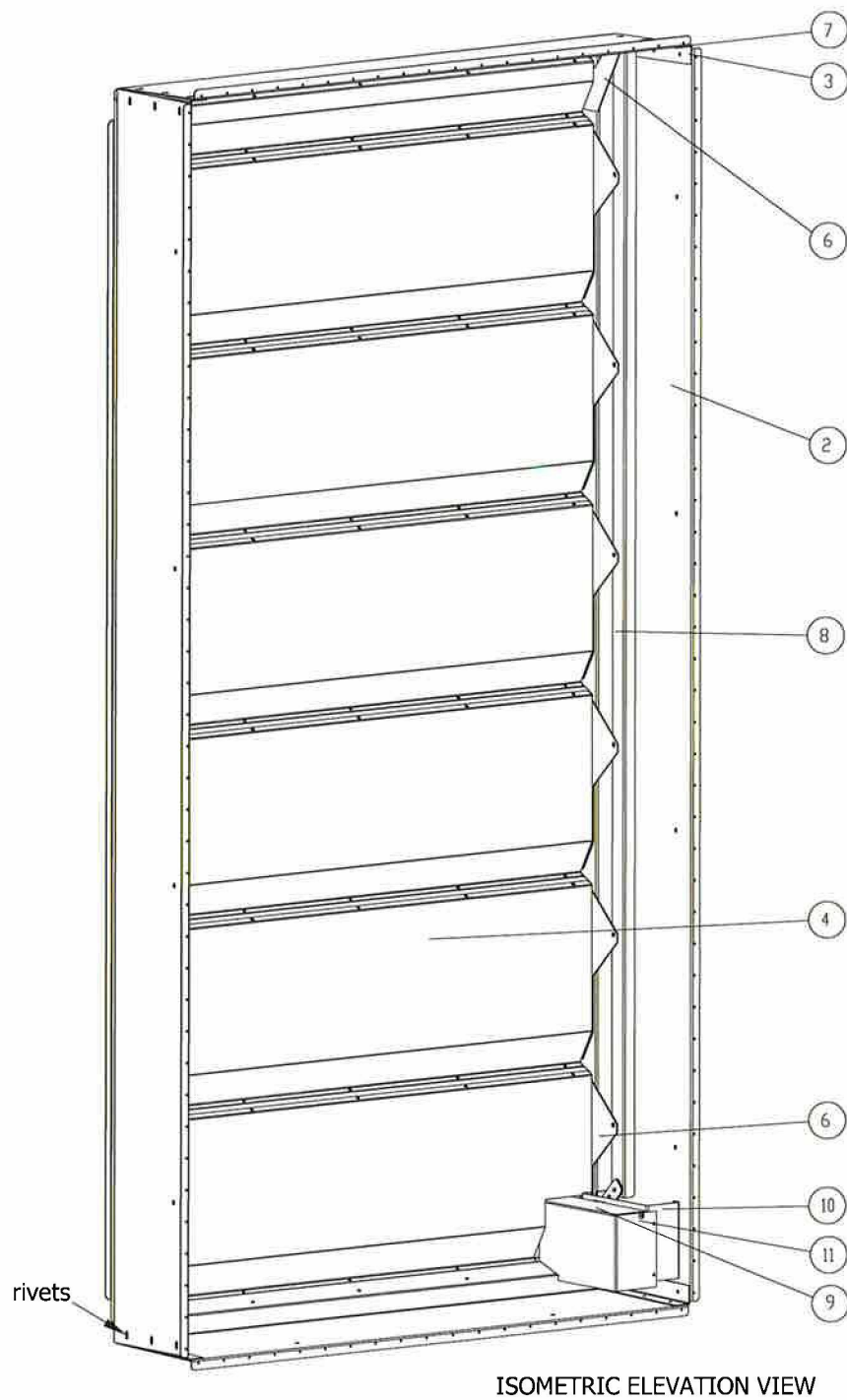
Do not scale. All dimensions are in mm

Figure 8 – Details of Damper



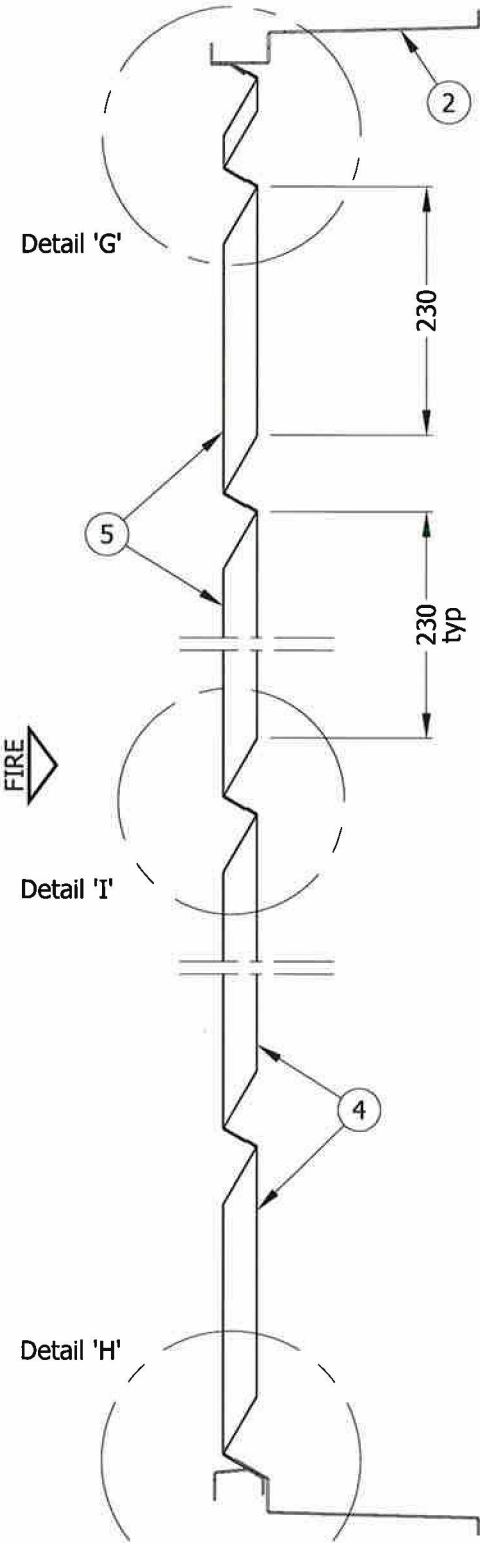
Do not scale. All dimensions are in mm

Figure 9 – Details of Damper



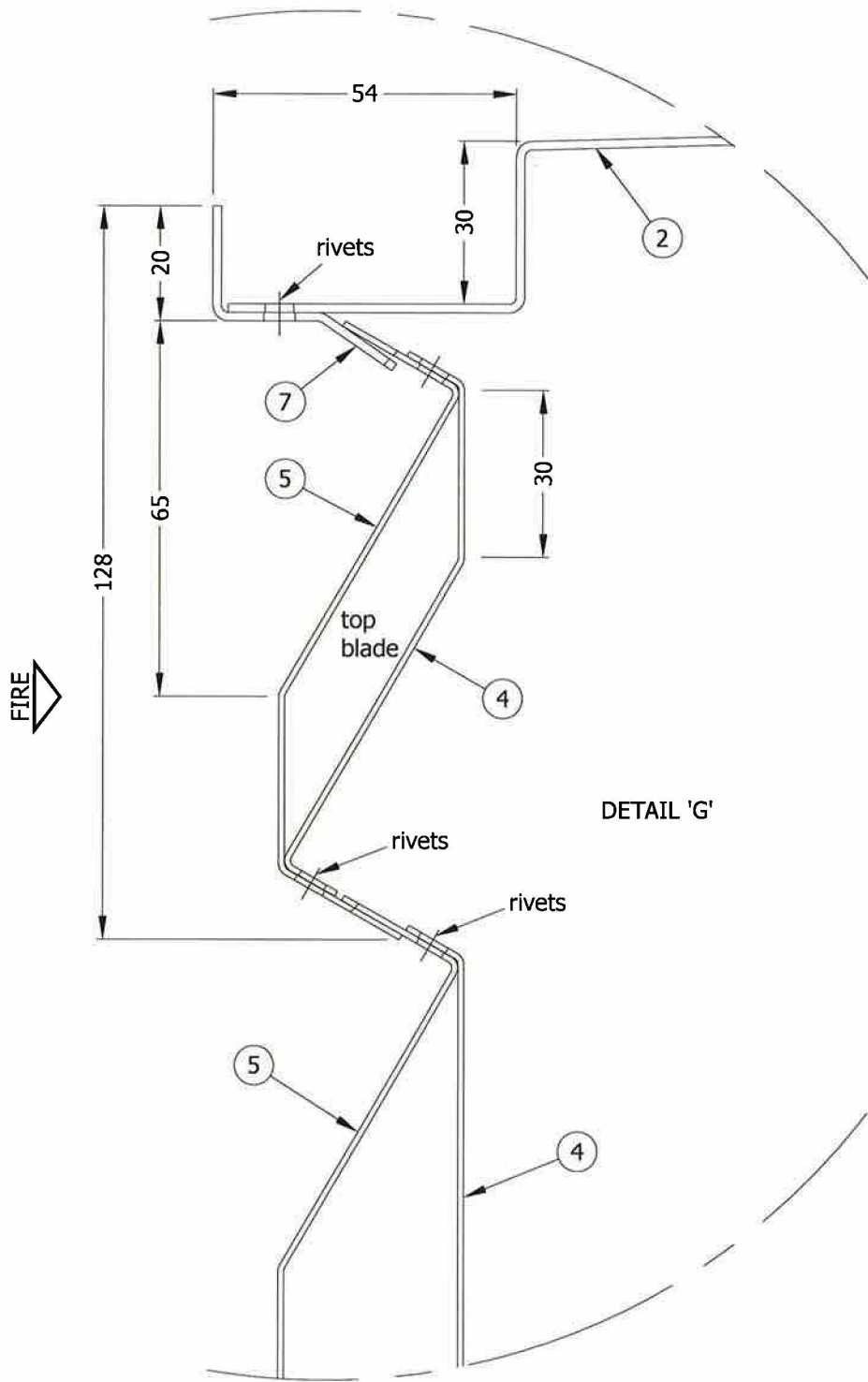
Do not scale. All dimensions are in mm

Figure 10 – Typical Blade Details



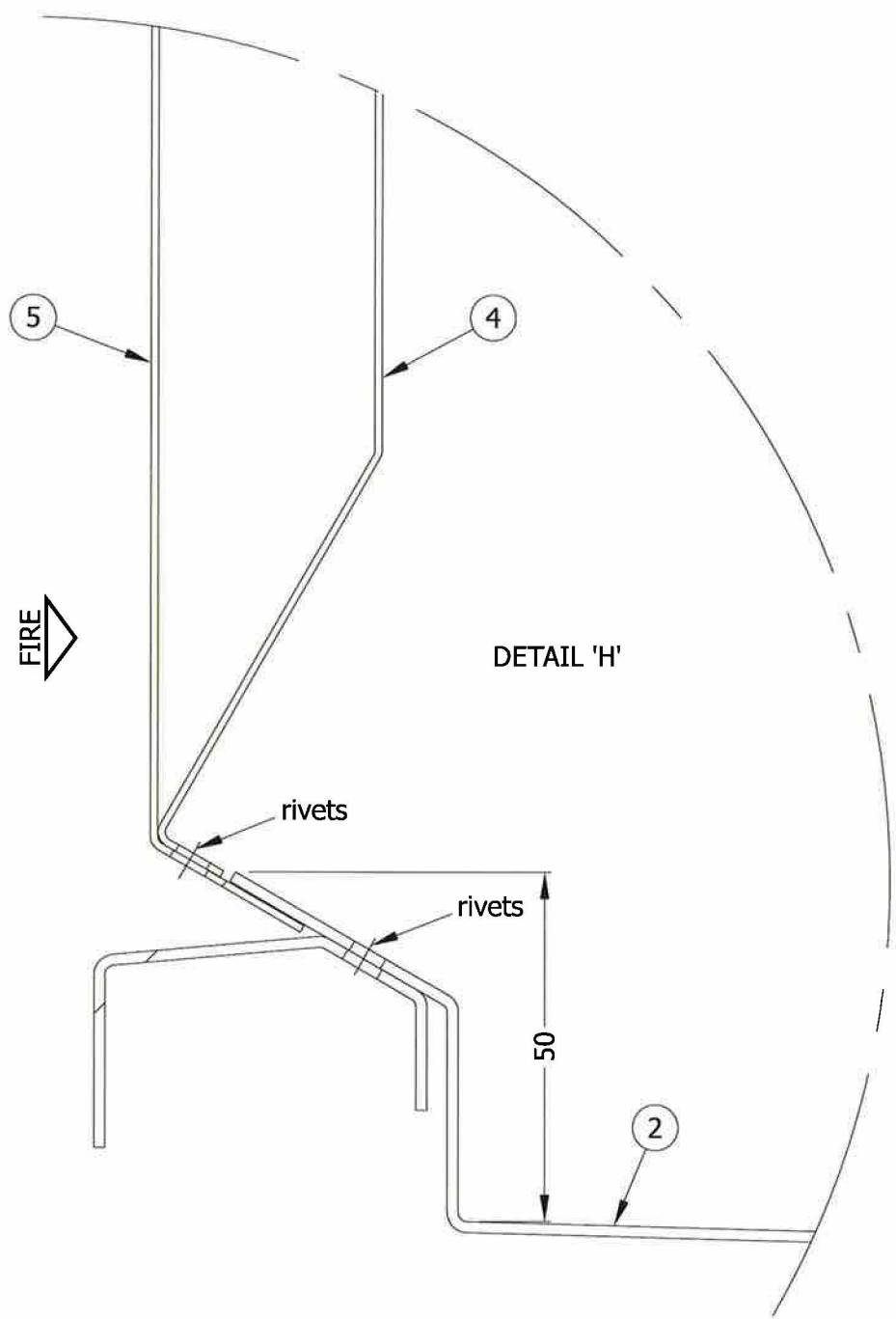
Do not scale. All dimensions are in mm

Figure 11 – Blade Details



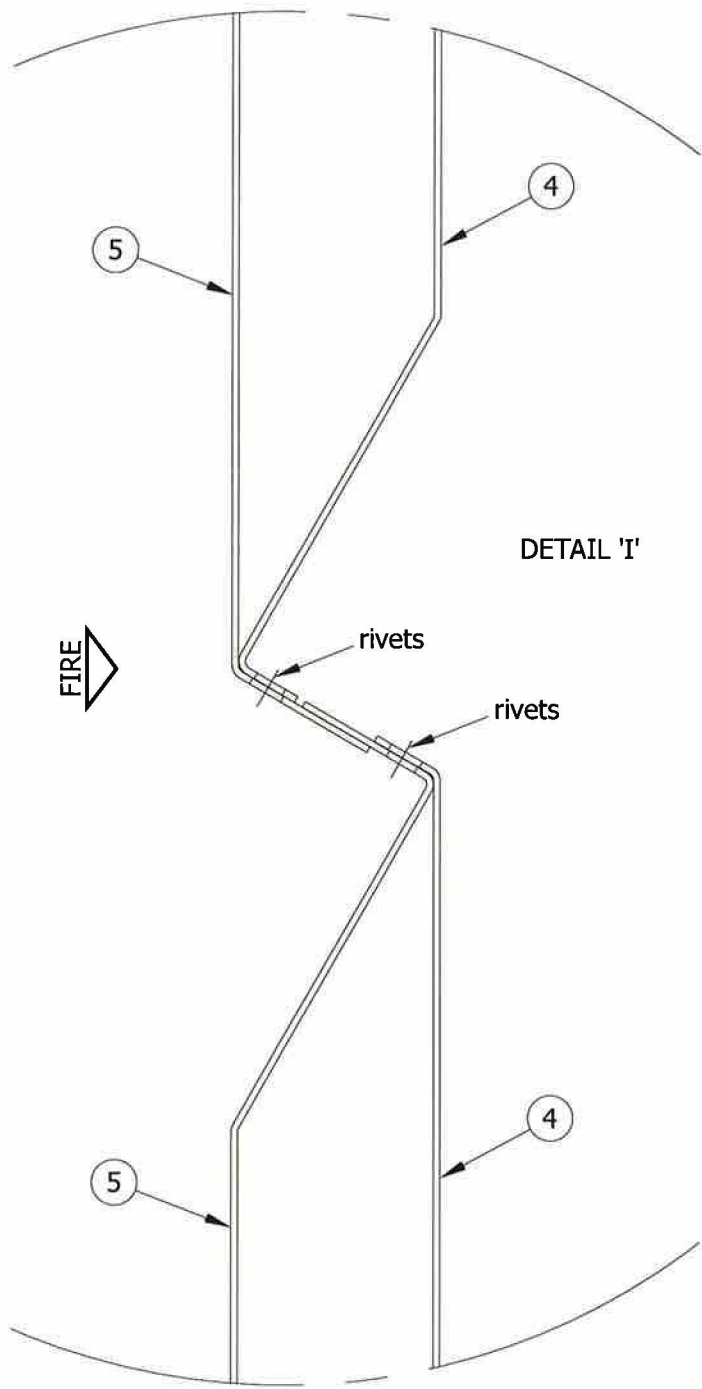
Do not scale. All dimensions are in mm

Figure 12 – Blade Details



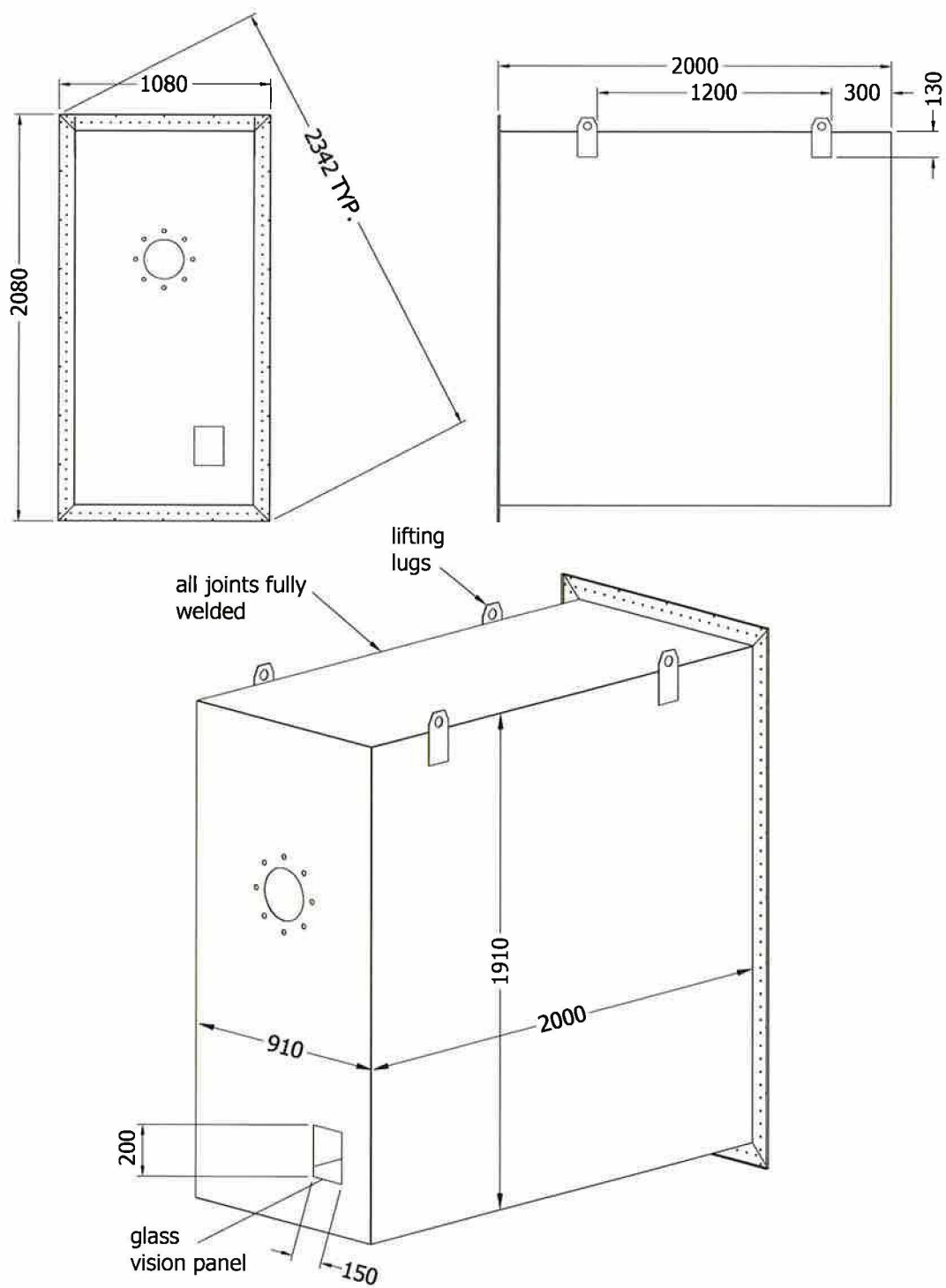
Do not scale. All dimensions are in mm

Figure 13 – Blade Details



Do not scale. All dimensions are in mm

Figure 14 – Details of Enclosure (item 15)



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 14)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item	Description
1. Partition (supplied by Exova Warringtonfire)	
Details of Framework	
Reference	
i. vertical studs	: 92 mm standard 'C' studs
ii. top and bottom channel	: 94 mm standard 'U' channels
Material	: Galvanised mild steel
Details of Plasterboard Panels	
Manufacturer	: British Gypsum
Reference	: Fireline
No. off Layers	: 2 no. layers, each layer 12.5 mm thick, at both faces of framework.
Fixing method	: Fixed to all framework members with drywall screws at 300 mm centres. All board joints were staggered with respect to the adjacent board layer and the boards on the opposite face of the partition.
Panel Joint Finish	: Standard paper tape, finished with gypsum based joint filler compound.
Details of Insulation	
Manufacturer	: Rockwool
Reference	: RW3
Material	: Rock fibre
Thickness	: 100 mm
2. Damper Casing	
Material	: Galvanised mild steel
Thickness	: 1.5 mm
Corner joints	: Rivet fixed to corner brackets (item 3) using 6 no. steel pop rivets, 4.8 mm diameter.
Fixing method to partition surround	: Fixed through pre-drilled holes at 500 mm centres along each damper face using 30 mm long x 4 mm diameter self tapping steel screws with steel washers.
3. Corner Bracket	
Material	: Galvanised mild steel
Thickness	: 1.5 mm
Overall section size	: 30 mm x 30 mm
4. Blade Front Skin	
Material	: Galvanised mild steel
Thickness	: 1 mm
Overall length	: 909 mm approx.
5. Blade Rear Skin	
Material	: Galvanised mild steel
Thickness	: 1 mm
Overall length	: 909 mm approx.
Fixing method	: Fixed to blade front skin (item 4) using 2 no. rows of steel pop rivets, each row of 5 no. pop rivets 4.8 mm

<u>Item</u>	<u>Description</u>
diameter at 210 mm centres along length of blade.	
6. Blade Hinge	
Material	: Galvanised mild steel
Thickness	: 1.5 mm
Quantity	: 2 no. hinges per blade (1 no. at each end of blade)
Fixing method	: Fixed to blade and to link bar (item 8) using 4.8 mm diameter steel pop rivets.
7. Top Blade Stop	
Material	: Galvanised mild steel
Thickness	: 1.5 mm
Fixing method	: Fixed to damper casing with 5 no. steel pop rivets, 4.8 mm diameter, at 210 mm centres.
8. Link Bar	
Material	: Galvanised mild steel formed angle
Thickness	: 1.5 mm
Overall section size	: 31 mm x 21 mm
Quantity	: 1 no. link bar
9. Actuator	
Manufacturer	: Belimo
Reference	: BLE24
Quantity	: 1 no. actuator
10. Actuator Mounting Bracket	
Material	: Galvanised mild steel
Thickness	: 1.5 mm
Fixing method	: Fixed to damper casing with steel pop rivets
11. Actuator Cover Plate	
Material	: Galvanised mild steel
Thickness	: 1 mm
Fixing method	: Fixed to mounting bracket with steel pop rivets
12. Drive Shaft	
Material	: Mild steel BZP
13. Actuator Lever Arm	
Material	: Galvanised mild steel plate
Thickness	: 2 no. plates, each 2 mm thick
Fixing method	
i. to drive shaft	: 'E' Type circlip
ii. to link bar	: Drive pin (item 14)
14. Drive Pin	
Material	: Mild steel BZP
Overall size	: 6.3 mm diameter
15. Enclosure	
Material	: Galvanised mild steel
Thickness	: 1.5 mm casing
Fixing method	: Flange jointed to the damper casing using 4 mm diameter self tapping steel screws through the mating flanges at 50 mm centres along each side.

Instrumentation

General	The instrumentation was provided in accordance with the Standard BS EN 1366 - Fire Resistance Tests for Service Installations - Part 2 Fire Dampers.
Furnace	Plate thermometers were provided in the furnace chamber as specified by the Standard, to measure the furnace temperature.
Flow Measurement	Pressure sensing devices provided within the furnace chamber, the duct plenum and the measuring station were utilised to monitor furnace pressure, static pressure in the duct plenum and differential pressure across the orifice plates within the measuring station during the test. The measurements recorded were used to measure the impermeability of the damper system whilst maintaining a constant pressure differential across the closed fire damper of 300 Pa.
Temperature Measurement	Thermocouples were provided to monitor the unexposed surface of the test construction and the specimen. The output of all instrumentation was recorded at one minute intervals. Figures 1 and 2 show the positions which were as follows:
Thermocouples 10 to 13	At four positions on the unexposed surface of the plenum duct, one approximately at the centre of each face of the plenum duct nominally 325 mm away from the surface of the test construction (referenced T ₂).
Thermocouples 6 to 9	At four positions on the unexposed surface of the plenum duct one approximately at the centre of each face and nominally 25mm away from its interface with the damper. (Referenced T ₁).
Thermocouples 2 to 5	At four positions on the unexposed face of the flexible wall construction nominally 25 mm away from the damper (Referenced T _s).
Thermocouple 14	At one position at the exit of the damper plenum to measure the gas temperatures.
Integrity measurement	Gap gauges and cotton pads were available to evaluate the integrity of the test construction.
Furnace pressure	The furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1366-2: 1999. Clause 5. The calculated pressure differential relative to the laboratory atmosphere at mid-height of the damper was 15 (±3) 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 19°C at the start of the test with a maximum variation of 8°C during the test.
00	00	The test commences. The damper was in the closed position at the start of the test.
02	40	Smoke / steam release is visible across the top of the wall assembly.
03	36	Smoke release is visible across the top face of the plenum.
05	00	Viewed from the exposed side, the paper face of the plasterboard starts to burn away and the edges of the damper blades start to glow a dull red.
08	55	The wall assembly starts to bow in along its horizontal axis at mid-height.
09	35	The top two corners of the plenum start to discolour blue / black.
12	52	Viewed through the plenum window the edges of the damper blades glow orange.
20	00	The exposed face of the damper glows orange.
26	02	Viewed from the exposed side a small kinks are visible at mid-span along the bottom edge of each blade.
32	50	The joints in the exposed face of the plasterboard start to open up.
44	57	Slight smoke release is visible along the plenum flange, along the left hand vertical edge.
60	49	The damper assembly continues to satisfy the integrity criteria of the test.
66	27	Viewed from the exposed side, both layers of plasterboard are still attached. The exposed damper glows orange.
71	01	The corner of the plenum / damper flange bow away from the wall, most noticeable in the top left hand corner, no gaps visible.
74	09	Viewed through the plenum window the top blades appear to be bowing into the plenum, down their central vertical axis at mid-width.
74	20	The leakage rate through the fire damper exceeds 360m³/h.m².
78	08	Viewed from the exposed side, the top small appears to have bowed differentially from the blades below.
92	00	The test is discontinued.

Test Photographs

The unexposed face of the assembly prior to testing



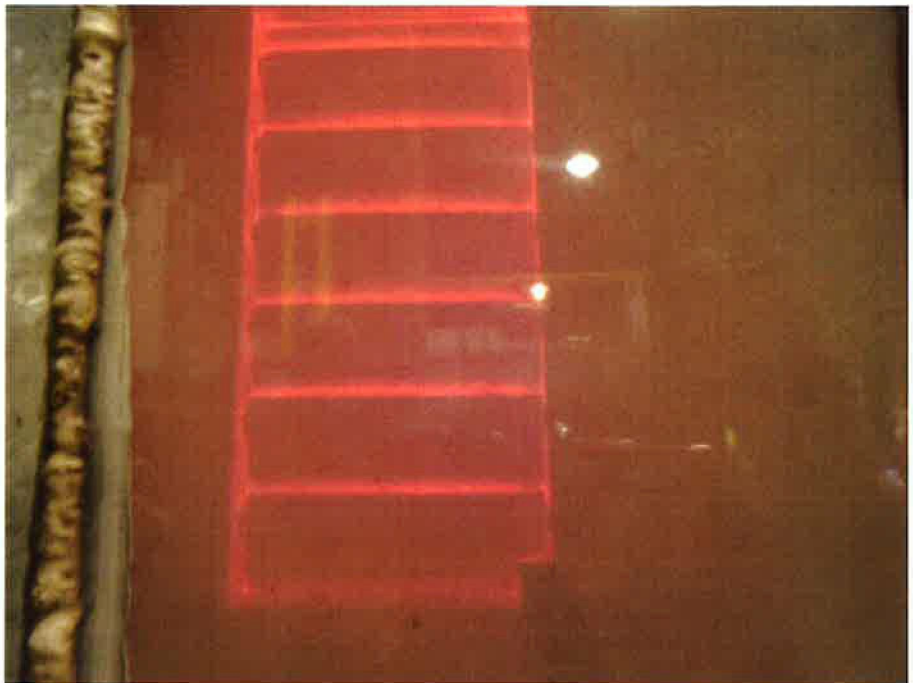
The exposed face of the assembly after a test duration of 20 minutes



The exposed face of the assembly after a test duration of 60 minutes



The damper viewed through the plenum window after a test duration of approximately 60 minutes



The exposed face
of the assembly
after a test
duration of 90
minutes



Temperature and Leakage 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
3	502	493
6	603	604
9	663	671
12	706	705
15	739	732
18	766	762
21	789	789
24	809	807
27	826	826
30	842	842
33	856	858
36	869	865
39	881	884
42	892	890
45	902	901
48	912	916
51	921	921
54	930	927
57	938	938
60	945	947
63	953	954
66	960	959
69	966	965
72	973	973
75	979	977
78	985	979
81	990	987
84	996	997
87	1001	999
90	1006	1019
92	1009	1024

Individual and mean temperatures recorded on the surface of the plenum duct by the thermocouples referenced T₂

Time Mins	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	Mean Temp. Deg. C
0	22	22	22	21	21
3	68	155	73	49	85
6	115	266	115	101	149
9	185	326	180	168	214
12	235	360	226	235	263
15	270	382	259	287	299
18	296	394	283	326	324
21	313	402	304	354	343
24	328	410	323	369	357
27	345	424	348	383	375
30	360	435	373	397	391
33	373	442	386	408	402
36	380	445	386	415	406
39	386	447	385	418	409
42	392	451	388	419	412
45	397	453	392	421	415
48	404	460	400	424	422
51	409	464	406	425	426
54	413	471	413	426	430
57	421	479	423	430	438
60	427	488	431	436	445
63	431	494	432	439	449
66	434	501	438	441	453
69	433	504	438	440	453
72	441	514	445	444	461
75	456	537	462	458	478
78	470	555	474	471	492
81	481	570	487	478	503
84	498	588	503	489	519
87	481	571	489	480	505
90	495	589	501	487	517
92	504	591	509	495	525

Individual temperatures recorded on the surface of the plenum duct 25 mm away from the damper / sleeve flange (position T₁)

Time Mins	T/C Number 6 Deg. C	T/C Number 7 Deg. C	T/C Number 8 Deg. C	T/C Number 9 Deg. C
0	20	20	21	21
3	72	251	72	49
6	126	370	120	89
9	200	424	200	132
12	253	449	254	189
15	289	471	292	236
18	316	484	319	272
21	339	495	344	296
24	357	504	367	321
27	376	520	388	348
30	393	535	405	375
33	411	544	424	397
36	425	550	434	417
39	435	558	440	426
42	444	564	446	435
45	450	569	451	440
48	459	577	461	447
51	466	583	469	451
54	473	594	479	459
57	482	605	491	466
60	493	615	504	474
63	500	624	512	481
66	509	634	523	487
69	516	640	528	492
72	525	654	539	499
75	540	680	557	509
78	553	698	568	520
81	564	714	580	529
84	580	732	595	538
87	571	709	583	535
90	582	733	595	547
92	590	732	599	551

Individual temperatures recorded on the dry wall construction nominally 25 mm away from damper (Position Ts).

Time Mins	T/C Number 2 Deg. C	T/C Number 3 Deg. C	T/C Number 4 Deg. C	T/C Number 5 Deg. C
0	18	19	19	19
3	19	22	19	19
6	20	33	21	19
9	24	47	26	21
12	32	60	32	23
15	41	77	41	28
18	58	92	53	77
21	65	101	64	87
24	74	108	72	88
27	79	118	78	87
30	85	126	82	86
33	90	128	86	85
36	93	132	91	85
39	99	135	95	86
42	104	139	101	86
45	108	143	106	88
48	112	147	111	90
51	113	153	116	93
54	116	161	122	98
57	120	169	125	104
60	123	174	129	110
63	125	187	131	115
66	124	193	136	117
69	125	196	141	118
72	127	200	149	120
75	132	215	159	122
78	139	233	169	128
81	147	241	179	130
84	156	251	188	134
87	162	271	196	139
90	167	282	203	143
92	173	292	211	148

Calculated volume flow (Corrected to 20° C)

Time	Volume
Minutes	Flow Rate m3/h
0	-1.372
3	247.212
6	216.397
9	201.712
12	185.694
15	176.111
18	161.219
21	154.255
24	158.567
27	162.959
30	170.22
33	168.78
36	173.258
39	170.898
42	176.199
45	178.256
48	186.13
51	186.127
54	210.629
57	221.482
60	230.994
63	235.88
66	254.979
69	284.143
72	306.046
75	365.124
78	420.515
81	458.018
84	546.08
90	534.277

At 84 minutes the pressure was reduced as the measuring temperature had exceeded 500 °C
the pressure was reinstated to give an indication of the volume flow at 90 minutes



Connecting Plenum/Duct Pressure Differential During Fire Test

Time	Plenum Pressure
Minutes	Pa
0	51.82
3	299.89
6	299.16
9	316.46
12	301.57
15	302.6
18	315.57
21	305.36
24	295.97
27	296.7
30	297.73
33	298.83
36	298.25
39	302.62
42	302.65
45	297.15
48	280.29
51	270.91
54	303.83
57	304.15
60	300.61
63	288.16
66	295.75
69	313.44
72	300.2
75	290.22
78	305.14
81	296.17
84	325.02
90	289.12

At 84 minutes the pressure was reduced as the measuring temperature had exceeded 500 °C
the pressure was reinstated to give an indication of the volume flow at 90 minutes

Measuring Station Pressure Differential During Fire Test

Time	Measuring Station Differential Pressure
Minutes	Pa
0	-6.08
3	220.51
6	184.77
9	174.17
12	153.22
15	141.13
18	120.44
21	111.17
24	118.32
27	127.33
30	140.13
33	139.84
36	147.85
39	145
42	154.6
45	158.9
48	175.07
51	176.49
54	229.06
57	256.88
60	283.58
63	296.67
66	352.83
69	445.08
72	528.06
75	778.64
78	1062.53
81	1290.8
84	1914.84
90	1831.76

At 84 minutes the pressure was reduced as the measuring temperature had exceeded 500 °C
the pressure was reinstated to give an indication of the volume flow at 90 minutes

Measuring station gas temperature during fire test

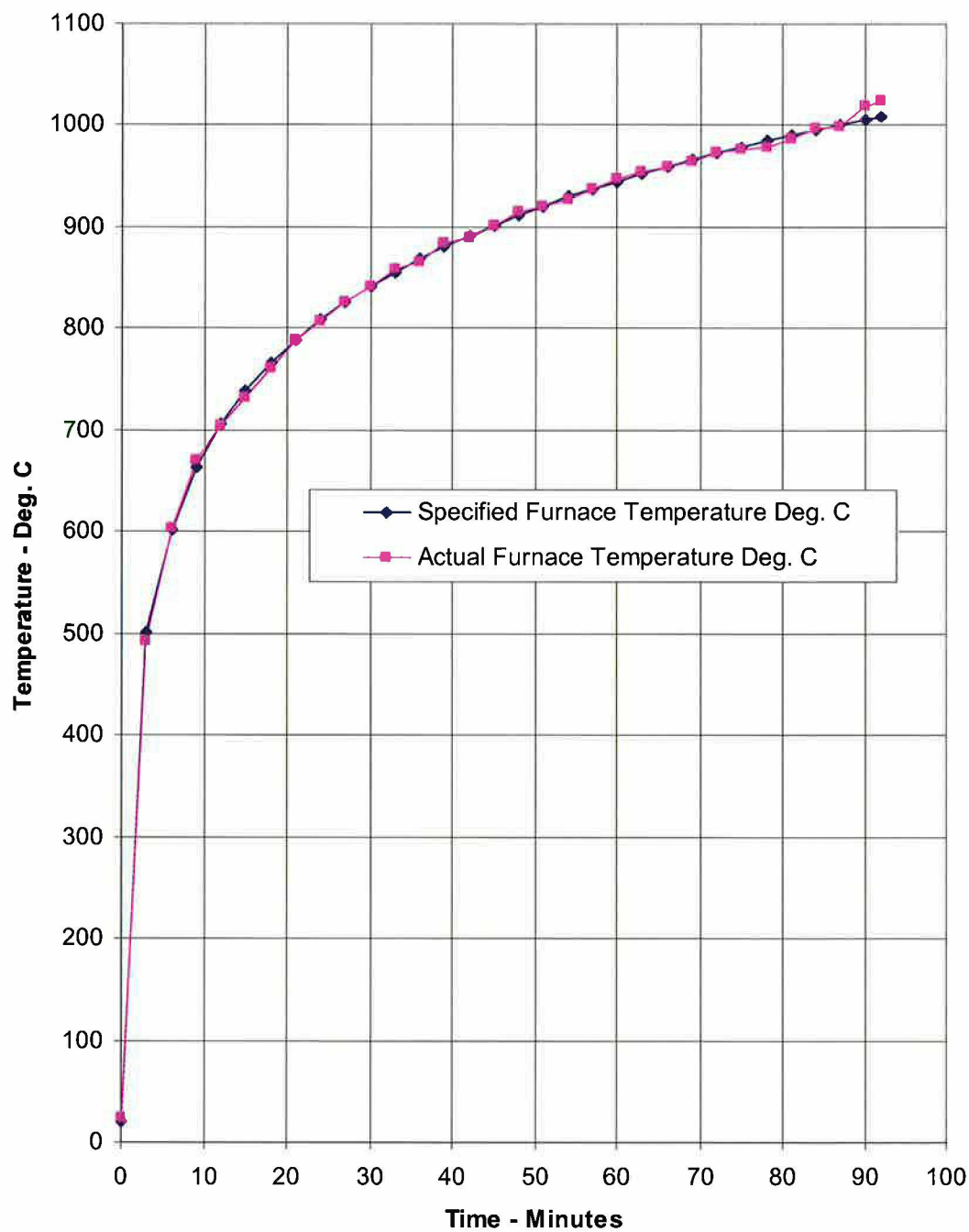
Time Minutes	Measuring Station Temperature Deg C
0	15.17
3	150.67
6	188.49
9	226.98
12	243.99
15	254.88
18	261.28
21	263.97
24	269.25
27	281.12
30	287.92
33	296.27
36	299.35
39	303.48
42	306.59
45	309.6
48	317.75
51	322.79
54	335.38
57	346.03
60	356.9
63	359.67
66	373.46
69	386.5
72	403.53
75	431.27
78	453.16
81	471.21
84	502.74
90	502.85

At 84 minutes the pressure was reduced as the measuring temperature had exceeded 500 °C
the pressure was reinstated to give an indication of the volume flow at 90 minutes

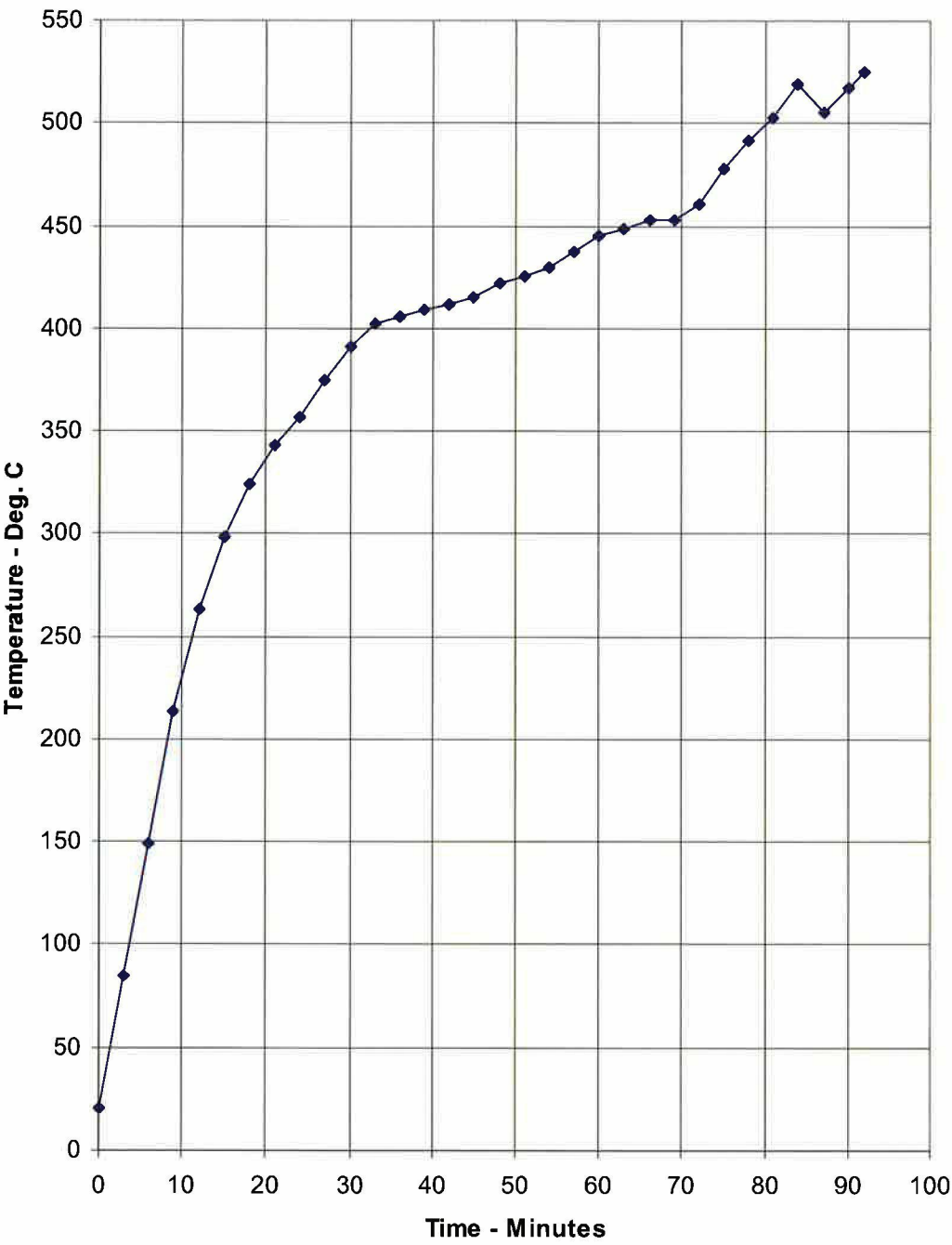
Plenum/Connecting Duct Exit Gas Temperature During Fire Test

Time Mins	T/C Number 14 Deg. C
0	22
3	293
6	392
9	438
12	470
15	484
18	503
21	514
24	525
27	536
30	545
33	554
36	556
39	562
42	564
45	565
48	573
51	575
54	583
57	592
60	598
63	602
66	609
69	616
72	627
75	648
78	662
81	678
84	702
87	675
90	707
92	686

Graph showing mean furnace temperature, together with the temperature/time relationship specified in the Standard



Graph showing mean temperature recorded on the surface of the duct by the thermocouples referenced T₂



Performance Criteria and Test Results

Integrity (Leakage)	Integrity (Leakage) - failure in accordance with the performance criterion of integrity is deemed to occur when leakage through the fire damper exceeds 360m³/h.m² measured after the first 5 minutes of the test duration. The integrity around the perimeter of the fire damper is also judged in accordance with the criteria given in BS EN 1363-1. The test specified that an under pressure of 300 ± 15 Pa be utilised. The specimen satisfied this criterion for duration of 74 minutes.
Integrity	It is required that the evaluation of the integrity of the junction between the supporting construction and connecting duct/specimen is determined, without either causing ignition of a cotton pad when applied, or permitting the penetration of a gap gauge as specified in BS EN 1363-1: 1999, or resulting in sustained flaming on the unexposed surface.
Sustained flaming	92 minutes*
Gap gauge	92 minutes*
Cotton pad	92 minutes*
	*The test duration. The test was discontinued after a period of 92 minutes.
Insulation	The mean temperature rise of the unexposed surface shall not be greater than 140°C (determined by the mean value of the thermocouples referenced T₂) and the maximum temperature rise shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1363-1: 1999. A maximum temperature rise greater than 180°C was recorded after a test duration of 3 minutes
Smoke leakage	Smoke leakage - failure in accordance with the performance criterion of leakage is deemed to occur when leakage through the fire damper exceeds 200m³/h.m² measured after the first 5 minutes of the test duration. The test specified that an under pressure of 300 ± 15 Pa be utilised. The specimen did not satisfy this criterion after the first five minutes of the test.

Ongoing Implications

Limitations 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 To determine the fire resistance performance of an insulated single bladed fire damper mounted within a standard flexible wall construction, when tested generally in accordance with BS EN 1366-2: 1999.The performance of the specimen was evaluated against the requirements of the Standard and achieved the following results:

PERFORMANCE CRITERIA	TEST RESULTS
Integrity (Leakage)	74 minutes
Smoke Leakage	0 minutes
Integrity (Cotton Pad)	*92 minutes
Integrity (Gap Gauge)	*92 minutes
Integrity (Sustained Flaming)	*92 minutes
Insulation	3 minutes
Leakage During Ambient Temperature Test (Clause 10.3)	256.8 m ³ /hr

*The test duration. The test was discontinued after a period of 92 minutes.

Actuator for
smoke control dampers 90° ↺.

- Torque 15 Nm
- Nominal voltage AC/DC 24 V
- Control: Open/close
- Damper rotation: 12 mm form-fit



Technical Data

Electrical data	Nominal voltage	AC 24 V, 50/60 Hz / DC 24 V
	Nominal voltage range	AC 19.2 ... 28.8 V / DC 21.6 ... 28.8 V
	Switching thresholds	min. ON voltage AC 19.2 V / DC 21.6 V
		max. OFF voltage AC 6.5 V / DC 6.5 V
	Power consumption	motoring 7.5 W @ nominal torque
		holding < 0.5 W
		for wire sizing 9 VA / I _{max} . 2.7 A @ 5 ms
	Auxiliary switch	2 x SPDT
	Contact rating (contacts gold plate on silver)	1 mA ... 3 A, DC 5 V ... AC 250 V □
	Switching points	3° ↺ / 87° ↺ (referred to 0 ... 90° ↺)
Functional data		Tolerance ±2° ↺
	Connecting cable	motor 1 m, 3 x 0.75 mm ² (halogen-free)
		auxiliary switch 1 m, 6 x 0.75 mm ² (halogen-free)
	Torque (nominal torque)	Min. 15 Nm @ nominal voltage
	Blocking torque	dynamic Min. 15 Nm
		steady-state Min. 20 Nm
	Direction of rotation	Selected by mounting L/R
	Angle of rotation	Max. 105° ↺
		(incl. mechanical overrun on each side)
	Running time	< 30 s for 90° ↺
Safety	Sound power level	Max. 62 dB (A)
	Damper rotation	Form-fit 12 mm
	Position indication	Mechanical with pointer
	Service life	At least 10'000 cycles
	Protection class	III Safety extra-low voltage
	Degree of protection	IP54 in all mounting positions
	EMC	CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC
	Low voltage directive	CE according to 2006/95/EC
	Mode of operation	Type 1.B (according to EN60730-1)
	Rated impulse voltage	0.8 kV (according to EN60730-1)
Dimensions / weight	Control pollution degree	3 (according to EN60730-1)
	Ambient temperature range	normal duty -30 ... +50°C
		safety duty See «Safety function» on page 2
	Non-operating temperature	-40 ... +80°C
	Ambient humidity range	95% r.H., non-condensating (EN 60730-1)
	Maintenance	Maintenance-free
	Dimensions	See «Dimensions» on page 3
	Weight	Approx. 1'680 g

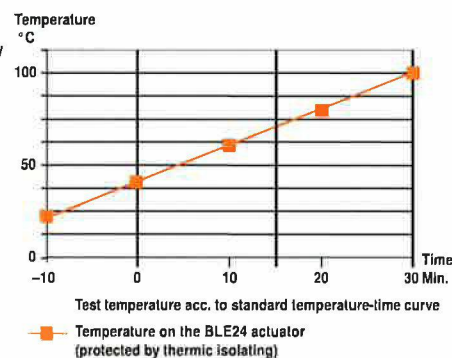
Safety notes



- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- The actuator is adapted and mounted to the smoke control damper by the damper manufacturer. For this reason, the actuator is only supplied direct to safety damper manufacturers. The manufacturer then bears full responsibility for the proper functioning of the damper.
- The device may only be opened at the actuator manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The device contains electronic and electrical components and may not be disposed of with the household waste. Observe local regulations and valid laws.

Product features

Mode of operation	2-wire open-close control. The actuator is overload-proof and can thus remain energised even at the end stops.
Signalling	Two microswitches with fixed settings are installed in the actuator for indicating the damper end positions. The position of the damper blade can be read off on a mechanical position indicator.
Manual operation	The crank handle supplied with the actuator allows it to be operated manually.
Standards and specifications	The design of the actuator is based on the following standards and specifications: <ul style="list-style-type: none"> • Draft DIN 18232, Part 6, Sept. 1992 <ul style="list-style-type: none"> – Fire protection in industrial buildings – Smoke and heat extraction systems • Preliminary standard ÖNORM H 6029, May 1997 <ul style="list-style-type: none"> – Ventilation systems – Fire smoke extraction systems • Extracts from: <ul style="list-style-type: none"> – prEN1366-10 (Fire resistance tests for service installations – Part 10: Smoke control dampers) – prEN12101-8 (Smoke and heat control systems – Part 8: Specification for smoke control dampers)
Safety function	The safety function is guaranteed within the temperature range shown in the diagram below which is based on standard ÖNORM H 6029 and DIN 18232.

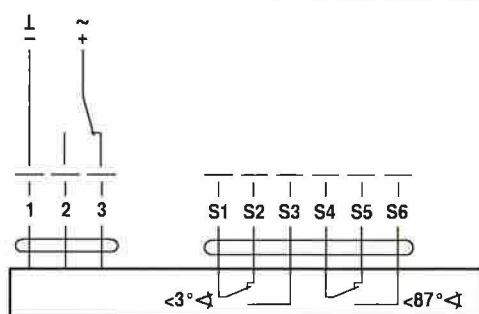


Electrical installation

Wiring diagram

Note

- Supply via safety isolation transformer
- Parallel connection of several actuators possible. Power consumption and switching thresholds must be observed!



Dimensions [mm]

Dimensional diagrams

