

**Title:**

The Fire Performance  
of Quelfire QRS Sleeves  
Classified According to  
EN 13501-2:2016

**Product Name:**

Quelfire QRS Sleeve

**Report No:**

360281/C

**Issue No:**

3

**Prepared for:**

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**Date:**

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## 1. Introduction

This classification report defines the classification assigned to the element QRS Sleeve in accordance with the procedures given in BS EN 13501-2: 2016.

## 2. Details of classified product

### 2.1 General

The element QRS Sleeve is defined as a fire resisting penetration sealing system to be used to reinstate the performance of walls and floors.

### 2.2 Product description

The product QRS Sleeve is fully described in the test reports provided in support of classification detailed in Clause 3.1.

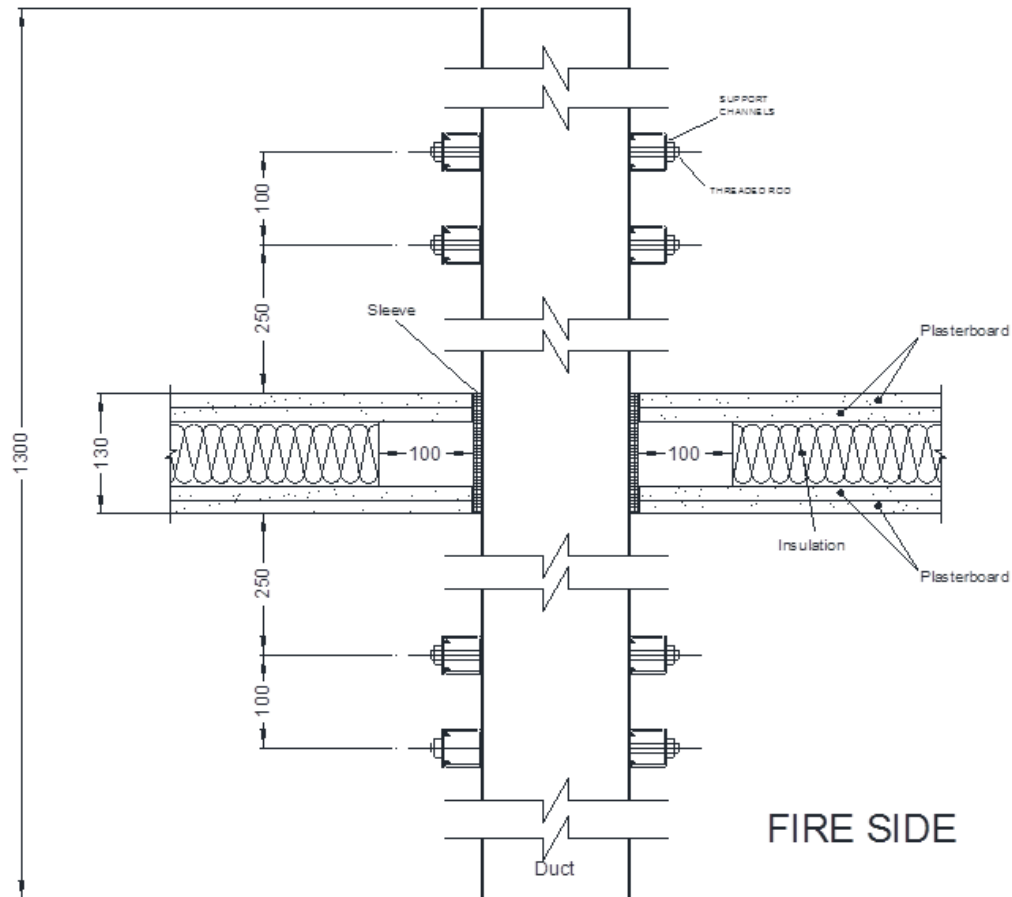
## 3. Test reports in support of classification

### 3.1 Summary of test reports

Name of laboratory	Name of sponsor	Test report no.	Test method
Exova Warringtonfire	Quelfire Ltd	WF Test Report No. 360670 Issue 2	BS EN 1366-3:2009
Warringtonfire	Quelfire Ltd	WF Test Report No. 424625 Issue 1	BS EN 1366-3:2009

### 3.1.1 WF 360670 Summary

## Summary of WF Test Report No. 360670 Issue 2



## **Item**

## **Description**

### **Flexible wall assembly (supplied by Exova Warringtonfire)**

#### Manufacturers

- |                   |   |                |
|-------------------|---|----------------|
| i. top track      | : | British Gypsum |
| ii. bottom track  | : | British Gypsum |
| iii. studs        | : | British Gypsum |
| iv. plasterboards | : | British Gypsum |
| v. insulation     | : | Rockwool       |

#### Reference

- |                   |   |                 |
|-------------------|---|-----------------|
| i. top track      | : | 72 Fec 50       |
| ii. bottom track  | : | 72 Fec 50       |
| iii. studs        | : | 70 s 50         |
| iv. plasterboards | : | Gyproc FireLine |
| v. insulation     | : | PROROXSL960/RW5 |

#### Material

- |                   |   |                                  |
|-------------------|---|----------------------------------|
| i. top track      | : | Galvanised mild steel            |
| ii. bottom track  | : | Galvanised mild steel            |
| iii. studs        | : | Galvanised mild steel            |
| iv. plasterboards | : | Gypsum to BS EN520 type F, I & R |

Density : 850 kg/m<sup>3</sup>, manufacturer stated

v. insulation : Mineral wool based

Density : 100 kg/m<sup>3</sup>, manufacturer stated

#### Thickness'

- |                   |   |                          |
|-------------------|---|--------------------------|
| i. top track      | : | 0.5 mm                   |
| ii. bottom track  | : | 0.5 mm                   |
| iii. studs        | : | 0.5 mm                   |
| iv. plasterboards | : | Double layer, 15 mm each |
| v. insulation     | : | Single layer, 60 mm slab |

#### Overall sizes

- |                   |   |   |
|-------------------|---|---|
| i. top track      | : | 72 mm wide x 50 mm flange   |
| ii. bottom track  | : | 72 mm wide x 50 mm flange   |
| iii. studs        | : | 70 mm wide x 32 mm flange   |
| iv. plasterboards | : | 2 No full board 3000 mm high x 1200 mm wide and 1 No half board 3000 mm high x 600 mm wide per each layer |

#### Fixing methods

- |                   |   |  |
|-------------------|---|--|
| i. top track      | : | Anchor screw fixed to concrete lining of restraint frame   |
| ii. bottom track  | : | Anchor screw fixed to concrete lining of restraint frame   |
| iii. studs        | : | Friction fitted between top & bottom track sections allowing 20 mm at the head for expansion during the test   |
| iv. plasterboards | : | Fitted in 2 No layers per side, and screwed to framework using 3.5 mm diameter drywall screws, 38 mm long first layer, 50 mm second layer. The joints of the second layer were staggered with respect to those of the first and were filled with GTEC Trade Joint Filler |
| v. insulation     | : | Friction fitted and retained in place by studs, track and plasterboard   |

**Specimen 'D', pipe penetration**

Aperture size	: 86mm diameter
Details of Pipe penetration	
i. pipe length	: 1300mm 500mm exposure
ii. pipe reference	: RDD75
iii. pipe material	: Polyethylene
iv. pipe size	: 75/63 mm diameter x 6/0.4 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS75
iii. material	: Galvanised steel
iv. overall size	: 85 mm outside diameter x 50 mm wide x 0.5 mm thick
v. intumescent layers	: Single layer of 50 mm wide x 4 mm thick graphite based intumescent, riveted to the sleeve shell
Position of Fire sleeve	: Through the aperture
Position of Fire sleeve	: Through the aperture

**Specimen 'E', penetration**

Aperture size	: 225 mm long x 80 mm wide
Details of penetration	
i. length	: 1300 mm, 500 mm exposure
ii. reference	: PVC-U to BS EN 1452-2
iii. material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. size	: 204 mm wide x 60 mm high x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS204/60 SS
iii. material	: Galvanised steel Grade 430
iv. overall size	: 228 mm long x 80 mm wide x 140 mm depth x 0.5 mm thick
v. intumescent layers	: Single layer of 50 mm wide x 4 mm thick graphite based intumescent at either end, held by 4 folded clips and riveted to the sleeve shell at the centreline 110 mm apart.
Position of Fire sleeve	: Through the aperture

**Specimen 'H', pipe penetration**

Aperture size	: 112 mm diameter
Details of Pipe penetration	
i. pipe length	: 1300 mm, 500 mm exposure
ii. pipe reference	: PVC-U to BS EN 1452-2
iii. pipe material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. pipe size	: 100 mm outside diameter x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS100
iii. material	: Stainless steel Grade 430
iv. overall size	: 110 mm outside diameter x 50 mm wide x 0.5 mm thick
v. intumescent layers	: Double layer of 50 mm wide x 4 mm thick graphite based intumescent, riveted to the sleeve shell
Position of Fire sleeve	: Through the aperture

**Specimen 'I', penetration**

Aperture size	: 130 mm long x 5 mm wide
Details of penetration	
i. length	: 1300 mm, 500 mm exposure
ii. reference	: PVC-U to BS EN 1452-2
iii. material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. size	: 110 mm wide x 54mm high x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS/110/54 SS
iii. material	: Galvanised steel Grade 430
iv. overall size	: 130 mm long x 75 mm wide x 140 mm depth x 0.5 mm thick
v. intumescent layers	: Single layer of 50 mm wide x 4 mm thick graphite based intumescent at either end, held by 4 folded clips and riveted to the sleeve shell at the centreline 110 mm apart.
Position of Fire sleeve	: Through the aperture

**Specimen 'O',**

Aperture size	: 225 mm long x 80 mm wide
Details of penetration	
i. length	: 1300 mm, 500 mm exposure
ii. reference	: PVC-U to BS EN 1452-2
iii. material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. size	: 204 mm wide x 60 mm high x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS205/60
iii. material	: Galvanised steel Grade 430
iv. overall size	: 228 mm long x 80 mm wide x 180 mm deep x 0.5 mm thick
v. intumescent layers	: Single layer of 50 mm wide x 8 mm thick graphite based intumescent at either end, riveted to the sleeve shell at the centreline 150 mm apart.
Position of Fire sleeve	: Through the aperture

**Specimen 'S', penetration**

Aperture size	: 240 mm long x 110 mm wide
Details of Pipe penetration	
i. length	: 1300 mm, 500 mm exposure
ii. reference	: PVC-U to BS EN 1452-2
iii. material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. size	: 220 mm wide x 90 mm high x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS 220/90 SS
iii. material	: Galvanised steel Grade 430
iv. overall size	: 240 mm long x 80 mm wide x 140 mm deep x 0.5 mm thick
v. intumescent layers	: Single layer of 50 mm wide x 8 mm thick graphite based intumescent at either end, held by 8 folded clips and riveted to the sleeve shell at the centreline 110 mm apart.
Position of Fire sleeve	: Through the aperture

**Specimen 'T', penetration**

Aperture size	: 240 mm long x 110 mm wide
Details of penetration	
i. length	: 1300 mm, 500 mm exposure
ii. reference	: PVC-U to BS EN 1452-2
iii. material	: Unplasticised Polyvinyl Chloride, PVC-U
iv. size	: 220 mm wide x 90 mm high x 1.5 mm thick wall
Details of Fire sleeve	
i. manufacturer	: Quelfire.
ii. reference	: QRS 220/90
iii. material	: Galvanised steel Grade 430
iv. overall size	: 240 mm long x 80 mm wide x 140 mm deep x 0.5 mm thick
v. intumescent layers	: Double layer of 50 mm wide x 8 mm thick graphite based intumescent at either end, held by 8 folded clips and riveted to the sleeve shell at the centreline 110 mm apart.
Position of Fire sleeve	: Through the aperture

**Notes on services:**

## Penetration supports

The penetrating pipe services are fixed to a support frame fabricated from proprietary steel channels of section size 41 mm by 41 mm by 2.5 mm thick. The support frame is fixed to the furnace restraint frame. Fixings for the pipe penetrations are propriety steel pipe clamps, 25 mm wide. The pipe clamps are attached to steel threaded rods which are fixed to the horizontal cross channels with nuts and washers. The penetration services are supported by steel channels below with steel channels resting on the top of the service connected to the supporting frame via threaded bar.

Sealant	: Small amount of sealant referenced 'QUELFIRE GM FR Intumescent Acrylic Sealant' was applied on collar fixing nuts and threaded bars on both faces
Pipe Collars	: Circular case of stainless steel 0.5 mm thick fitted with a double steel clasp to clamp the collar around the pipe and 4 no. lugs to one edge for fixing to the floor. The case is lined internally with layers of a pre-formed graphite based intumescent material Please see Figure 9 for details
Pipe sleeves	: Circular case of stainless steel 0.5 mm thick fitted with 4 lugs 42 mm long x 4 mm wide from the case over the intumescent, the case is lined with layers of pre formed graphite based intumescent, the case is fixed with a 2.5mm diameter x 10mm dome head screw. Please see Figures 10 and 11 for details
Sleeves	: Rectangular case of galvanised steel 0.5mm thick fitted with a 10mm friction fit over lap. 5 mm x 2 mm cut ins in all beat corners. The case is lined with layers of pre formed graphite based intumescent. Please see Figures 10,12,13 and 14 for details



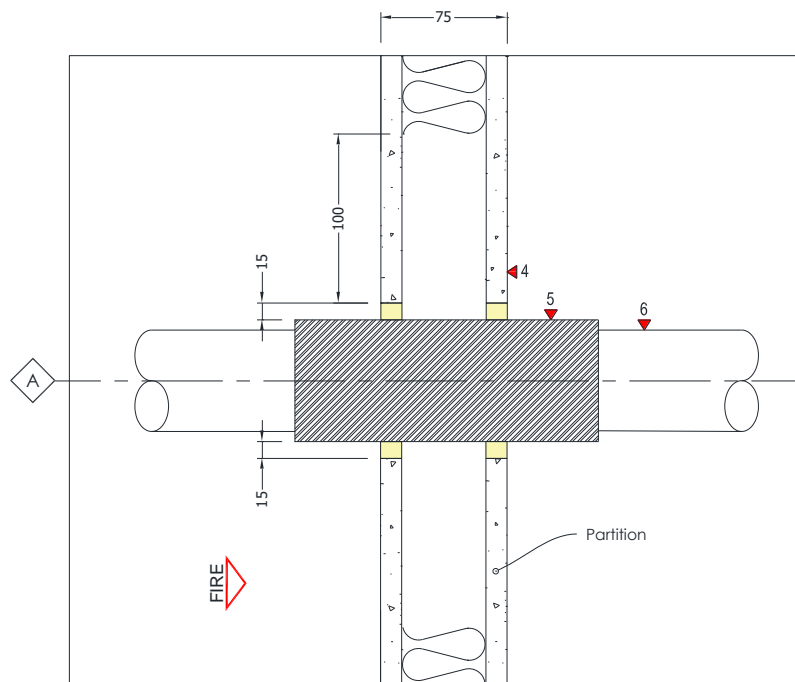
Specimen	Integrity (minutes)			Insulation (minutes)
	Cotton pad	Sustained flames	Gap Gauge	
E	96#	96	96#	91
H	132*	132*	132*	132*
I	132*	132*	132*	132*
O	132*	132*	132*	132*
S	86#	86	86#	79
T	132*	132*	132*	123

\*The test duration. The test was discontinued after a period of 132 minutes.

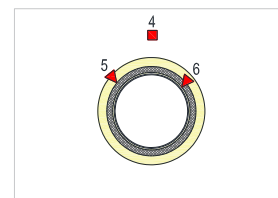
#Specimen Blanked off to allow the test to continue

3<sup>rd</sup> December 2015

### 3.1.2 WF 424625 Summary



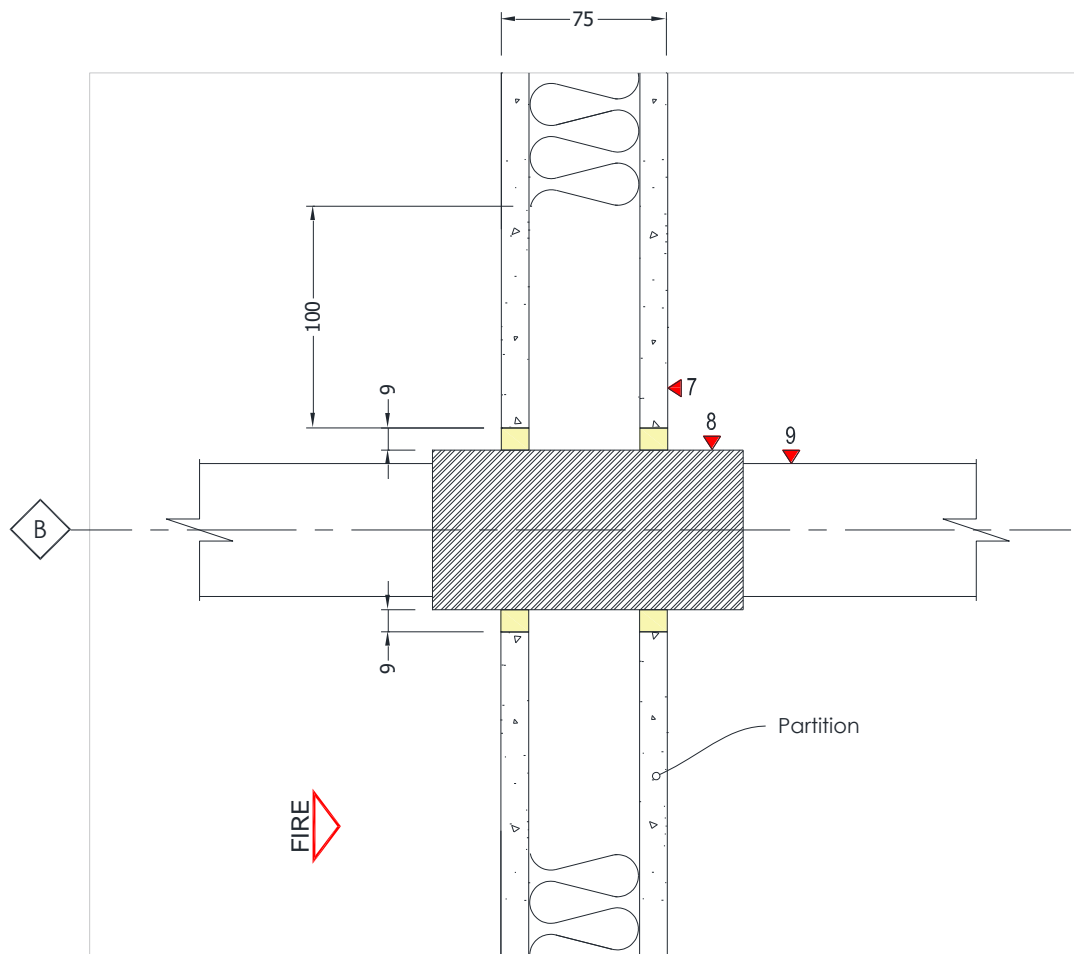
Reference Legend		
Item	Description	Size
	Specimen - PVC Ducting	Ø 125 x 1500 x 1.5 mm
	Quelpac Acrylic Sealant	12.5 x 15 mm annulus
	QRS 130 Fire Sleeve	Ø 130 x 180 x 10 mm
	Thermocouple Positions	



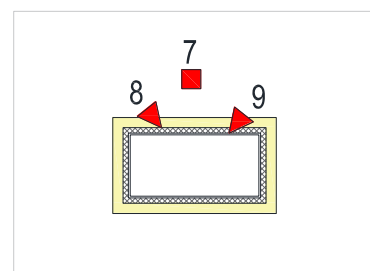
ELEVATION OF SPECIMEN A



CROSS SECTIONAL DETAIL VIEW  
SPECIMEN A

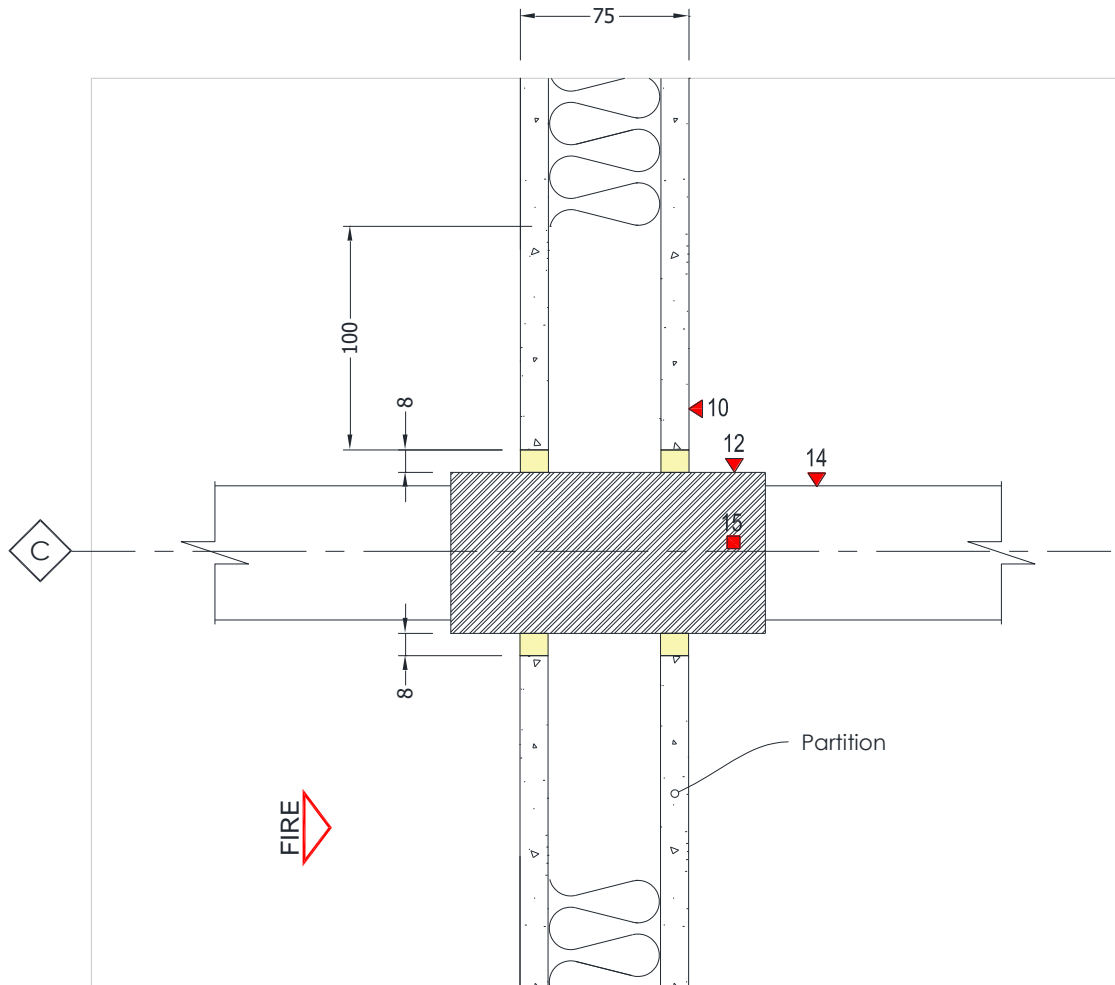


Reference Legend		
Item	Description	Size
	Specimen - PVC Ducting	110 x 54 x 1500 x 1.5mm
	Quelstop Acrylic Sealant	12.5 x 9 mm annulus
	QRS110/54SS Fire Sleeve	110 x 54 x 140 x 4.5mm
	Thermocouple Positions	

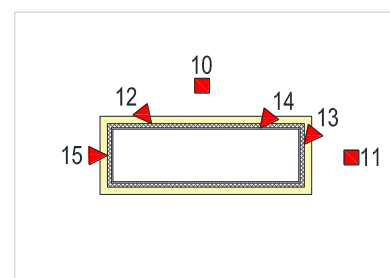


ELEVATION OF SPECIMEN B

**A-A**  
**2** CROSS SECTIONAL DETAIL VIEW  
SPECIMEN B

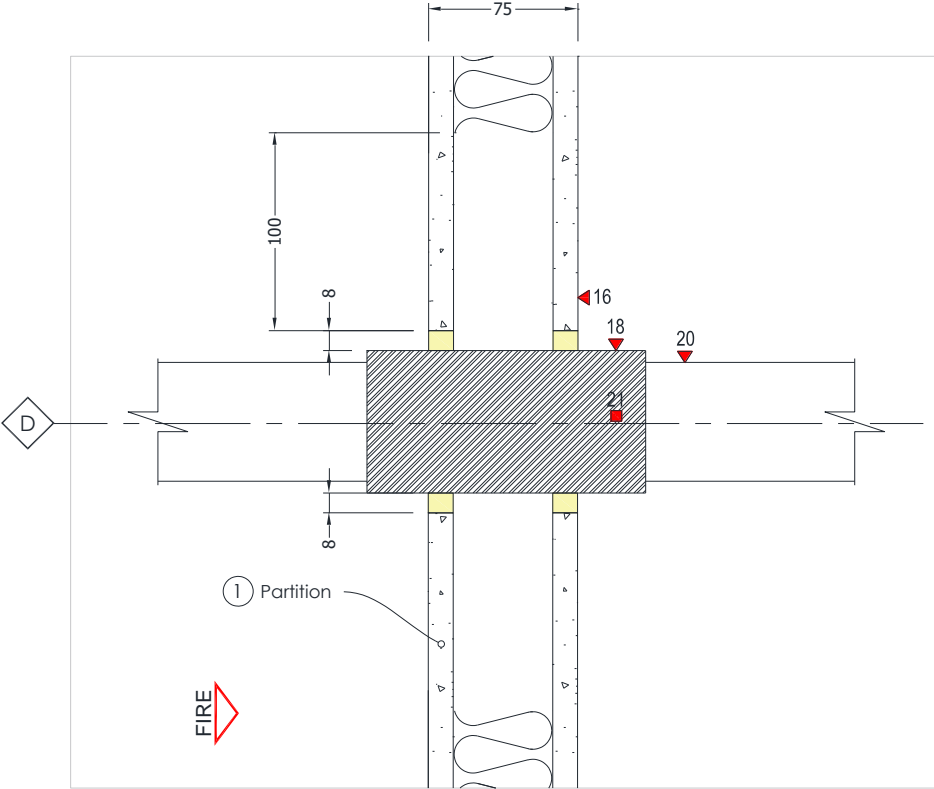


Reference Legend		
Item	Description	Size
	Specimen - PVC Ducting	204 x 60 x 1500 x 1.5mm
	Quelstop Acrylic Sealant	12.5 x 8 mm annulus
	QRS205/60SS Fire Sleeve	205 x 60 x 140 x 4.5mm
	Thermocouple Positions	

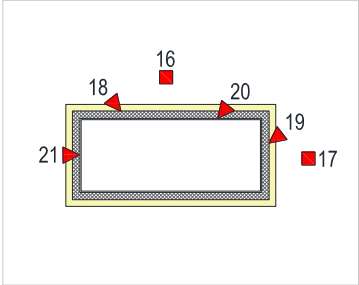


ELEVATION OF SPECIMEN C





Reference Legend		
Item	Description	Size
	Specimen - PVC Ducting	220 x 90 x 1500 x 1.5mm
	Quelstop Acrylic Sealant	12.5 x 8 mm annulus
	QRS220/90SS Fire Sleeve	205 x 60 x 140 x 9mm
	Thermocouple Positions	



ELEVATION OF SPECIMEN D

**A-A**  
4 CROSS SECTIONAL DETAIL VIEW  
SPECIMEN D

<b><u>Item</u></b>	<b><u>Description</u></b>
<b>Specimens A,B,C,D</b>	
<b>Vent Ducting with Fire Sleeve</b>	
Aperture Details	
Size	
i. Specimen A	: 180 mm Dia.
ii. Specimen B	: 136 mm wide x 80 mm high
iii. Specimen C	: 229 mm wide x 85 mm high
iv. Specimen D	: 254 mm wide x 124 mm high
Linings	: None
Details of Pipes	
Material	: PVC Vent Duct
Size	
i. Specimen A	: 125 mm OD x 1.5 mm wall thickness
ii. Specimen B	: 110 mm wide x 54 mm high x 1.5 mm wall thickness
iii. Specimen C	: 204 mm wide x 60 mm high x 1.5 mm wall thickness
iv. Specimen D	: 220 mm wide x 90 mm high x 1.5 mm wall thickness
Intumescent Fire Sleeve	
Manufacturer	: Quelfire
Closure device reference	
i. Specimen A	: QRS130
ii. Specimen B	: QRS110/54SS
iii. Specimen C	: QRS205/60SS
iv. Specimen D	: QRS220/90SS
Material	: Flexible galvanised steel shell containing graphite based intumescent material
Overall thickness	
i. Specimen A	: 10 mm
ii. Specimen B	: 4.5 mm
iii. Specimen C	: 4.5 mm
iv. Specimen D	: 9 mm
v.	
Overall size	
i. Specimen A	: 130 mm Dia. x 180 mm long
ii. Specimen B	: 110 mm x 54 mm x 140 mm long
iii. Specimen C	: 205 mm x 60 mm x 140 mm long
iv. Specimen D	: 220 mm x 90 mm x 140 mm long
Installation method	: Installed around ventilation ducting, centrally within the partition aperture
Annular Gap Seal	
Manufacturer	: Quelfire
Material	: Quelstop Intumescent Acrylic Sealant
Dimensions	
i. Specimen A	: 15 mm Annulus x 12.5 mm Depth
ii. Specimen B	: 9 mm Annulus x 12.5 mm Depth
iii. Specimen C	: 8 mm Annulus x 12.5 mm Depth
iv. Specimen D	: 8 mm Annulus x 12.5 mm Depth

Specimen	Integrity (minutes)			Insulation (minutes)
	Cotton pad	Sustained flames	Gap Gauge	
A	66*	66*	66*	2
B	66*	66*	66*	2
C	66*	66*	66*	34
D	66*	66*	66*	2

\*The test duration. The test was discontinued after a period of 66 minutes.

14<sup>th</sup> December 2020

## 4. Classification and field of application

### 4.1 Reference of classification

This classification has been carried out in accordance with clause 7 of EN 13501-2: 2007 + A1: 2009.

### 4.2 Classification of Test ref.: WF 360670

The product, QRS Sleeve may be classified according to the following combinations of performance parameters and classes as appropriate.

R	E	I	W		<i>t</i>	-	M	C	S	IncSlow	sn	ef	r
---	---	---	---	--	----------	---	---	---	---	---------	----	----	---

Considering the test submitted for classification, QRS Sleeve provides the following classification for the sleeve type:

Fire resistance classification with rectangular uPVC pipes in flexible and rigid wall constructions - 130 mm or thicker. See also the field of direct application rules section				
Penetrating Service Item	Dimensions (mm)	Intumescent Thickness (mm)	Sleeve reference & intumescent	FIRE RESISTANCE CLASSIFICATION
Rectangular uPVC Pipe	110 x 54 x 1.5	4	QRS110/54SS	<b>EI120 U/U</b>
	204 x 60 x 1.5		QRS204/60SS	<b>EI90 U/U</b>
	220 x 90 x 1.5	8	QRS220/90SS	<b>EI60 U/U</b>
	204 x 60 x 1.5	8	QRS204/60	<b>EI120 U/U</b>
	220 x 90 x 1.5	16	QRS220/90	<b>EI120 U/U</b>
uPVC Pipe	100 x 1.5	8	QRS100	<b>EI120 U/U</b>
PE Corrugated Pipe (RDD75)	75/63 mm diameter x 6/0.4 mm thick wall	4	QRS/75	<b>E120 U/U</b> <b>EI90 U/U</b>

Test ref: 360670

### 4.3 Classification of Test ref.: WF 424625

Considering the test submitted for classification, QRS Sleeve provides the following classification for the sleeve type:

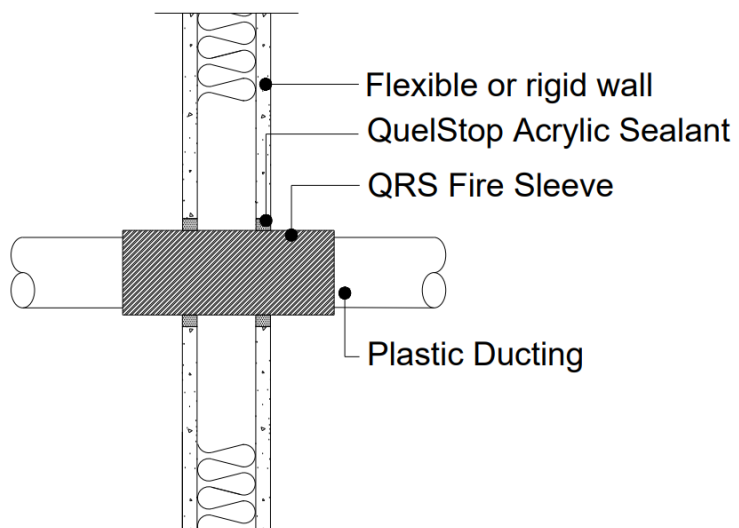
#### Construction Details:

- Minimum 75mm thick flexible or rigid walls\*. Flexible wall may be insulated or uninsulated.
- Flexible walls to have a minimum 50mm wide stud and minimum 1no. layer of 12.5mm plasterboard\* on both sides of the stud
- First service support maximum 400mm from both faces of the substrate
- Gaps  $\leq 8\text{mm}$  between the QRS and the plasterboard should be sealed with QuelStop Acrylic Sealant to 12.5mm depth
- QRS Sleeve installed centrally within the wall.
- Sleeve length to be as tested for 75mm thick walls, or following the Field of Direct Application rules for increased wall thicknesses

\* See Field of Direct Application section

#### QRS Fire Sleeve & QuelStop Acrylic Sealant

Correct size QRS Fire Sleeve for the U-PVC pipe/rectangular pipe size



Service Type	Size of Services	Product Code	Pipe Wall Thickness	CLASSIFICATION
U-PVC Rectangular Pipes	110 x 54mm x 140mm long	QRS110/54SS	1.5	<b>E60 U/U</b>
	204 x 60mm x 140mm long	QRS204/60SS		<b>E60 U/U &amp; EI 30 U/U</b>
	220 x 90mm x 140mm long	QRS220/90SS		<b>E60 U/U</b>
U-PVC Circular Pipes	Ø125mm x 180mm long	QRS130	1.5	<b>E60 U/U</b>

Test ref: 424625



## 4.4 Field of Direct Application

The classifications provided herein are valid for alternative end use applications if relevant direct field of application rules exist to allow variation in the sealing system configuration. The direct field of application rules from BSEN 1366-3 2009 are extract verbatim, below. Note that not all rules will be relevant to the sealing systems described herein. Other changes are not permitted.

### Field of Direct Application - General (from EN 1366-3: 2009)

#### Orientation

Test results are only applicable to the orientation in which the penetration seals were tested, i.e. in a wall or floor.

#### Supporting construction

##### Rigid floor and wall constructions

Test results obtained with rigid standard supporting constructions may be applied to concrete or masonry separating elements of a thickness and density equal to or greater than that of the supporting construction used in the test. This rule does not apply to pipe closure devices positioned within the supporting construction in case of higher thickness of the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.

##### Flexible wall constructions

Test results obtained with the standard flexible wall constructions according to 7.2.2.1.2 cover all flexible wall constructions of the same fire resistance classification provided,

- the construction is classified in accordance with EN 13501-2;
- the construction has an overall thickness not less than the minimum thickness of the range given in Table 3 for the standard flexible wall used in the test. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides;
- in the case of penetration seals installed within the wall and where a flexible wall with insulation was used in the test an aperture framing shall be used in practice. The aperture frame and aperture lining shall be made from studs and boards of the same specification as those used in the wall in practice. The thickness of the aperture lining shall be minimum 12,5 mm. This rule does not apply in the case where the insulation was removed around the penetration seal(s) (see 7.2.2.1.2);
- the number of board layers and the overall board layer thickness is equal or greater than that tested when no aperture framing is used;
- flexible wall constructions with timber studs are constructed with at least the same number of layers as given in Table 3, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal and the stud, and 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud.

An aperture framing is considered as being part of the penetration seal. Tests without an aperture framing cover applications with aperture framing but not vice versa.

The standard flexible wall construction does not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides. Penetrations in such constructions shall be tested on a case by case basis.

Test results obtained with flexible supporting walls may be applied to concrete or masonry elements of an overall thickness equal to or greater than that of the element used in the tests. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.

### **Service support construction**

The standard cable ladders/trays as defined in Annex A cover metal trays with a melting point higher than the furnace temperature at the classification time, e.g. stainless steel, galvanised steel. For all other ladders/trays (e.g. plastic, aluminium) separate evidence is necessary.

Steel ladders/trays with organic coatings are covered by the standard ladders/trays if their overall classification is minimum A2 according to EN 13501-1.

The distance from the surface of the separating element to the nearest support position for services shall be as tested or less.

### **Seal size and distances**

The test results obtained using standard wall and floor configurations for penetration systems are valid for any penetration size (in terms of linear dimensions) equal to or smaller than that tested, provided the total amount of cross sections of the services (including insulation) does not exceed 60 % of the penetration area, the working clearances are not smaller than the minimum working clearances (as defined in Annex A, B, E and F) used in the test and a blank penetration seal of the maximum seal size desired was tested in addition.

A blank penetration seal test may be omitted for mortar seals, seals made from rigid boards and mineral wool boards of a density of minimum 150 kg/m<sup>3</sup> and for single service penetration seals.

(Section 6.1 – size and distance: The minimum distance between adjacent penetration seals shall be not less than 200mm unless it has been proven otherwise by demonstrating that a small separation distance does not have a negative effect on fire performance)

For floor constructions, results from tests with a penetration seal length of minimum 1 000 mm apply to any length as long as the perimeter length to seal area ratio is not smaller than that of the test specimen.

The distance between a single service and the seal edge (annular space, e.g. a1 according to Figures B.7 and E.2) shall remain within the tested range.

## **Field of Direct Application - Metal pipes (from EN 1366-3: 2009)**

### **Pipe diameter and pipe wall thickness**

Results of tests conducted as specified in the standard configurations may be interpolated for pipes with diameters and wall thicknesses between those tested, based upon the lowest result achieved (see Figure E.3), provided the minimum pipe diameter is greater than or equal to 40 mm. If pipe A according to figure E.3 was not included in the test the maximum wall thickness is restricted to 14.2 mm.

### **Type of pipe material**

Results of tests conducted as specified in the standard configurations, on a particular pipe material covers pipe materials with a thermal conductivity lower than that tested, subject to the material having a melting point at least equal to the material tested or greater than the furnace temperature achieved at the required classification period.

**Pipe arrangement**

The results of a test conducted as specified in Option 1 of the standard configurations does not cover 'clusters' of pipes, unless the distances  $a_3$  (Figure E.1) or  $a_2$  (figure E.2) are >100 mm in practice.

The results of a test conducted as specified in Option 2 of the standard configurations covers pipes with linear separation.

**Number of pipes**

Results from a multiple penetration seal may be extended to a single penetration seal of the same type but not vice versa.

**Pipe end configuration**

A test with pipe end configuration U/C covers all pipe end situations of Table 2.

**Pipes fitted with an insulation material having class B to F according to EN 13501-1**

A test conducted on insulated pipes does not cover non-insulated pipes.

A test conducted on non-insulated pipes does not cover insulated pipes.

Thickness of insulation between the tested dimensions (tests with a specific pipe dimension) for all arrangements of insulation according to 3.13 (cases CS, CI, LS and LI) may be used. Where E.1.4.3 allows testing only at minimum insulation thickness, there is no limit for maximum thickness of the insulation.

The length of a local insulation may be increased but may not be reduced.

No extension to the range of pipe insulation materials is permissible beyond that tested.

If a pipe was tested perpendicular to the seal as well as oblique, the result is valid for each angle between a right-angle and the angle tested.

**Field of Direct Application - Plastic pipes (from EN 1366-3: 2009)****General**

Results from a multiple penetration seal may be extended to a single penetration seal of the same type but not vice versa.

**Seal size****Pipe closure devices**

The maximum pipe closure device size within a design group determined according to E.2.2.1 covers smaller sizes of this design group.

If the thickness of the active component of the pipe closure device is changed (length remains constant) the maximum pipe closure device sizes from the design groups comprising the smallest and the largest pipe closure device sizes cover the size range / design groups in between provided the thickness of their active components is higher than the calculated value from the straight line that connects the maximum and minimum size in a thickness - pipe diameter diagram (see Figure E.8). This interpolation is only permissible if the inner diameter of the smallest pipe closure device included in the test is greater than or equal to 40 mm. NOTE: For further details see H.4.7.2

### Pipe end configuration

Test results obtained from tests with "plastic pipes" having both ends uncapped (see Table 2, test condition "U/U") are valid for all other test conditions of Table 2. Test results obtained from tests where a flue gas recovery system was used are valid for pipe end conditions U/C and C/C.

**Table E.1 – Field of application rules for pipe end configuration**

	Tested				
		U/U	C/U	U/C	C/C
Covered	U/U	Y	N	N	N
	C/U	Y	Y	N	N
	U/C	Y	Y	Y	N
	C/C	Y	Y	Y	Y

Y = acceptable, N = not acceptable

### Pipe and insulation material

The pipe and/or insulation material range permitted is the range covered by the test including the critical pipe approach results where applicable.

Test results on pipes made from PVC-U according to EN 1329-1, EN 1453-1 or EN 1452-1 are valid for pipes made from PVC-U according to EN 1329-1, EN 1453-1 and EN 1452-1 as well as pipes made from PVC-C according to EN 1566-1.

Test results on pipes made from PE-HD according to EN 1519-1 or EN 12666-1 are valid for pipes made from PE according to EN 12201, EN 1519-1 and EN 12666-1, for pipes made from ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1.

### Pipe wall thickness

#### Pipe closure devices for pipes without insulation

The range between that tested is covered for a particular size of the pipe closure device. The maximum thickness tested with the maximum size within a design group (see Annex E.2.2.1) of pipe closure device sizes is valid for smaller sizes within the design group. For a design group not included in the test either a linear interpolation between the corner points tested or a step approach as illustrated in Figure E.9 may be used. Where the minimum wall thickness remains the same over several design groups, the design groups representing the maximum and minimum sizes cover the intermediate ones.

#### Seals other than pipe closure devices

Results of tests conducted as specified in the standard configurations may be interpolated for pipes with diameters between those tested and wall thicknesses between those tested.

### Pipe orientation

If a pipe was tested perpendicular to the seal as well as oblique, the result is valid for each angle between a right-angle and the angle tested.

### Separations

For multiple penetrations the separations a1 to a3 from a test conducted as specified in the standard configurations may be increased without limitation (see Figure E.1).

Where single pipes penetrate directly through the structural associated construction (masonry walls, flexible walls, concrete floors etc.) the annular space between the pipe and the supporting construction shall remain within the tested range. Separation a2 may be increased.

For seals other than pipe closure devices the results of a test conducted as specified in Option 1 of the standard configurations does not cover 'clusters' of pipes, unless the distances a3 (Figure E.1) or a2 (Figure E.2) are > 100 mm in practice. The results of a test conducted as specified in Option 2 of the standard configurations covers pipes with linear separation.

## Additional rules for pipes fitted with an insulation

### Pipe closure devices

In the case where a pipe closure device is used, the maximum pipe closure device size within a design group determined according to E.2.2.1 covers smaller sizes. If the thickness of the active component of the pipe closure device is changed (length remains constant) the maximum pipe closure device sizes from the design groups comprising the smallest and the largest pipe closure device sizes cover the size range / design groups in between provided the thickness of their active components is higher than the calculated value from the straight line that connects the maximum and minimum size in a thickness - pipe diameter diagram (see Figure E.8). In this situation pipe diameter as shown in Figure E.9 equals the sum of the actual pipe diameter and twice the thickness of the insulation.

Tests on non-insulated pipes do not cover insulated pipes.

Tests with sustained insulation cover interrupted insulation but not vice versa. Tests with sustained insulation do not cover interrupted insulation where the pipe closure device is in direct contact with the pipe.

### Seals other than pipe closure devices

The thickness of the insulation may be interpolated between tested dimensions.

## 5. Limitations

This classification document does not represent type approval or certification of the product.

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