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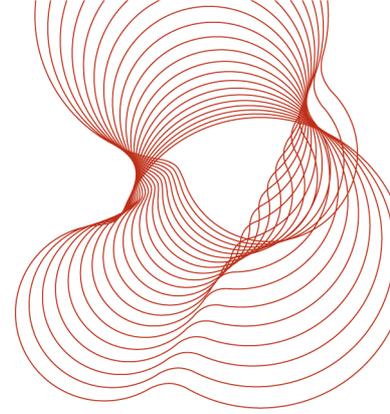
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**An assessment of the
fire performance of
Sandersfire Fire-Rated
Mortar penetration seal
systems**

Prepared for:
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23 September 2013

**Assessment report number
CC 91095B Review 4 Issue 3**



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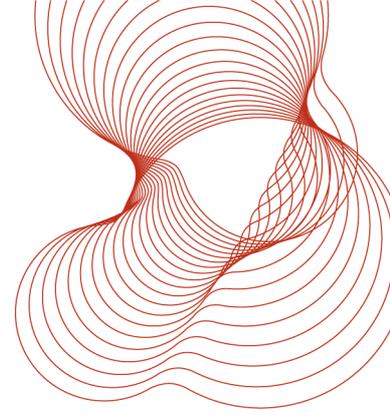
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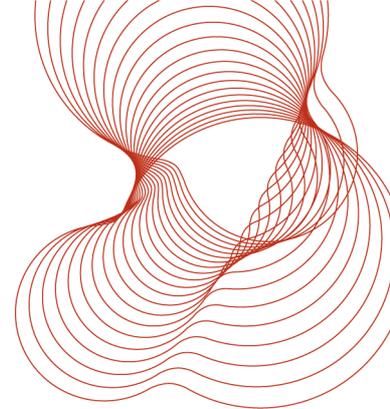
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1 Introduction

The Firecrete Standard, Firecrete HS and Firecrete HD Mortar penetration seal systems are designed to provide a fire rating of up to four hours when fitted with various types of penetrating service and when mounted in concrete floors or in a masonry or concrete wall. This report describes the assessment which has been carried out on the systems for horizontal and vertical orientations and for various types of penetrating service.

2 Scope

This assessment report covers the fire performance of the Firecrete Standard, Firecrete HS and Firecrete HD Mortar penetration seal systems, in terms of the adopted integrity and insulation criteria of BS 476: Part 20: 1987, for fire ratings of up to four hours, for the cellulosic or hydrocarbon heating regimes.

3 Supporting data

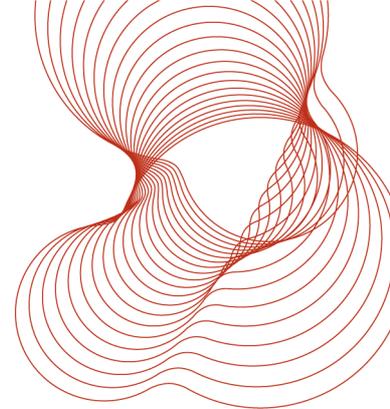
This assessment is based on supporting test data which is more than five years old. This supporting data has therefore been reviewed against current test procedures.

A series of fire resistance tests employing the draft European Standard prEN 1366-3 for penetration seals or adopting the procedures and performance criteria of BS 476: Part 20: 1987 have been carried out on the Firecrete Standard, Firecrete HS and Firecrete HD Mortar penetration seal systems. See BRE(LPC) test reports TE 90792, TE 91327A, TE 91327B, TE 88122A, TE 88122B, TE 88648, TE 201433 and TE 209933 and SGS Yarsley test reports J86627/1 and J86627/2 for full details. Non-combustibility tests in accordance with BS 476: Part 4 have also been carried out on the mortars. See test reports WARRES nos 123018, 101156 and 101155 for full details.

Summaries of the tests and results are given in the appendix to this report.

4 Description of proposals

The Firecrete Standard, Firecrete HS and Firecrete HD Mortar penetration seal systems being considered in this assessment are the same as those tested in the reports listed in section 3 of this report. The seals may be installed in openings in concrete floors and in masonry or concrete walls at least 100mm thick or the overall thickness of the seal, whichever is the greater, and which have at least the same fire rating as



that required for the penetration seal. The minimum density for the concrete of the floor or wall is 580/kg/m³ and for walls made of concrete blocks is 650kg/m³.

The nominal dry densities of the three mortars are as follows:

Firecrete Standard: 1000kg/m³

Firecrete HS: 1550Kg/m³

Firecrete HD: 2500kg/m³

Three different seal configurations are included in this assessment for all three types of mortar as follows:

- a) For seals in floors - a layer of 50mm-thick Rocksil LR140 stone mineral wool slab, nominal density 128kg/m³, is tightly fitted in the opening and then the mortar, from 50mm to 200mm thick, is cast on top of the slab. The slab may have to be supported while the mortar sets.
- b) For seals in walls - a layer of 50mm-thick Rocksil LR140 stone mineral wool slab is tightly fitted in the opening and then the mortar, from 25mm to 50mm thick, is trowelled over the slab on both faces.
- c) For seals in walls or floors - a layer of stone mineral wool shuttering is fitted into the opening and then the mortar, nominally 100mm thick, is cast (floors) or trowelled (walls) over the shuttering. The shuttering is removed once the mortar has set.

The services which may be fitted through the seals are electrical cables of various sizes from communication cables to power cables. The cables may be mounted on steel cable trays or ladders or mounted in steel trunking or conduits. If fitted in trunking, the inside of the trunking around the cables must be filled with stone mineral wool where it passes through the seal. Other services which may be fitted through the seals are steel, copper or plastic pipes and steel ducts fitted with steel dampers. Plastic pipes must be fitted with intumescent closing devices, or similar, which have been shown by test or assessment to be suitable for use with this type and thickness of penetration sealing system and suitable for the fire rating specified, and in the required orientation and for the pipe diameter and plastic type. Dampers should be installed within Firecrete HS Mortar. The dampers must also have been shown by test to be suitable for this type and thickness of installation and for the required fire rating. The services must be supported adjacent to the seal on both sides so that the weight of the services is not taken by the seal.

For Sandersfire Firecrete HS Mortar seals between walls or floors and single or multiple dampers, the damper(s) must be mounted in a HEVAC/HVCA installation frame within the opening in the masonry or concrete wall or floor and the mortar must be at least 82mm thick. The Rocksil LR140 stone mineral wool, minimum 50mm thick, is left in place for floor installations. The ratio of the seal width between the edge of the installation frame and the reveal of the wall or floor opening to the mortar depth must not exceed 12:1 for the Firecrete HS Mortar. The installation frame does not need to be mechanically tied to the wall or floor for dampers with a clear opening (duct size) up to 1000mm x 1000mm. For larger dampers, the installation frame must be mechanically tied to the wall or floor. The damper seal configuration is suitable for integrity ratings of up to 240 minutes and insulation ratings of up to 120 minutes, given that the damper assembly itself is uninsulated. The duct must be supported with steel supports on both sides of the damper so that the weight of the duct is not taken by the damper.

The thicknesses of seal required for the various configurations and fire resistance periods are given in tables 1 and 2 for the cellulosic and hydrocarbon heating regimes.

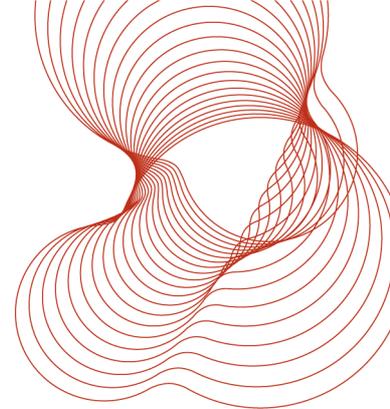


Table 1 Cellulosic heating regime

Wall or Floor	Seal type & thickness (mm)	Test criteria ¹ (min)							
		Seal only		Cable tray & cables		Steel pipes		Plastic pipes with collars	
		Int	Ins	Int	Ins	Int	Ins	Int	Ins
F	(a) 50rw+ 50m	240	180	240	60	240	30 to 60	*	*
F	(a) 50rw+100m	240	240	240	120	240	30 to 120	*	*
F	(a) 50rw+150m	240	240	240	240	240	60 to 180	*	*
F	(a) 50rw+200m	240	240	240	240	240	120 to 240	*	*
W	(b) 25m+50rw+25m	240	180	240	120	240	30 to 60	*	*
W	(b) 50m+50rw+50m	240	240	240	240	240	30 to 120	*	*
W	(c) 100m	240	240	240	120	240	30 to 120	*	*
F	(c) 100m	240	240	240	60	240	30 to 120	*(2)	*(2)

Notes:

(a), (b), and (c) refer to the three different methods listed on page 5.

rw = rock wool

m = mortar

*dependent on proven performance of intumescent pipe collars or wraps.

¹ Int = Integrity, Ins = Insulation

(2) In fire test TE 91327A, two PVCu pipes, fitted with intumescent pipe wraps, were included in the test on the floor construction. (see section A.7).

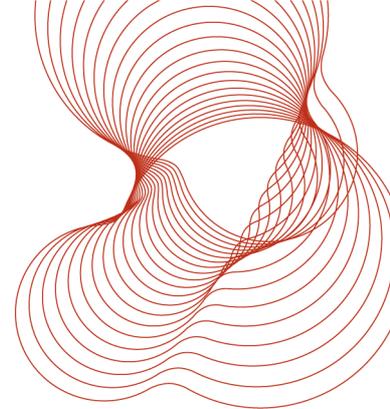


Table 2 Hydrocarbon heating regime

Wall or Floor	Seal type & thickness (mm)	Test criteria ¹ (min)							
		Seal only		Cable tray & cables		Steel Pipes		Plastic pipes with collars	
		Int	Ins	Int	Ins	Int	Ins	Int	Ins
W	(c) 100m	240	240	240	30 to 60	240	20 to 30	*	*
F	(c) 100m	240	240	240	30 to 60	240	20 to 30	*	*

Notes:

*dependent on proven performance of intumescent pipe collars or wraps.

¹ Int = Integrity, Ins = Insulation

(c) refers to the method listed on page 5

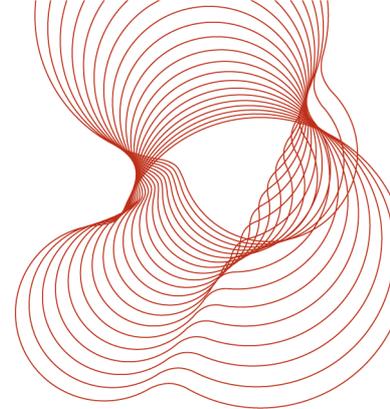
m = mortar

5 Assessment

The Firecrete Standard, Firecrete HS, and Firecrete HD Mortar penetration seal systems, as described above, are the same as the seals tested (see section 3 of this report). The systems include vertical and horizontal seals and various penetrating services.

On the specimens tested there was some hairline cracking of the mortar seals but the seals remained intact and in position for the durations of the heating periods without any detachment of the mortar. Where a specimen failed the integrity criteria of the standard this was not due to cracking or detachment of the mortar but due to the penetrating service (e.g. cable core or pipe) falling out, allowing flaming on the non-fire side. The slippage of the cables and pipes in the tests was due to the failure of the clamping devices as the temperature of the services increased. Tables 1 and 2 give details of the assessed fire ratings for the various seal configurations and thicknesses. The tables give different values for the seal without any penetrating services and the seal with various penetrating services. The values given in the tables are based on the combined evidence from the tests.

The maximum size of the tested seals included in this assessment was 600mm x 400mm, (0.24m²). However, ambient temperature loadbearing capacity tests on the fire stop mortars, without reinforcement, mounted in openings in concrete slabs, have been carried out at an independent research laboratory.



These tests have demonstrated that, even if it is assumed that only 25mm to 30mm of sound material remains on the non-fire face of the seal, the seal is able to carry a load many times its self-weight. From these results we are satisfied that the fire-stop mortars are suitable for sizes of openings where the ratio of opening span width to mortar depth does not exceed 8:1 for the Firecrete Standard Mortar and Firecrete HD Mortar and 20:1 for the Firecrete HS Mortar. The length of the opening is not restricted. It is assumed that the seal is only required to support its self-weight in the event of a fire. The suitability of the seal for the applied load and span in normal conditions should be determined by a suitably qualified person for each application.

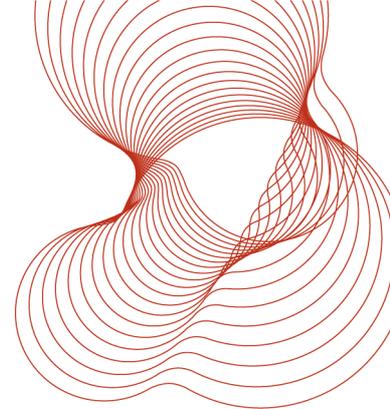
It is not possible to give precise details of the insulation performance for the services when mounted in the mortar seal systems but tables 1 and 2 give typical insulation performance values. Cast iron pipes and copper pipes may be fitted as well as steel pipes. The insulation performance for the cast iron pipes will be similar to those for the steel pipes but the values for the copper pipes would be much lower. As very limited test data has been presented on plastic pipes, these may only be fitted through the mortar seals if they comply with the requirements detailed in section 4 of this report. Also the requirements for the installation of dampers detailed in section 4 must be followed. Reference should be made to the test reports for the fire performance of specific service/seal combinations.

6 Conclusion

Therefore it is our opinion that the Firecrete Standard, Firecrete HS and Firecrete HD Mortar penetration seal systems, as described in section 4 of this report, are suitable for installations where a fire rating of up to those given in tables 1 and 2 (and section 4) is specified in accordance with the adopted integrity and insulation criteria of BS476: Part 20: 1987, for both the cellulosic or hydrocarbon heating regimes, given the requirements and limitations described above.

7 Re-issue of report

This assessment report was re-issued to correct the product name to Sandersfire Fire-Rated Mortar.



8 Validity of the assessment

8.1 Declaration by applicant

- We the undersigned confirm that we have read and complied with the obligations placed on us by the PFPF Guide to Undertaking Assessments in Lieu of Fire Tests.
- We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.
- We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.
- We are not aware of any information that could adversely affect the conclusions of this assessment.
- If we subsequently become aware of any such information we agree to cease using the assessment and ask BRE Global to withdraw the assessment.

Signed: _____

For and on behalf of: _____

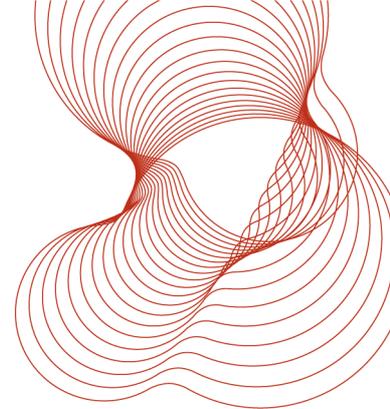
This assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

8.2 BRE Global declaration

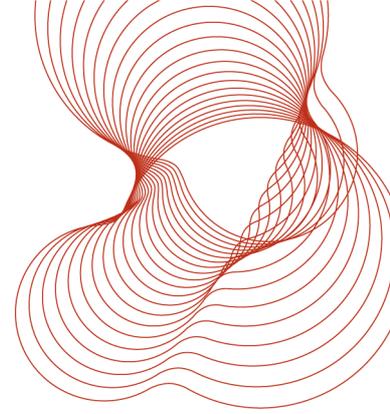
This assessment was reviewed on 23 July 2013. We have received written confirmation from Hoben International Limited that there have been no changes in the specification of their Sandersfire Fire-Rated Mortar penetration seal systems since the original date of the assessment. There have been no changes in the fire test procedures or methods of assessment, which would adversely affect the fire performance of the systems. We are therefore satisfied that the validity of this assessment may be extended for a further five years.

This assessment is based on test data, experience and the information supplied. If contradictory evidence becomes available to BRE Global the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. The assessment is valid for a period of five years after which it should be returned for review to consider any additional data, which has become available or any changes in the fire test procedures. Any changes in the specification of the product will invalidate this assessment.

This assessment has been carried out in accordance with Fire Test Study Group Resolution No. 82. It relates to the fire performance of the product and does not cover aspects of quality, durability, maintenance nor service requirements. This assessment relates only to the specimen(s) assessed and does not by itself infer that the product is approved under any Loss Prevention Certification Board approval or certification scheme or any other endorsements, approval or certification scheme.



Next review date: 23 July 2018



Appendix A – Summary of fire test data

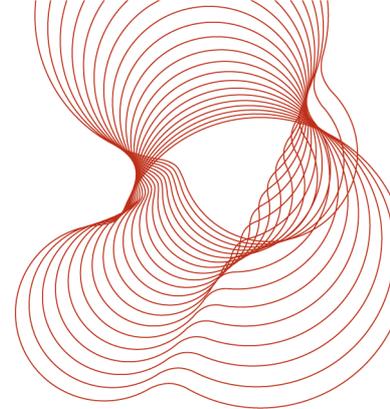
A.1 Fire test TE 88648

A fire resistance test on two mortar penetration sealing systems, each sealing apertures, 600mm x 400mm, in a 200mm-thick aerated reinforced concrete floor slab around a selection of electrical cables on two cable trays and a selection of mild steel pipes, was carried out employing the furnace heating conditions, procedures and criteria of draft European Standard 1366: Part 3: 1996-1-28 for a duration of 300 minutes in on 26 June 1997. For the criteria adopted the following performances for the two systems were achieved:

Penetration A	Firecrete Standard Mortar, 50mm thick, over 140kg/m ³ Rocksil mineral wool slab, 50mm thick	Integrity: 86 minutes Insulation: 31 minutes
Penetration B	Firecrete Standard Mortar, 100mm thick, over 140g/m ³ Rocksil mineral wool slab, 50mm thick	Integrity: 99 minutes Insulation: 42 minutes

The following table gives an indication of where failure occurred with reference to the specific services passing through each.

Penetration	Service ref.	Service Description	Insulation failure (min)	Integrity failure (min)
A	1	108mm-diameter steel pipe	31	no failure
	2	60.8mm-diameter steel pipe	40	no failure
	3	42mm-diameter steel pipe	45	no failure
	4	25mm-diameter steel pipe	73	no failure
	D	Cable tray with 16 x 13mm-diameter cables and a 55mm-diameter cable	59	86
	E	Cable tray with 3 x 35mm-diameter cables	48	89
B	-	Centre of largest free area of seal	232	no failure
	1	108mm-diameter steel pipe	42	no failure
	2	60.8mm-diameter steel pipe	67	no failure
	3	42mm-diameter steel pipe	80	no failure
	4	25mm-diameter steel pipe	160	no failure
	D	Cable tray with 16 x 13mm-diameter cables and a 55mm-diameter cables	93	99
E	Cable tray with 3 x 35mm-diameter cables	84	119	
-	Centre of largest free area of seal	no failure	no failure	



Test stopped after 300 minutes at the request of the sponsor.

A.2 Fire test TE 88122A

A fire resistance test on Sandersfire Firecrete HS Mortar penetration sealing system, 100mm thick, sealing an aperture, 600mm x 400mm, in an aerated reinforced concrete floor slab around a selection of electrical cables on two cable trays and a selection of mild steel pipes, was carried out employing the furnace heating conditions, appropriate procedures and criteria of draft European Standard prEN 1366-3 on 16 December for a duration of 240 minutes.

The Firecrete HS mortar penetration sealing system achieved 35 minutes with respect to insulation and 82 minutes with respect to integrity.

For information the following table gives an indication of where failure occurred with reference to the specific services passing through the sealing system.

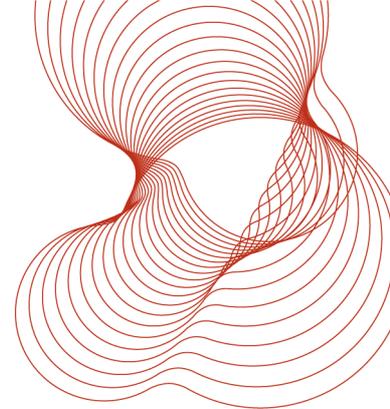
Service reference	Service description	Insulation failure min	Integrity failure min
1	25mm-diameter	90.5	No failure
2	42mm-diameter pipe	63.5	No failure
3	60.3mm-diameter pipe	49.0	No failure
4	108mm-diameter pipe	35.5	No failure
D	Cable tray with 3 x 35mm-diameter cables	57.0	No failure
E	Cable tray with 19 x 13mm-diameter cables and a 55mm-diameter cable	56.5	82*
-	Centre of largest free area of seal	231.0	No failure

* Integrity failure caused by copper core slipping down out of cable insulating sleeve due to inadequate clamping.

A.3 Fire test TE 88122B

An ad-hoc fire resistance test on a Sandersfire HD Mortar penetration sealing system, sealing an aperture, 600mm x 400mm, in an aerated reinforced concrete floor slab around a selection of electrical cables on two cable trays and a selection of mild steel pipes, was carried out employing the furnace heating conditions, appropriate procedures and criteria of draft European Standard prEN 1366-3 on 16 December 1996 for a duration of 240 minutes.

The Sandersfire HD Mortar sealing system, 100mm thick, achieved 38 minutes with respect to insulation and 84 minutes with respect to integrity.



For information, the following table gives an indication of where failure occurred with reference to the specific services passing through the sealing system.

Service reference	Service description	Insulation failure (min)	Integrity failure (min)
1	25mm diam. mild steel pipe	101	No failure
2	42mm diam. mild steel pipe	70.5	No failure
3	60.3mm diam. mild steel pipe	52	No failure
4	108mm diam. mild steel pipe	38	No failure
D	Cable tray with 3 x 35mm diam. cables	42.5	No failure
E	Cable tray with 19 x 13mm diam. cables and a 55mm diam. cable	51.5	84*
-	Centre of largest free area of seal	201	No failure

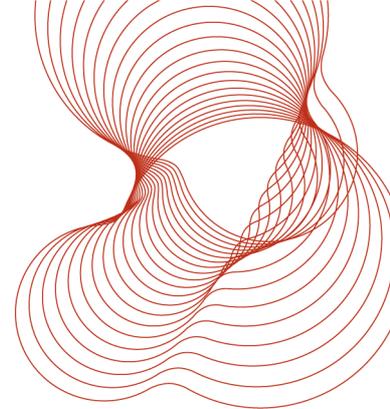
* Integrity failure caused by copper core slipping down out of cable insulating sleeve due to inadequate clamping.

A.4 Fire test J 86627/1

A fire resistance test on Firecrete Standard penetration sealing system, sealing four apertures (A to D), each 200mm x 200mm, in a 250mm-thick aerated reinforced concrete floor slab and two apertures (E & F) in a 230mm-thick brick wall, each 600mm x 200mm. Each aperture was fitted with a selection of electrical cables on a cable tray and one aperture (F) was fitted with a steel pipe. The test was carried out employing the furnace heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 for a duration of 240 minutes.

The seals were:

- Penetration A 50mm-thick Firecrete Standard Mortar over 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.
- Penetration B 100mm-thick Firecrete Standard Mortar over 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.
- Penetration C 150mm-thick Firecrete Standard Mortar over 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.
- Penetration D 200mm-thick Firecrete Standard Mortar over 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.
- Penetration E 25mm-thick Firecrete Standard Mortar on both sides of 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.
- Penetration F 50mm-thick Firecrete Standard Mortar on both sides of 50mm x 128kg/m³ Rocksil LR140 mineral wool slab.



All the penetration seals satisfied the adopted integrity criteria for 240 minutes. Seals A to D satisfied the adopted insulation criteria for 240 minutes. Seal E satisfied the adopted insulation criteria for 180 minutes on the seal and 160 minutes on the cable tray and seal F for 240 minutes on the seal and cable tray and 160 minutes on the steel pipe.

A.5 Fire test J 86627/2

A fire resistance test on Firecrete Standard Mortar penetration sealing system, sealing an aperture in a 230mm-thick brick wall, 750mm x 250mm. The aperture was fitted with a selection of electrical cables on two cable trays. The mortar was 100mm thick. The test was carried out employing the furnace heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 for a duration of 242 minutes. The penetration seal satisfied the adopted integrity criteria for 242 minutes and satisfied the adopted insulation criteria for 242 minutes on the seal and 123 minutes on the cable tray.

A.6 Fire test TE 90792

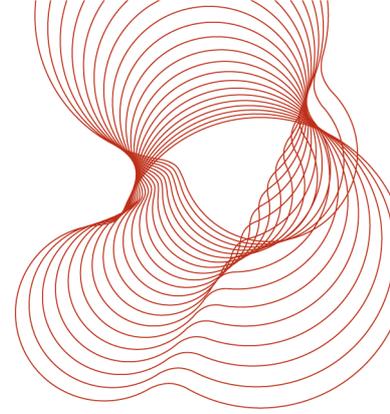
An ad-hoc fire resistance test employing the furnace heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 was carried out on 6 May 1998 on a damper penetration seal system in a dense concrete block wall, 140mm thick, for a heating period of 258 minutes. The Actionair Fire/Shield 201 damper was housed in a steel HEVAC/HVCA installation frame, 600mm x 575mm. The aperture between the frame and the 780mm x 780mm opening in the wall was sealed with Firecrete HS Mortar, 82mm thick. The damper was restrained solely by the sealant; no fixings to the wall were employed. The damper and penetration seal satisfied the adopted integrity criteria for 258 minutes and satisfied the adopted insulation criteria on the seal for 164 minutes on the seal. The damper was uninsulated.

A.7 Fire test TE 91327A

An ad-hoc fire resistance test employing the furnace heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 was carried out on 20 July 1998 on a pipe penetration seal system in a lightweight aggregate concrete floor, 1700mm x 1200mm x 200mm thick, for a heating period of 240 minutes. The two PVCu pipes, each 110mm outside diameter x 3.6mm wall thickness, were located 200mm apart and centrally through an aperture, 600mm x 150mm, so that 500mm protruded from each side and were strapped approx. 300mm above the slab using plastic-coated wire to a steel Unistrut frame fixed to the slab. Rocksil S140 was fitted tightly across the aperture in the slab around the pipes 100mm below the top of the slab. Sleeve pipe wraps were fitted around each pipe with a 10mm depth of the lower edge of each pipe wrap inserted into a channel cut in the Rocksil S140 to suit. One pipe wrap comprised four layers of intumescent sheet, each 2.5mm thick x 65mm wide, the other pipe wrap comprised four layers of intumescent sheet, each 2.5mm thick x 75mm wide. Firecrete HS Mortar was poured and trowelled onto the Rocksil S140 around the pipes up to the level of the top of the slab forming a 100mm-deep seal. After the seal had set, the Rocksil S140 was not removed. The end of the pipe within the furnace was sealed with a 50mm-thick stone mineral fibre plug. The pipe and penetration seal satisfied the adopted insulation and integrity criteria for 240 minutes.

A.8 Fire test TE 91327B

An ad-hoc fire resistance test employing the furnace heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 was carried out on 20 July 1998 on a damper penetration seal system in a lightweight aggregate concrete floor, 1700 x 1200mm x 200mm thick, for a heating period of 240 minutes. The Actionair Fire/Shield 201 damper was housed in a steel HEVAC/HVCA installation frame, 500mm x



400mm. The aperture between the frame and the 700mm x 600mm opening in the floor was sealed with Firecrete HS Mortar, 90mm thick, with a permanent shuttering underneath the compound of Rocksil LR140, 40mm thick. The damper was restrained solely by the sealant; no fixings to the wall were employed. The damper and penetration seal satisfied the adopted integrity criteria for 240 minutes and satisfied the adopted insulation criteria on the seal, away from the damper, for 225 minutes to 240 minutes. The damper was uninsulated. After the heating period the damper was subjected to an imposed load of 210kg before the mortar could no longer support the load.

A.9 Fire test WARRES no. 101156

A non-combustibility test in accordance with BS 476: Part 4: 1970 was carried out on 24 November 1997 on Firecrete HD Mortar. The material was found to be classifiable as non-combustible.

A.10 Fire test WARRES no. 123018

A non-combustibility test in accordance with BS 476: Part 4: 1970 was carried out on 8 February 2002 on Firecrete Standard Mortar. The material was found to be classifiable as non-combustible.

A.11 Fire test WARRES no. 101155

A non-combustibility test in accordance with BS 476: Part 4: 1970 was carried out on 9 December 1997 on Firecrete Firecrete HS Mortar. The material was found to be classifiable as non-combustible.

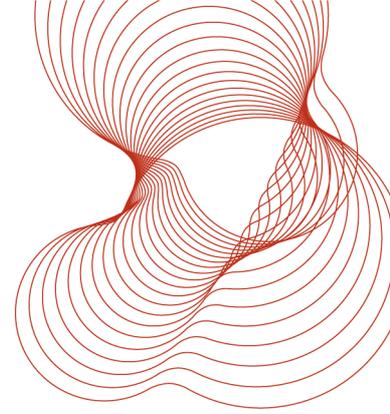
A.12 Fire test TE 201433

This document confirms that an ad-hoc fire resistance test employing the appropriate procedures and criteria of BS 476: Part 20: 1987 was conducted on two service penetration sealing systems in an aerated concrete floor, 1m x 1.5m x 200mm thick, for a duration of 245 minutes. The furnace was controlled to follow the hydrocarbon fire-simulation heating regime of Appendix D of the standard as closely as possible.

Both penetrations measured 600mm x 400mm. The following services passed through each penetration: a 225mm-wide slotted galvanised-steel cable tray bearing one 32mm-diameter cable and a bundle of sixteen 12mm-diameter cables; and steel pipes of diameter/wall thickness of 102mm/6mm, 60mm/5mm, 42mm/4mm and 25mm/1.5mm. Firecrete Standard Mortar, 100mm thick, sealed one penetration around the services, Sandersfire Firecrete HS Mortar, 100mm thick, similarly sealed the other penetration.

The test was carried out on 18 October 2000 and a preliminary assessment of the results indicates that for the criteria adopted the following performances were achieved:

Firecrete Standard Mortar	Integrity:	245min
	Insulation:	24min
Firecrete HS Mortar	Integrity:	245min
	Insulation:	23min (102mm diameter pipe)



The time to first exceeding the maximum temperature limit (180° C rise) for specific locations is given in the following table:

Location	Firecrete Standard Mortar	Firecrete HS Mortar
	min	min
On 32mm-diameter cable	50	40
On cable bundle	83	79
On cable tray	136	244
On 25mm-diameter pipe	81	47
On 42mm-diameter pipe	30	30
On 60mm-diameter pipe	27	26
On 102mm-diameter pipe	24	23
On seal away from services and the concrete	No failure	No failure

Full details of the test and the test construction will be found in BRE(LPC) report reference TE 201433.

A.13 Fire test 209933

An ad-hoc fire resistance test was carried out to determine the performance of four dampers sealed in a blockwork wall with Firecrete HS Mortar when subjected to the heating conditions, appropriate procedures and criteria of BS 476: Part 20: 1987 for a duration of 240 minutes on 15 October 2002.

Four Actionair dampers were installed in a 2 x 2 array within the aperture, 2.50m wide x 2.57m high, of a concrete blockwork wall and sealed with Firecrete HS mortar. The dampers were Fire/Shield 101 and 201 and two Smoke/Shield PTC501 dampers. Each was fitted into a HVCA frame. A length of duct was fitted to the non-fire face of the right-hand Smoke/Shield PTC501 damper, (as viewed from the non-fire side). Each damper was approximately 1m x 1m. The Firecrete HS mortar filled the aperture in the wall between and around the dampers in widths of 90mm to 140mm, sealing and supporting the dampers in the wall. The mortar was 90mm deep and flush with the fire side of the wall. The pairs of steel strips around the perimeter of the HVCA frames were not folded out such that the mortar was applied with the steel strips remaining almost parallel with the damper casing.

For the criteria adopted, the construction maintained integrity until 234 minutes when a gap developed between the blades in the left-hand Smoke/Shield PTC501 damper, (as viewed from the non-fire side). There was no integrity failure in any of the other dampers nor in the Firecrete HS Mortar seal throughout the test. The dampers were not assessed with respect to the insulation criteria. The maximum temperature limit, (180°C rise), on the Firecrete HS Mortar remote from the dampers was first exceed after 219 minutes.

=====REPORT ENDS=====