FIREMAC

passive fire protection

Issue Number: 5
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FIREMAC FM FIRE DUCTS

Technical Manual: Firemac FM Fire Duct Systems tested to BS 476: Part 24: 1987

BS 476: Part 24

FIREMAC TECHNICAL MANUAL

FOR FIREMAC FM FIRE DUCTS

TESTED TO BS 476: PART 24

ISSUE 5 – 6th November 2023

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1. Introduction

Section 1.1: Scope

Firemac Technical Manual (Issue 5) includes most of the information required to fabricate and install the correct Firemac FM Fire Duct System tested to BS 476: Part 24: 1987 for ventilation (supply and extract), kitchen extract, smoke extract, and pressurisation. Each installation should be considered and approved by the approval authority before each installation. Supervisors for the ductwork fabrication team, and supervisors for the installation team, should be fully familiar with the complete manual and should have successfully completed a Firemac training course.

Firemac Technical Manual (Issue 5) does not cover Firemac FM (EN) Fire Duct Systems, tested to the European Standards. For Systems requiring compliance with the European Standards – please consult Firemac direct:

Technical Email:	technical@firemac.com
Contact Number:	01620 892 202 (Option 2 – for 'Technical')

Section 1.2: Methods of fire protecting Heating Ventilation and Air Conditioning (HVAC) systems

Ductwork in buildings is essential for ventilation, and smoke control. When these systems penetrate walls and floors, they form a passage for fire and smoke to rapidly spread throughout the building and to block escape routes. Therefore, it is vital that these life safety systems are fire resisting, and tested for the relevant criteria in accordance with the relevant test standard. This document shall discuss Firemac FM Fire Duct Systems tested to BS 476: Part 24: 1987. As these systems are an important part of the fire strategy in a building, it is critical that the persons who are specifying, fabricating, and installing these systems are competent to do so.

As stated in the BESA document DW/144 "ductwork constructed to DW/144 standard has no fire resistance." Where ductwork passes through fire separating elements such as compartment walls or floors or the enclosures to protected escape routes, then the integrity of those elements should be maintained, using one or a combination of:

Method 1:	Thermally actuated fire dampers
Method 2:	Fire-resisting enclosures
Method 3:	Fire-resisting ductwork
Method 4:	Automatically actuated fire and smoke dampers triggered by smoke detectors

This document shall discuss 'Method 3: fire resisting ductwork'.

Section 1.3: What is fire resisting ductwork?

Fire resisting ductwork is ductwork which has been succesfully tested to satisfy performance criteria in accordance with a relevant test standard. This document shall discuss fire resistant ductwork, tested in accordance with BS 476: Part 24: 1987, tested to satisfy the following performance criteria:

Stability (required for all systems)

Stability is the ability of a duct system to remain in position to fulfil its function for the required duration, in the event of a fully developed fire. For smoke extract ductwork, this also means the ductwork will maintain over 75% of its cross sectional area, to enable it to adequately extract smoke as required, in the event of a fire.

Integrity (required for all systems)

Integrity is the ability of a duct system to prevent the passage of hot gases or flaming through the ductwork walls or cross joints, for the required duration, in the event of a fully developed fire.

Insulation (required unless a relaxation is obtained)

Insulation is the ability of a duct system to prevent the outer surface from exceeding an average temperature rise of 140°C, and a maximum temperature rise of 180°C, for the required duration. There is additional guidance, for kitchen extract ductwork, in section 3.2. For further information, contact Firemac.

Section 1.4 What is the process, for the design, fabrication and installation of fire resisting ductwork?

Due to the various parties involved in the design, fabrication and installation of fire resisting ductwork systems, it is critical that all the relevant parties are involved at the relevant stage(s) in the project. To assist in providing guidance on this matter, we have prepared the below table using the RIBA Fire Safety Plan of Work as a template. The below table is not exhaustive, but outlines the principles of the installation. See ASFP TGD 18 for further information, which offers further guidance on the installation of fire resisting ductwork systems.

Activity	Who does this apply to?	Section	RIBA Stage
Development of Plan of Works	Principal Designer & Principal Contractor.	-	Stage 1
Initial Site Survey	Principal Designer, Principal Contractor, System Manager & System Designer.	-	Stage 1
Concept Design to Technical Design	Principal Designer, Principal Contractor, System Manager & System Designer.	2 & 3	Stage 2-3
Final Site Survey	Principal Designer, Principal Contractor, System Manager & System Designer.	-	Stage 3-4
Procurement & Manufacture of Fire Resisting Ductwork	Principal Contractor, System Manager, Quantity Surveyor, Fire Resisting Duct Manufacturer.	4	Stage 5
Selection of Installation Contractor	Principal Contractor, System Manager & Quantity Surveyor.	-	Stage 5
Installation of Fire Resisting Ductwork*	Principal Contractor, System Manager & Fire Resisting Duct Installer.	5	Stage 5
Installation of Firestopping*	Principal Contractor, System Manager & Firestopping Contractor.	6	Stage 5
Installation of Insulation*	Principal Contractor, System Manager & Insulation Contractor.	7	Stage 5
Installation (Other)	All Parties	8	Stage 5
Inspection (Relevant after each of the stages above, with an asterix *)	Principal Contractor, System Manager & Fire Resisting Duct Installer.	9	Stage 5
Issue of O&M Documentation	Principal Contractor, System Manager & Contract Adminstrator.	9 & 10	Stage 6
On-going use (Periodic Inspection / Maintanence)	Client	10	Stage 7

Figure 1: Flow Chart, following the stages of the RIBA Plan of Works Fire Safety

Section 1.5: Where can Firemac FM Fire Duct Systems be used?

Firemac have developed and succesfully tested a wide range of fire-resisting ductwork systems using Firemac FM Fabric PSA applied to steel ductwork. All Firemac FM Fire Duct systems are listed in the decision tree and selector chart given within section 3.5 and 3.6 with specific construction details for the fabrication and installation of the Firemac FM Fire Duct Systems given within sections 4 to 7.

Firemac FM Fire Duct Systems are designed to be used as normal ventilation ducts, kitchen extract ducts, smoke extract ducts, and pressurisation ducts with fire resistance of up to 240 minutes when tested to BS 476: Part 24: 1987 (ISO 6944: 1985).

The maximum permissable duct size is 2500mm wide x 1250mm deep (for rectangular and flat oval) or 1250mm diameter (for circular). For larger ductwork, please contact Firemac Ltd.

Section 1.6: Firemac CPD

To help you better understand the Firemac FM Fire Duct Systems, Firemac offer tailored training courses on fire resisting and smoke control ductwork, and would encourage all those involved within a construction project to be familiar with all relevant standards and terms. Firemac provide training courses for Firemac FM Fire Duct systems to fabricators / installers, but can also provide separate courses to architects, fire consultants, and those with an interest in the specification of fire resisting ductwork systems.

Firemac are a certified CPD course provider by the Chartered Institution of Building Service Engineers (CIBSE), with the course entitled 'An Introduction to Fire Resisting Ductwork: Covering British & European Standards'. The course lasts approximately 1-hour – and is available in person and / or via Microsoft Teams format. If interested, please contact Firemac.

CIBSE CPD

Section 1.7: Third-Party Certification

Firemac FM Fabric PSA is manufactured under a third-party certification scheme operated by IFC Certification Ltd. The relevant certificates, IFCC FRD600 and IFCC FRD600a, are available on the IFC Certification website.

Section 1.8: Supporting Test Data

A Building Research Establishment (BRE) Global assessment report summarises all the fire resistance tests that have been carried out on the Firemac FM Fire Duct Systems, and describes in detail the range of duct systems that they consider will provide the stated fire resistance. A copy of the assessment is available to the fire engineer / approval authority, upon request.

2. System Design & Design Considerations

Section 2.1: Drawing Notes

The party responsible for the creation of drawings of the fire resisting ductwork on a project, should ensure they do their upmost to ensure the project drawings are clear and concise. This section outlines areas of good practice, which should be followed when creating such drawings.

1. Where there is sufficient fire resisting ductwork, this should be shown on a separate drawing from any standard non-fire resisting ductwork. For co-ordination purposes, this may require the duct to be produced on the same drawing but on a separate layer, with the facility to add an agreed standard of hatching for different purposes

2. The construction notes on the drawing should refer to the Firemac specification as well as any other relevant specification e.g. BESA documents DW/144, DW/172, and TR 19.

3. The drawing should name the relevant Firemac FM Fire Duct System, e.g. Firemac FM120 Fire Duct System, and clearly state the required fire resistance period including if its stability and integrity ONLY or if it is designed to also satisfy the insulation criteria. The drawing should also state the purpose of the ductwork.

4. All drawings should include the following note: "*All Firemac ductwork supports are calculated to suit the ductwork loading in a fire situation. Therefore no other services or trades work can be supported from the duct or duct supports. Firemac ducts should be supported directly from a structure capable of supporting the load of the Firemac System under fully developed fire conditions, for the required period. If this is impossible due to site conditions, contact Firemac for advice. Any failure to comply with this, will result in a Certificate of Conformity not being issued.*"

5. Duct support details and access panel sizes and locations should be detailed on the drawing. Further guidance on the size and location of access panels, is given later in this construction manual.

Section 2.2: Design Considerations

At an early stage in a construction project, there are many items to consider, and all relevant parties involved in the design, fabrication and installation of fire resisting ductwork systems should be consulted. The below items are items which should be considered. This list is not extensive, but is to provide guidance to ensure you are clear in what one is quoting for when pricing for the installation of a Firemac System.

1. Is the ductwork going to be installed in an underground / metro location, OR in a swimming pool area? If so, contact Firemac. Additional requirements may need to be satisifed in said environments.

2. Who is responsible for the installation of fire-stopping? The relevant information from section 6 of this manual, is to be passed to the relevant contractor, to enable them to adequately carry out the installation.

3. Is the ductwork to be insulated? If so, is this for acoustic / thermal purposes under ambient conditions, or does the ductwork need to satisfy the insulation criteria of the test standard under fire conditions. Will the acoustic / thermal insulation flame, when exposed to heat?

4. If the ductwork is to be insulated to satisfy the insulation criteria of the test standard under fire conditions, who is responsible for the installation of the insulation? The relevant information from section 7 of this manual, is to be passed to the relevant contractor, to enable them to adequately carry out the installation.

5. Who is the contractor, responsible for the ongoing maintenance of the Firemac System? E.g. the cleaning contractor? Once this is identified, what are their requirements in terms of the size and location of access panels required, to enable them to adequately maintain the Firemac FM Fire Duct System?

6. Is the ductwork installed externally? If so, who is responsible for carrying out protection to external ductwork, after the installation of the Firemac FM Fire Duct System.

3. Specification for Firemac FM Fire Duct Systems

Section 3.1: Ventilation Ductwork

If the approval authority requires general purpose ventilation, but they cannot install dampers, for example due to lack of space, the Firemac FM Fire Duct Systems may be used to maintain compartmentation. These are generally required from point of inlet (extract) / outlet (supply) to where the system terminates, e.g. outside the building on the roof. The most appropriate Firemac FM Fire Duct Systems for this application would be as follows Firemac FM60, FM120, FM240, FM60i, and FM120i.

Firemac System	Fire Resistance Performance to BS 476: Part 24: 1987		
	Stability	Integrity	Insulation
FM60	60 min	60 min	-
FM60i	60 min	60 min	60 min
FM120	120 min	120 min	-
FM120i	120 min	120 min	120 min
FM240	240 min	240 min	-

Table 1: Firemac FM Fire Duct Systems (Ventilation)

Section 3.2: Kitchen Extract Ductwork

Risk of a fire in the kitchen spreading to other compartments

If the approval authority is concerned about a fire originating in the kitchen, and spreading to other compartments, the most appropriate Firemac FM Fire Duct Systems for this application would be as follows: Firemac FM60, FM120, FM240, FM60i, and FM120i. Such systems would generally be accepted, if the kitchen is separated from other areas using fire resisting construction (walls, floors etc.).

Risk of a fire outside the duct, igniting grease inside the duct and spreading back to the kitchen

If the approval authority is concerned about a fire outside of the kitchen compartment, igniting grease inside the duct and causing a fire to spread back into the kitchen, the most appropriate Firemac FM Fire Duct System for this application would be the Firemac FM30K. Such systems would generally be required, if the kitchen is not separated from other compartments using fire resisting construction (walls, floors etc.), or if the kitchen does not form part of an escape route.

Firemac System	Fire Resistance Performance to BS 476: Part 24: 1987			
	Stability	Integrity	Insulation	Combustible Linings
FM60	60 min	60 min	-	-
FM60i	60 min	60 min	60 min	-
FM120	120 min	120 min	-	-
FM120i	120 min	120 min	120 min	30 min
FM240	240 min	240 min	-	-
FM30K*	120 min	120 min	120 min	30 min

Table 2: Firemac FM Fire Duct Systems (Kitchen Extract)

*If this system is required, the ductwork should be fabricated / installed in accordance with the Firemac FM120i Fire Duct specification, taking into consideration additional requirements for kitchen extract ducts.

Section 3.3: Smoke Control Ductwork

The purpose of smoke control ductwork, is to extract smoke from the building. Its ability to function is demonstrated by its ability to maintain more than 75% of the duct's original cross-sectional area when tested to BS 476: Part 24. To address the smoke control requirement, it would be important to identify the requirements of the approval authority. The approval authority should be consulted on each project, before proceeding.

The performance of the duct system will depend on the internal air temperature it is exposed to and its location in relation to combustible materials and personnel. The performance of each duct system is listed in the table below. The appropriate parties i.e., the smoke control consultant, fire consultant, and approval authority should be consulted, to help determine which system is required. The appropriate Firemac FM Fire Duct Systems for this application would be as follows: Firemac FM60, FM120, FM60i, or FM120i.

Firemac System	Fire Resistance Performance to BS 476: Part 24: 1987				Insulation, when the maximum air temperature does not exceed 300°C.
	Stability	Integrity	Insulation	Smoke Extract	
FM60	60 min	60 min	-	60 min	60 min
FM60i	60 min	60 min	60 min	60 min	60 min
FM120	120 min	120 min	-	120 min	120 min
FM120i	120 min	120 min	120 min	120 min	120 min

Table 3: Firemac FM Fire Duct Systems (Smoke Control)

Section 3.4: Important notes for all Firemac FM Fire Duct Systems:

It is important to ensure you are clear on which system is required prior to proceeding with the fabrication and installation of the Firemac FM Fire Duct Systems, to ensure the system you fabricate and install is capable of satisfying the requirements of the project. In section 3.5, a project specification questionnaire is prepared to help enable you to obtain the relevant answers to all questions from your client.

The duct construction specification is to comply with this manual; and the current version of any relevant design codes. For example, DW/144, DW/172, TR19, HTM 03-01, SHTM 03-01. On the provision this is adhered to, the Firemac FM Fire Duct Systems will be capable of satisfying the stability, integrity and insulation criteria of BS 476: Part 24: 1987, defined in the tables above.

Section 3.5: Project Specification Questionnaire

It is critical to ensure the Firemac FM Fire Duct System specified is fit for purpose. To enable you to select the relevant construction standards table, Firemac would strongly recommend the below document is issued to someone familiar with the fire strategy, for completion. Contact Firemac Ltd, to obtain the most recent copy of the project specification questionnaire. Firemac would recommend issuing the completed document to Firemac, with your proposed system, to ensure it is adequate to comply with your clients requirements.

	Question	Response
1	What is the project name, and address?	Example: Firemac Ltd, Dunbar, EH42 1RQ.
2	What is the purpose of the ductwork?	Example: Smoke Extract
3	What is the maximum size of the ductwork?	Example: 1000mm x 600mm
4	What is the required fire resistance period?	Example: 120 minutes
5	If the system is being used for kitchen extraction, is the kitchen separated from other compartments, via fire resisting construction (walls/floors/doors)?	Example: Yes
6	If the ductwork is required for smoke extraction, is the ductwork required to extract smoke during the early stages of a fire, e.g. while sprinklers are operating, or during and after a fully developed fire?	Example: while sprinklers are operating.
7	If the ductwork is only required to extract smoke during the early stages of a fire, please confirm what temperature is expected within the ductwork?	Example: 300°C
8	Does the ductwork have to satisfy the insulation performance criteria? If yes, please define if all compartments, or if only in certain compartments. The approval authority may accept a relaxation, for example, where the ductwork is located at least 500mm from personnel or combustible materials, but this should be addressed through a written fire risk assessment, with written approval obtained.	Example: Yes, over the escape corridor and within compartments where the ductwork is within 500mm of any combustible services. A relaxation has been obtained within the riser shaft, as it is enclosed with fire resisting construction with no combustible materials within 500mm of the proposed ductwork.
9	Have the required access panels been marked on the drawings (see DW/144, DW/172 and TR 19)	Example: Yes, shown on drawings.
10	Please confirm if there are any additional design requirements e.g. high pressure, acoustic insulation, or external location	Example: No
11	Will the duct be installed in an underground/metro?	Example: No

Questions answered by:

Name	Position	Company	Date
Example: John Smith	Example: Senior Fire Engineer	Example: John Smith Fire Protection	Example: XX / XX / XX

Table 4: Firemac Project Specification Questionnaire

Section 3.6: Decision Tree

Before proceeding with the fabrication, please issue the client with the 'Project Specification Questionnaire'. See 3.5 for further information. Once this information is clear, use the below 'Firemac Decision Tree' to identify the correct system required for this project. Written approval should be obtained from the approval authority before proceeding with the fabrication and installation of a Firemac FM Fire Duct System.

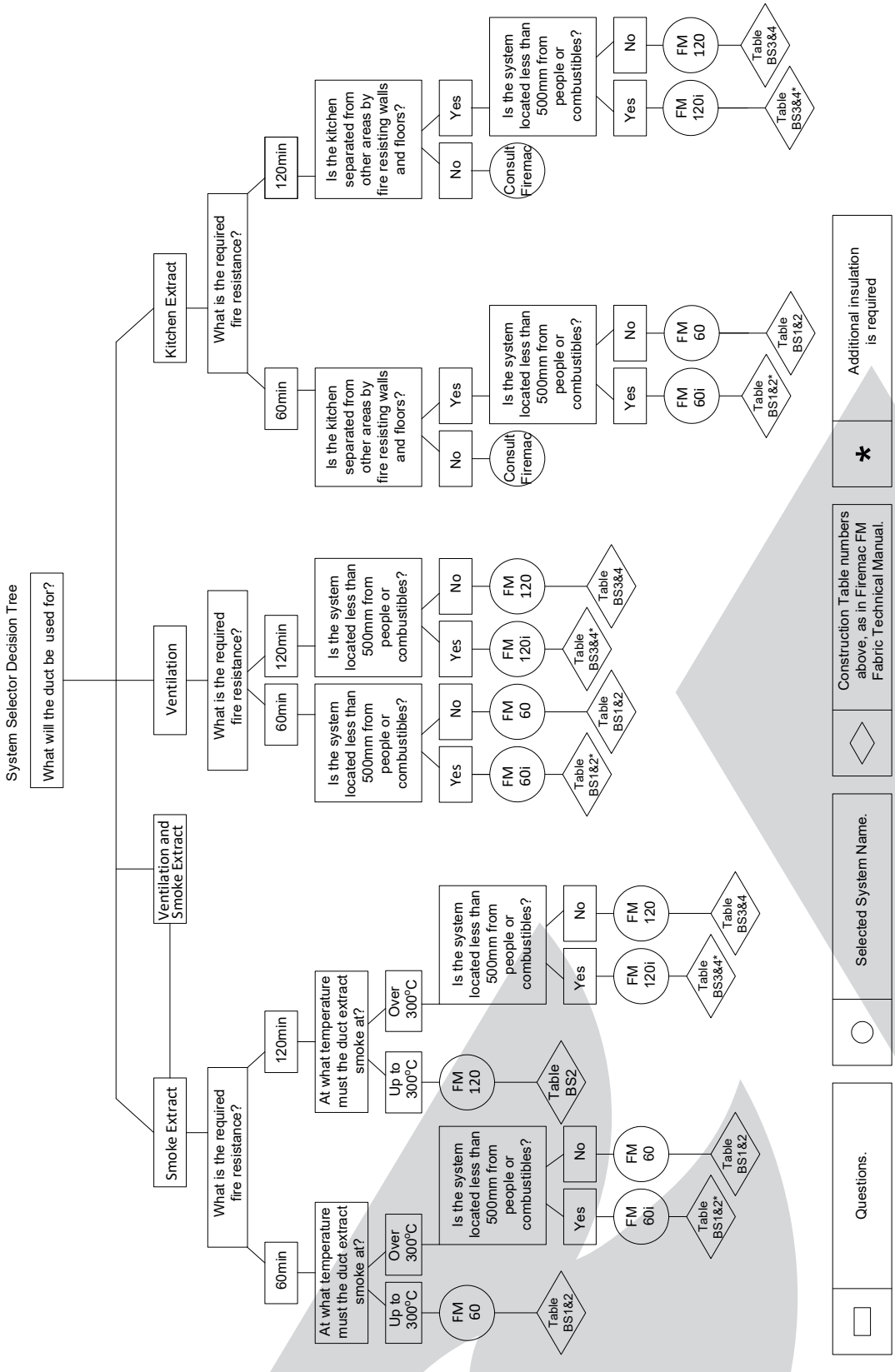


Figure 2: Firemac FM Fire Duct System Flow Chart.

4. Fabrication (Base Ductwork)

Section 4.1: Steel Ductwork Sections

Once the correct Firemac FM Fire Duct System has been specified (section 3) and written approval is obtained, a trained fabricator may fabricate the relevant Firemac FM Fire Duct Sections. Guidance is given in this section, on the main principles with regards the fabrication of the duct sections. The fabricator should, however, be familiar with the full construction manual.

The following specification of Firemac FM Fire Duct sections is relevant to rectangular ductwork sections, maximum 2500mm wide x 1250mm deep x 1500mm long, and circular ductwork up to 1250mm in diameter. For larger ductwork, contact Firemac Ltd.

CAUTIONARY NOTE TO ALL DUCTWORK DESIGNERS, MANUFACTURERS AND INSTALLERS:

The construction details and materials of the whole Firemac duct system are proven by test or assessment in accordance with the requirements of BS 476: Part 24: 1987, and so the ductwork should comply with the current Firemac Technical Manual, as well as any relevant design specifications and the project performance specification.

Section 4.2: Key Considerations

The steel ductwork is to comply with this manual, AND the project performance specification AND the current version of the relevant design codes. For example, DW144, DW/172 and TR 19 – whichever is relevant & most onerous. For kitchen extract ducts, for example, DW/172 recommends the base ductwork is fully welded.

DW/144 states that an aspect ratio of width: height of greater than 4:1 is not recommended. Although such ducts offer no problems of construction, they increase frictional resistance and possibility of noise.

The duct can be made using mild steel, galvanised steel, or stainless steel. The minimum thickness of steel sheet will vary for various sizes of ducts, fire and smoke performance, and duct operating pressures (e.g., see DW/144), but should never be less than 0.8mm thick.

If using a different method of cross-joint (e.g. a TDF profile), contact Firemac for guidance.

For ventilation and smoke extract ducts, Firemac FM Silicone Sealant or Firemac FM Acrylic Sealant is used to seal flange corners and the longitudinal seam. Firemac FM Acrylic Sealant is only suitable for use, when the ductwork will be located in a dry internal environment, and will not be exposed to moisture.

For kitchen extract ducts, Firemac FM Silicone Sealant is required to seal flange corners and longitudinal corner joints. Firemac also recommend a bead of Firemac FM Silicone Sealant is applied near the ends of the fabric covered steel duct before the flanges are slid into position, or around the internal perimeter of the flange.

Particular care should be taken with joints in kitchen extract ducts. For example, DW/172 states in the kitchen fire zone, where total grease tightness is required, the duct shall be constructed from either 1.2mm stainless steel or 1.6mm zintec, be of fully welded construction with welded angle iron flanges, and use full-faced gaskets. We have been unable to identify any manufacturer of a slide-on flange profile that can give a 100% guaranteed method of sealing against grease leakage. Therefore, it is advisable to extend the DW/172 specification for ductwork inside the kitchen area, for at least 3m from the canopy, even if this means the duct is outside the kitchen.

Between flange joints, an approved Firemac gasket / tape should be used. Refer to section 5.4 for guidance on the tapes required to seal cross-joints in Firemac FM Fire Duct Systems.

Firemac would recommend the use of all-steel, blind, sealed rivets in all fire resisting ductwork systems, which are mandatory in kitchen extract systems. It is good practice not to use screw fixings due to health and safety concerns. This is particularly important within 1000mm of access panels used for cleaning or maintenance of the Firemac FM Fire Duct Systems.

Section 4.3: Firemac Products

Firemac have tested a range of products, each succesfully tested to form part of the Firemac FM Fire Duct system range. it is critical these products, purchased direct from Firemac Ltd, are used in the fabrication of the Firemac FM Fire Duct System(s). For up to date prices and to order materials, please contact Firemac as below:

Sales Email: sales@firemac.com
Sales Contact Number 01620 892 202 (Option 1 - for 'Sales')

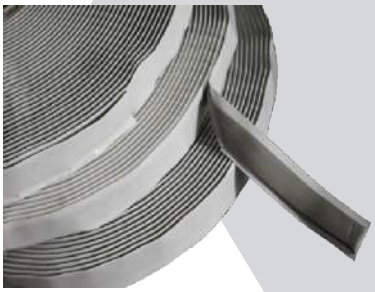
Firemac FM Fire Duct Product Range		
Fabric	**Firemac FM Fabric PSA**	
Sealants	**Firemac FM Acrylic Sealant** (for use in ventilation and smoke control systems, located in dry internal environments)	
	Firemac FM Silicone Sealant (for use in kitchen extract ducts, and in environments moisture is likely to be present e.g. external)	
Gasket	**Firemac FM Butyl Tape** (A ceramic tape is also applicable for use in certain applications, as per section 5.3. For further further information, please contact Firemac)	
Access Panels	**Firemac FM Access Panels**	

Table 5: Firemac FM Product Range

Section 4.4: Application of Firemac FM Fabric PSA

Firemac FM Fabric PSA contains a self adhesive backing. No additional adhesive is therefore required.

The Firemac FM Fabric is applied to steel ductwork sections, after the ductwork sections are formed, but before any slide-on flanges or stiffeners are fixed. However, if it is preferred to use steel angle flanges that are welded to the steel sheet, then the fabric is applied after the angles are installed, and the edge of the fabric abuts the toe of the flange leg. In the latter case, as well as bonding the fabric to the steel sheet, the edge of the fabric that abuts the angle should be mechanically fastened using options 2 or 3, as described below.

Prior to the application of the fabric, all surfaces should be clean, dry and grease free.

The Firemac FM Fabric should also be secured mechanically at any fabric joint that is not held by a slide-on flange profile or external stiffener, using any of the following options. In all cases, use 4.8mm x 10mm all-steel, blind, sealed rivets in kitchen extract ducts, and within 1000mm of all Firemac FM Access Panels.

Firemac strongly recommend the use of option 1 to mechanically secure any longitudinal seams, as this helps prevent damage to corners when handling the ductwork and during transportation.

For kitchen extract ducts, it is recommended that the fabric overlap is kept along an upper corner in any horizontal run of kitchen extract duct, to reduce the likelihood of leakage.

Option 1: Steel Angle

A steel angle (25 x 25 x 1mm or similar) is applied, along the longitudinal edge of the duct section where the fabric overlap is located. The angle is secured through the fabric into the steel duct at 200mm centres using all-steel, blind, sealed rivets, 4.8mm x 10mm with a minimum 9mm diameter head.

Option 2: Steel Strip

A steel strip (25 x 1mm or similar) is applied, along the longitudinal edge of the duct section where the fabric overlap is located. The strip should be located 2mm from the edge, to avoid concerns with sharp edges. The strip is secured through the fabric into the steel duct at 200mm centres using all-steel, blind, sealed rivets, 4.8mm x 10mm with a minimum 9mm diameter head.

Option 3: Large Head Rivets

The fabric overlap is secured at maximum 200mm centres, using all-steel, blind, sealed rivets, 4.8mm x 10mm with a minimum 12mm diameter head.

IMPORTANT NOTE: CIRCULAR DUCTWORK (SPIRAL SEAM)

If Firemac FM Fabric PSA is to be applied to circular ductwork with a spiral seam, care should be taken to ensure a clear and concise finish. Firemac recommend the following procedure is followed:

a) Place foam (for example, Barofoam) on a flat surface.
b) Place Firemac FM Fabric onto the acoustic foam, fabric face down.
c) Remove a small amount of the backing paper (e.g. 50mm), from the Firemac FM Fabric PSA.
d) Place the steel ductwork section onto the 50mm.
e) Remove the remaining adhesive backing paper.
f) Roll the ductwork section onto the Firemac FM Fabric, applying a small amount of pressure downwards.

This process helps the fabric compress into the foam, and should provide a neat finish. For complex items such as bends, or for further guidance on the above, please contact Firemac.

Section 4.5: Construction Standards Tables

Once the correct Firemac FM Fire Duct System has been specified (section 3) and written approval is obtained, a trained fabricator may fabricate the relevant Firemac FM Fire Duct Sections. Guidance is given in this section, on the main principles with regards the fabrication of the duct sections. The fabricator should, however, be familiar with the full construction manual.

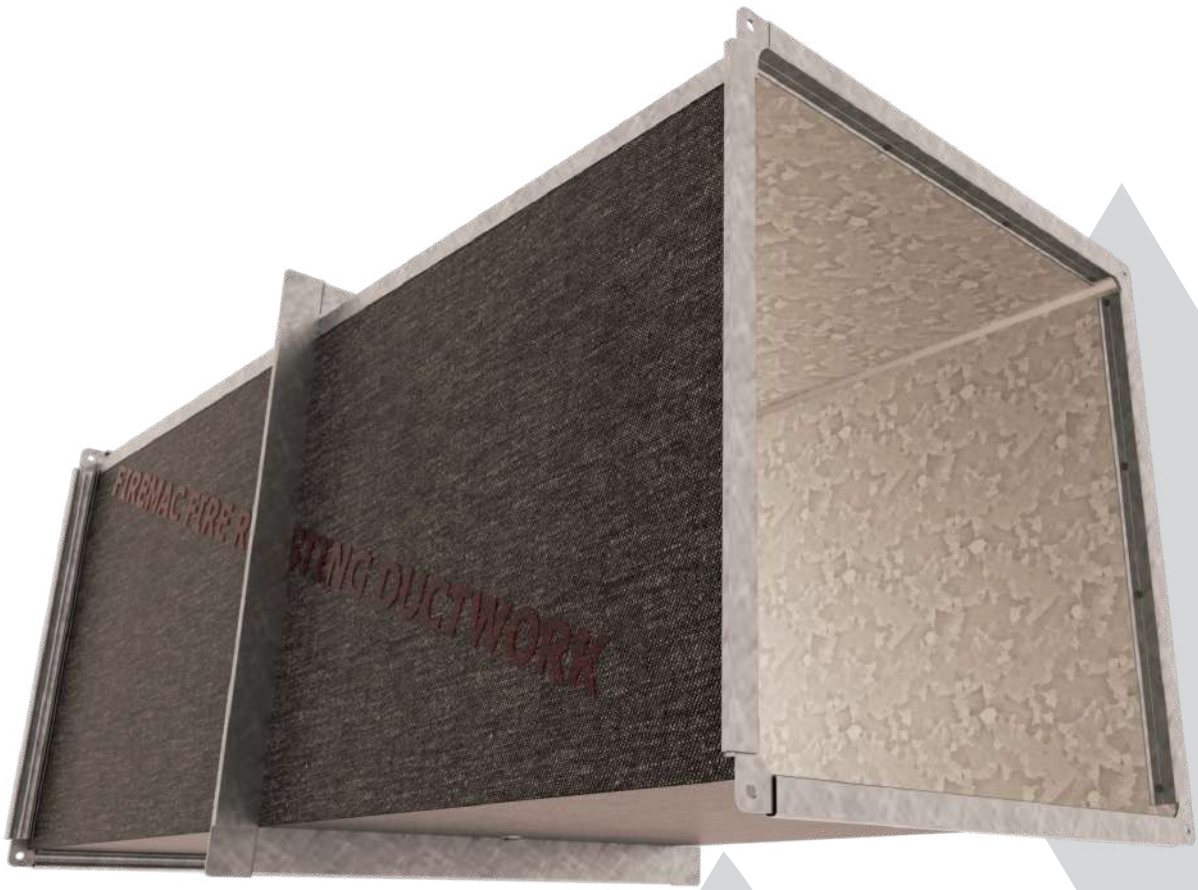


Figure 3: Firemac FM Fire Duct Fabrication

Note: See 'Notes' in each construction table for reference to the numbers above.

Table BS1R: Firemac FM60 & FM60i Fire Duct System. Construction Standards Table (Rectangular Systems)

Longest Side (mm)	Steel Thickness (mm)	Max. Section Length (mm)	Coating (2/3)	Cross Joint Rating (equivelent RSA) (4)	External Stiffener Rating (equivelent RSA) (5)		Internal Stiffening (6)			Longitudinal Seam		Radius Bend (7)		Maximum Duct Size (mm)
							Max Spacing	Fixing	Stiffening Profile	Corner	Sheet	Min. Throat (mm)	Number of Splitters	
800	0.8	1500	Firemac FM Fabric	J3 (30x30x4)	Not required		Not required			Pittsburgh lockform or grooved corner seam only. Use Firemac FM Acrylic or Silicone Sealant.	Grooved or welded seam only. Use Firemac FM Acrylic or Silicone Sealant.	100	1	800 x 800
999	0.8			J3 (30x30x4)	Max. spacing, 750mm centres along the length of each duct section.	S3 (30x30x3)	Not required					100	1	999 x 999
1000	1.0			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1000 x 1000
1250	1.0			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1250 x 1250
1600	1.0			J4 (30x30x4)		S4 (40x40x4)	1000mm centres across the width of each	All-steel nuts, bolts and washers.	M10			100	2	1600 x 1250
2000	1.0			J5 (40x40x4)		S5 (50x50x5)			M12			100	3	2000 x 1250
2500	1.0			J5 (40x40x4)		S5 (50x50x5)			M16			100	Not given in DW/144	2500 x 1250

For duct sizes greater than 2500mm wide x 1250mm deep, contact Firemac Ltd.

Key	Notes
1	Duct sections must be formed from galvanised steel sheets stiffened by means of beading at 400mm centres.
2/3	Firemac FM Fabric PSA products have a self-adhesive backing, and must be applied in accordance with section 4.3 of this Firemac Technical Manual. For other fabrics, contact Firemac.
4	Slide on flanges are mechanically fastened using all steel rivets at maximum 200mm centres. RSA profiles are mechanically fastened using all steel rivets at maximum 150mm centres.
5	Proprietary stiffener mechanically fastened using all-steel rivets at maximum 150mm centres, or as instructed by the manufacturer (whichever is more onerous) RSA profiles are mechanically fastened using all-steel rivets at maximum 150mm centres.
6	Additional internal stiffening required at max. 500mm centres where ducts pass through any fire resisting walls / partitions following the same principles with regards fixings / profile.
7	Radius bend information taken from DW/144. Splitters are recommended, rather than using turning vanes.

Fire Performance when tested to BS 476: Part 24	
Stability	60 minutes
Integrity	60 minutes
Insulation	60 minutes if 60mm thick Rockwool DuctRock product is applied to the outer face. This table does not consider the use of Knauf. For this, contact Firemac.
Smoke Extract	60 minutes.
Kitchen Extract	Contact Firemac if 'combustible linings criteria' is to be satisified.

The specification for the galvanised steel ductwork given is the minimum required, and is designed to satisfy at least medium pressure class B within DW/144. If BESA DW/144, SMACNA or other relevant codes require a more onerous specification for the required function of the duct in normal conditions, then these must be complied with.

This table is designed to provide notes on the fabrication of the Firemac FM Fire Duct System, but care must be taken to ensure the fabricator is familiar with the full Firemac Technical Manual, with adequate training by a Firemac representative.

Table BS1C: Firemac FM60 Fire Duct System: Construction Standards Table (Circular Systems)								
Diameter (mm)	Steel Thickness (mm)	Max. Section Length (mm)	Coating (1)	Cross Joint Rating (2)		Longitudinal Seam		Maximum Diameter (mm)
				Slide-on Flange (mm)	RSA (mm)	Sprial Wound	Straight Seam	
200	0.8	1500	Firemac FM Fabric PSA	10	30x30x4	Providing the seam is tightly formed, this is an adequate method.	Grooved seam only, to be continued to the very end of the duct, sealed using Firemac FM Acrylic or Silicone Sealant	200
280	0.8			10	30x30x4			280
355	0.8			15	30x30x4			355
500	0.8			20	30x30x4			500
800	0.8			20	30x30x4			800
1000	1.0			30	30x30x4			1000
1250	1.0			30	40x40x4			1250
For duct sizes greater than 1250mm in diameter, contact Firemac Ltd.								
Key	**Notes:**							
1	The manufacturer of any proprietary flange must be consulted, to ensure their profile can satisfy the required pressure classification.							
2	Slide-on profile and RSA mechanically fastened using all-steel rivets at maximum 150mm centres.							

Fire Performance when tested to BS 476: Part 24	
Stability	60 minutes
Integrity	60 minutes
Insulation	If required, contact Firemac.
Smoke Extract	60 minutes
Kitchen Extract	If required, contact Firemac.

The specification for the galvanised steel ductwork given is the minimum required, and is designed to satisfy at least medium pressure class B within DW/144. If BESA DW/144, SMACNA or other relevant codes require a more onerous specification for the required function of the duct in normal conditions, then these must be complied with.

This table is designed to provide notes on the fabrication of the Firemac FM Fire Duct System, but care must be taken to ensure the fabricator is familiar with the full Firemac Technical Manual, with adequate training by a Firemac representative.

Table BS2R: Firemac FM120 & FM120i / FM30K Fire Duct System. Construction Standards Table (Rectangular Systems)

Longest Side (mm)	Steel Thickness (mm)	Max. Section Length (mm)	Coating (2/3)	Cross Joint Rating (equivelent RSA) (4)	External Stiffener Rating (equivelent RSA) (5)		Internal Stiffening (6)			Longitudinal Seam		Radius Bend (7)		Maximum Duct Size (mm)
							Max Spacing	Fixing	Stiffening Profile	Corner	Sheet	Min. Throat (mm)	Number of Splitters	
800	1.0	1220 for smoke extract ducts (>300°C) 1500 for smoke extract ducts up to ≤300°C, and all other duct types	Firemac FM Fabric	J3 (30x30x4)	Not required		Not required			Pittsburgh lockform or grooved corner seam only. Use Firemac FM Acrylic or Silicone Sealant.	Grooved or welded seam only. Use Firemac FM Acrylic or Silicone Sealant.	100	1	800 x 800
999	1.0			J3 (30x30x4)	Max. spacing, 750mm centres along the length of each duct section.	S3 (30x30x3)	Not required					100	1	999 x 999
1000	1.0			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1000 x 1000
1250	1.0			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1250 x 1250
1600	1.0			J4 (30x30x4)		S4 (40x40x4)	1000mm centres across the width of each	All-steel nuts, bolts and washers.	M10			100	2	1600 x 1250
2000	1.0			J5 (40x40x4)		S5 (50x50x5)			M12			100	3	2000 x 1250
2500	1.0			J5 (40x40x4)		S5 (50x50x5)			M16			100	Not given in DW/144	2500 x 1250
For duct sizes greater than 2500mm wide x 1250mm deep, contact Firemac Ltd.														

Key	Notes
1	Duct sections must be formed from galvanised steel sheets stiffened by means of beading at 400mm centres.
2/3	Firemac FM Fabric PSA products have a self-adhesive backing, and must be applied in accordance with section 4.3 of this Firemac Technical Manual. For other fabrics, contact Firemac.
4	Slide on flanges are mechanically fastened using all steel rivets at maximum 200mm centres. RSA profiles are mechanically fastened using all steel rivets at maximum 150mm centres.
5	Proprietary stiffener mechanically fastened using all-steel rivets at maximum 150mm centres, or as instructed by the manufacturer (whichever is more onerous) RSA profiles are mechanically fastened using all-steel rivets at maximum 150mm centres.
6	Additional internal stiffening required at max. 500mm centres where ducts pass through any fire resisting walls / partitions following the same principles with regards fixings / profile.
7	Radius bend information taken from DW/144. Splitters are recommended, rather than using turning vanes.

Fire Performance when tested to BS 476: Part 24	
Stability	120 minutes
Integrity	120 minutes
Insulation	120 minutes if 90mm thick Rockwool FirePro product is applied to the outer face. This table does not consider the use of Knauf. For this, contact Firemac.
Smoke Extract	120 minutes (please note maximum duct length)
Kitchen Extract	30 minutes if 90mm thick Rockwool FirePro product is applied to the outer face

The specification for the galvanised steel ductwork given is the minimum required, and is designed to satisfy at least medium pressure class B within DW/144. If BESA DW/144, SMACNA or other relevant codes require a more onerous specification for the required function of the duct in normal conditions, then these must be complied with.

This table is designed to provide notes on the fabrication of the Firemac FM Fire Duct System, but care must be taken to ensure the fabricator is familiar with the full Firemac Technical Manual, with adequate training by a Firemac representative.

Table BS2C: Firemac FM120 Fire Duct System: Construction Standards Table (Circular Systems)								
Diameter (mm)	Steel Thickness (mm)	Max. Section Length (mm)	Coating (1)	Cross Joint Rating (2)		Longitudinal Seam		Maximum Diameter (mm)
				Slide-on Flange (mm)	RSA (mm)	Sprial Wound	Straight Seam	
200	1.0	1220 for smoke extract ducts (>300°C) 1500 for smoke extract ducts up to ≤300°C, and all other duct types	Firemac FM Fabric PSA	10	30x30x4	Providing the seam is tightly formed, this is an adequate method.	Grooved seam only, to be continued to the very end of the duct, sealed using Firemac FM Acrylic or Silicone Sealant	200
280	1.0			10	30x30x4			280
355	1.0			15	30x30x4			355
500	1.0			20	30x30x4			500
800	1.0			20	30x30x4			800
1000	1.0			30	30x30x4			1000
1250	1.0			30	40x40x4			1250
For duct sizes greater than 1250mm in diameter, contact Firemac Ltd.								
Key	**Notes:**							
1	Firemac FM Fabric PSA has a self-adhesive backing, and must be applied in accordance with section 4.3 of this Firemac Technical Manual. For other fabrics, contact Firemac.							
2	Slide-on profile and RSA mechanically fastened using all-steel rivets at maximum 150mm centres.							

Fire Performance when tested to BS 476: Part 24	
Stability	120 minutes
Integrity	120 minutes
Insulation	If required, contact Firemac.
Smoke Extract	120 minutes (please note maximum duct length)
Kitchen Extract	If required, contact Firemac.

The specification for the galvanised steel ductwork given is the minimum required, and is designed to satisfy at least medium pressure class B within DW/144. If BESA DW/144, SMACNA or other relevant codes require a more onerous specification for the required function of the duct in normal conditions, then these must be complied with.

This table is designed to provide notes on the fabrication of the Firemac FM Fire Duct System, but care must be taken to ensure the fabricator is familiar with the full Firemac Technical Manual, with adequate training by a Firemac representative.

Table BS3R: Firemac FM240 Fire Duct System. Construction Standards Table (Rectangular Systems)

Longest Side (mm)	Steel Thickness (mm)	Max. Section Length (mm)	Coating (2/3)	Cross Joint Rating (equivelent RSA) (4)	External Stiffener Rating (equivelent RSA) (5)		Internal Stiffening (6)			Longitudinal Seam		Radius Bend (7)		Maximum Duct Size (mm)
							Max Spacing	Fixing	Stiffening Profile	Corner	Sheet	Min. Throat (mm)	Number of Splitters	
800	1.2	1500	Firemac FM Fabric PSA	J3 (30x30x4)	Not required		Not required			Pittsburgh lockform or grooved corner seam only. Use Firemac FM Acrylic or Silicone Sealant.	Grooved or welded seam only. Use Firemac FM Acrylic or Silicone Sealant.	100	1	800 x 800
999	1.2			J3 (30x30x4)	Max. spacing, 750mm centres along the length of each duct section.	S3 (30x30x3)	Not required					100	1	999 x 999
1000	1.2			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1000 x 1000
1250	1.2			J3 (30x30x4)		S3 (30x30x3)	Not required					100	2	1250 x 1250
1600	1.2			J4 (30x30x4)		S4 (40x40x4)	1000mm centres across the width of each	All-steel nuts, bolts and washers.	M10			100	2	1600 x 1250
2000	1.2			J5 (40x40x4)		S5 (50x50x5)			M12			100	3	2000 x 1250
2500	1.2			J5 (40x40x4)		S5 (50x50x5)			M16			100	Not given in DW/144	2500 x 1250

For duct sizes greater than 2500mm wide x 1250mm deep, contact Firemac Ltd.

Key	Notes
1	Duct sections must be formed from galvanised steel sheets stiffened by means of beading at 400mm centres.
2/3	Firemac FM Fabric PSA products have a self-adhesive backing, and must be applied in accordance with section 4.3 of this Firemac Technical Manual. For other fabrics, contact Firemac.
4	Slide on flanges are mechanically fastened using all steel rivets at maximum 200mm centres. RSA profiles are mechanically fastened using all steel rivets at maximum 150mm centres.
5	Proprietary stiffener mechanically fastened using all-steel rivets at maximum 150mm centres, or as instructed by the manufacturer (whichever is more onerous) RSA profiles are mechanically fastened using all-steel rivets at maximum 150mm centres.
6	Additional internal stiffening required at max. 500mm centres where ducts pass through any fire resisting walls / partitions following the same principles with regards fixings / profile.
7	Radius bend information taken from DW/144. Splitters are recommended, rather than using turning vanes.

Fire Performance when tested to BS 476: Part 24	
Stability	240 minutes
Integrity	240 minutes
Insulation	-
Smoke Extract	-
Kitchen Extract	-

The specification for the galvanised steel ductwork given is the minimum required, and is designed to satisfy at least medium pressure class B within DW/144. If BESA DW/144, SMACNA or other relevant codes require a more onerous specification for the required function of the duct in normal conditions, then these must be complied with.

This table is designed to provide notes on the fabrication of the Firemac FM Fire Duct System, but care must be taken to ensure the fabricator is familiar with the full Firemac Technical Manual, with adequate training by a Firemac representative.

Section 4.6: Hanger / Bearer Supports

The Firemac FM Fire Duct Systems should be supported by walls and/or floors capable of supporting the load of the duct for the required fire resistance period. Normally concrete or masonry structures will be adequate, but for other types of structure this should be checked with the relevant person(s) on-site.

The hangers should be of suitable size and spacing to ensure the stress on each member does not exceed: 15N/mm² for up to 60 minutes, 10N/mm² for up to 120 minutes or 6N/mm² for up to 240 minutes fire resistance. The bearers should be of a suitable size and spacing to ensure the stress on each member does not exceed the limit it was exposed to under testing. The hanger / bearer members are defined below.

Table 6-10 outline the required specification of the hanger and bearer support system(s) for each system, for various sizes. Please note that this does not consider unique arrangements such as cantilevered supports. If / where you have more complex arrangements, please contact Firemac for further guidance.

Firemac FM60 Fire Duct System (Uninsulated)			
Duct Size (mm)	Minimum Hanger Size	Minimum Bearer Size (mm)	
		Rectangular	Circular Split Rings
1000 x 250 (or up to 800 diameter)	M10	41 x 41 x 2.5	30 x 3
1000 x 500 (or up to 1000 diameter)	M10	41 x 41 x 2.5	40 x 5
1000 x 1000 (or up to 1250 diameter)	M10	41 x 62 x 2.5	40 x 5
1250 x 1250	M10	41 x 83 x 2.5	-
1600 x 1250	M10	76 x 38 x 6.7 PFC	-
2000 x 1250	M10	100 x 50 x 10 PFC	-
2500 x 1250	M10	100 x 50 x 10 PFC	-

Table 6: Hanger / Bearer Support Specification for Firemac FM60

Firemac FM60i Fire Duct System (60mm Insulation - See Section 7)			
Duct Size (mm)	Minimum Hanger Size	Minimum Bearer Size (mm)	
		Rectangular	Circular
1000 x 250 (or up to 800 diameter)	M10	41 x 41 x 2.5	30 x 3
1000 x 500 (or up to 1000 diameter)	M10	41 x 62 x 2.5	40 x 5
1000 x 1000 (or up to 1250 diameter)	M10	41 x 62 x 2.5	40 x 5
1250 x 1250	M10	41 x 83 x 2.5	-
1600 x 1250	M12	76 x 38 x 6.7 PFC	-
2000 x 1250	M12	100 x 50 x 10 PFC	-
2500 x 1250	M16	100 x 50 x 10 PFC	-

Table 7: Hanger / Bearer Support Specification for Firemac FM60i

Firemac FM120 Fire Duct System (Uninsulated)			
Duct Size (mm)	Minimum Hanger Size	Minimum Bearer Size (mm)	
		Rectangular	Circular
1000 x 250 (or up to 800 diameter)	M10	41 x 41 x 2.5	30 x 3
1000 x 500 (or up to 1000 diameter)	M10	41 x 41 x 2.5	40 x 5
1000 x 1000 (or up to 1250 diameter)	M10	41 x 62 x 2.5	40 x 5
1250 x 1250	M10	41 x 83 x 2.5	-
1600 x 1250	M10	76 x 38 x 6.7 PFC	-
2000 x 1250	M10	100 x 50 x 10 PFC	-
2500 x 1250	M12	100 x 50 x 10 PFC	-

Table 8: Hanger / Bearer Support Specification for Firemac FM120

Firemac FM120i Fire Duct System (90mm Insulation - See Section 7)			
Duct Size (mm)	Minimum Hanger Size	Minimum Bearer Size (mm)	
		Rectangular	Circular
1000 x 250 (or up to 800 diameter)	M12	41 x 41 x 2.5	30 x 3
1000 x 500 (or up to 1000 diameter)	M12	41 x 62 x 2.5	40 x 5
1000 x 1000 (or up to 1250 diameter)	M16	41 x 62 x 2.5	40 x 5
1250 x 1250	M16	41 x 83 x 2.5	-
1600 x 1250	M16	76 x 38 x 6.7 PFC	-
2000 x 1250	M16	100 x 50 x 10 PFC	-
2500 x 1250	M20	100 x 50 x 10 PFC	-

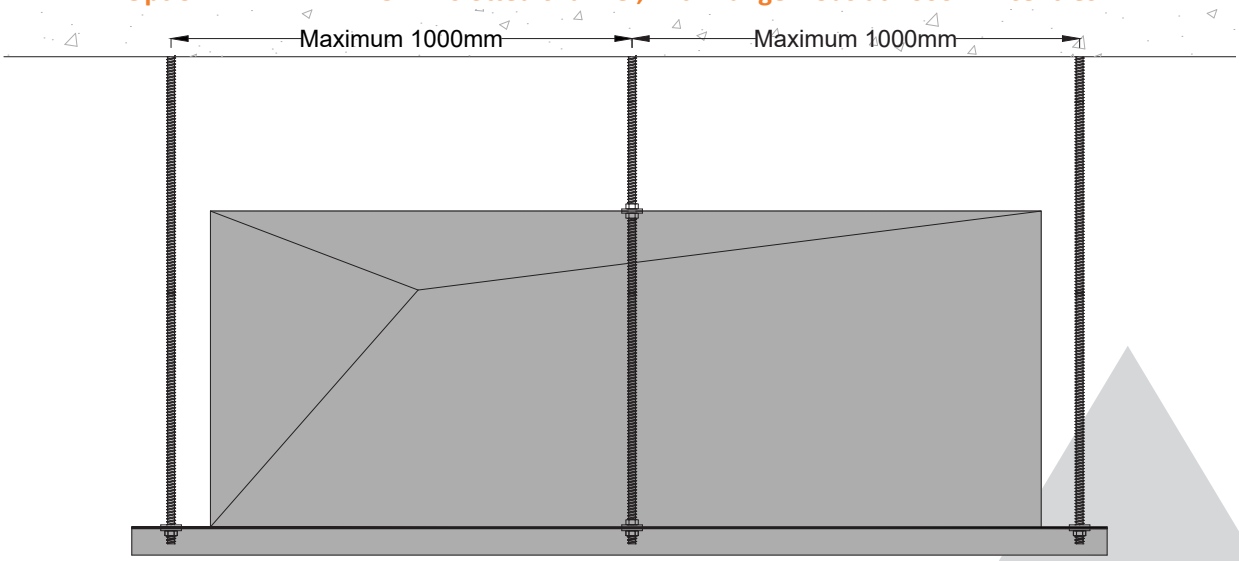
Table 9: Hanger / Bearer Support Specification for Firemac FM120i

Firemac FM240 Fire Duct System (Uninsulated)			
Duct Size (mm)	Minimum Hanger Size	Minimum Bearer Size (mm)	
		Rectangular	Circular
1000 x 250 (or up to 800 diameter)	M10	41 x 41 x 2.5	30 x 3
1000 x 500 (or up to 1000 diameter)	M10	41 x 62 x 2.5	40 x 5
1000 x 1000 (or up to 1250 diameter)	M12	41 x 62 x 2.5	40 x 5
1250 x 1250	M12	41 x 83 x 2.5	-
1600 x 1250	M16	76 x 38 x 6.7 PFC	-
2000 x 1250	M16	100 x 50 x 10 PFC	-
2500 x 1250	M16	125 x 65 x 15 PFC	-

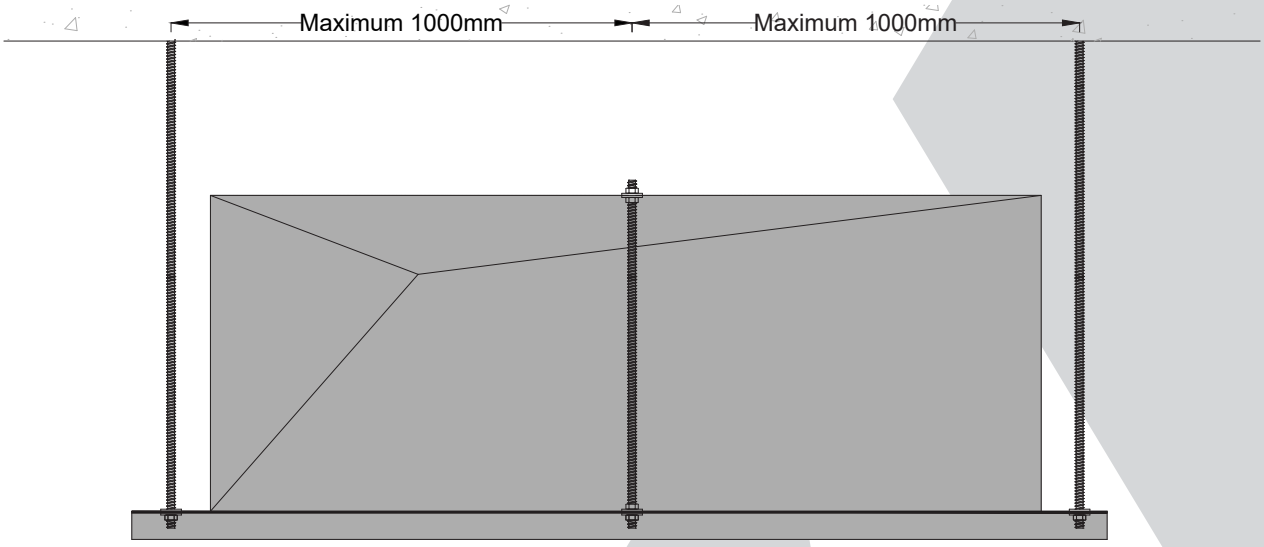
Table 10: Hanger / Bearer Support Specification for Firemac FM240

To avoid the use of a larger bearer profile, for Firemac FM Fire Duct Systems greater than 1000mm wide, hanger rods may be installed at maximum 1000mm centres across the width, to enable the installation of the 41mm x 41mm x 2.5mm slotted channel. If this method is preferred, the hanger rods would need to be secured to the structure above using suitably tested all-steel anchors, secured to the top of the duct inside and outside with all-steel nuts/washers, and secured to the bearer profile using all-steel nuts/washers. See figure 4, option 1. Alternatively, the intermediate hanger rod may be omitted but the hanger and bearer specification would need upgraded in accordance with the specification in tables 6-10, and internal tie bars would still be required at maximum 1000mm centres accross the width of each ductwork section. See figure 4, option 2.

Option 1: 41 x 41 x 2.5mm slotted channel, with hanger rods at 1000mm centres.



Option 2: Increased bearer profile, with internal tie bars at 1000mm centres.



Key	
1	Substrate capable of supporting the Firemac duct, under fire conditions, for the required duration.
2	Firemac FM Fire Duct System
3	Suitably sized hanger rod, installed within 50mm on each side of the Firemac FM Fire Duct System.
4	Intermediate hanger rod(s) at maximum 1000mm centres across the width of the Firemac FM Fire Duct System, secured to the top wall of the duct and bearer using M10 nuts/bolts/washers.
5	Suitably tested all-steel fixings, to secure the hanger rods to the loadbearing substrate.
6	41mm x 41mm x 2.5mm slotted channel bearer.

Figure 4: Alternative horizontal support arrangement, for ductwork more than 1250mm wide

Section 4.7: Plant Equipment

Where ancillary items such as attenuators and volume control dampers are concerned, these components may generally be upgraded, however some may require to be encased within a fire resisting enclosure. The fabrication of said components should follow the same principles as section 4 for the steel ductwork sections. For guidance on specific components – contact Firemac (see section 1.1).

Section 4.8: Firemac FM Access Panels

Only Firemac FM Access Panels can be used in Firemac FM Duct Systems. These panels should be purchased directly from Firemac Ltd. The size and position of access panels should be per guidance given by the ductwork cleaning company and the manufacturer of any ancillary items e.g. dampers. If this is not available, one may refer to guidance in the relevant design codes e.g., DW/144, DW/172 and TR/19.

For installation of the Firemac FM Access Panels, please refer to section 5.6.

5. Installation (Ductwork)

Only trained Firemac contractors should install a Firemac FM Fire Duct System. The trained installation team should liaise with the fabricator to ensure all parties are familiar with the design features and performance criteria of the system. The supervisor or site foreman should be familiar with the full Firemac System. Please contact Firemac, for information on toolbox talks and training.

In addition to being trained to fabricate and install the Firemac FM Fire Duct Systems, Firemac would strongly recommend anyone installing the Firemac FM Fire Duct System operates under a suitable third-party certification scheme, such as LPCB, FIRAS, IFCC for the installation of fire resisting ductwork. If you would like further guidance on any such schemes, please contact Firemac Ltd.

Section 5.1: Handling & Storage

Labour handling Firemac FM Fire Duct Sections should be suitably instructed in the care required with this product. As this is a life safety system, one should ensure:

1. All fire resisting ductwork is checked for damage.
2. The site should thus provide a suitable lay-down area. Outside storage is not acceptable.
3. Any fire resisting ductwork on-site, should be covered.
4. See also guidance in the relevant duct specification documents e.g. Appendix C of DW/144.

Any damage to the Firemac FM Fire Duct Sections should be repaired by way of a steel plate, covered with the Firemac FM Fabric, fixed with all-steel, blind, sealed rivets (4.8mm x 10mm) over the damaged area (at least 4 fixings per plate). The steel plate thickness is to be at least the same as the duct walls.

Any damage to the Firemac FM Acrylic Sealant or Firemac FM Silicone Sealant during transit, would require re-sealing on-site using the appropriate Firemac Sealant. It should be checked with the ductwork fabricator, what sealant was used originally.

Section 5.2: Key Considerations

Any fire resisting system is only as strong as its weakest point. Care should thus be taken to ensure the system is suitable for use both under ambient conditions, and under fire conditions, to satisfy the project requirements.

Do not install the duct within 500mm of combustible materials or personnel, unless the duct is insulated by the appropriate product per section 7 of this document.

It is important to ensure the fire-stopping documentation is issued to your client, so they can provide this information to the company responsible for carrying out the fire-stopping.

It is recommended to provide labelling beside the Firemac FM Fire Duct System, secured to an adjoining wall, providing guidance such as (a) the system name; (b) the system purpose; (c) the name of the installer; (c) the date of the installation. This provides the end client with clarity on the system, especially if it is insulated, and can act as a useful marketing tool for the installation contractor for future projects. If this is of interest, Firemac can supply labelling to assist with this process.

Section 5.3: Support Systems

The Firemac FM Fire Duct System should be supported by walls and/or floors capable of supporting the load of the duct for the required fire resistance period. Normally concrete or masonry structures will be adequate, but for other types of structure it is recommended to check with the client.

The Firemac FM Fire Duct System should always be supported independently from other services. If it is not possible for the ductwork to be independently supported, contact Firemac.

The hangers should be of suitable size and spacing to ensure the stress on each member does not exceed: 15N/mm² for up to 60 minutes, 10N/mm² for up to 120 minutes or 6N/mm² for up to 240 minutes fire resistance. The bearers should be of a suitable size and spacing to ensure the stress on each member does not exceed the limit it was exposed to under testing (see section 4.6).

Horizontal Firemac FM Fire Duct Systems should be supported:

1. within 500mm of all fire resisting walls and partitions, on both sides, and;
2. at maximum 1500mm centres, and;
3. at all changes in direction, and;
4. at all ancilliary items.

Hanger rods should be within 50mm on both sides of Firemac FM Fire Duct Systems.

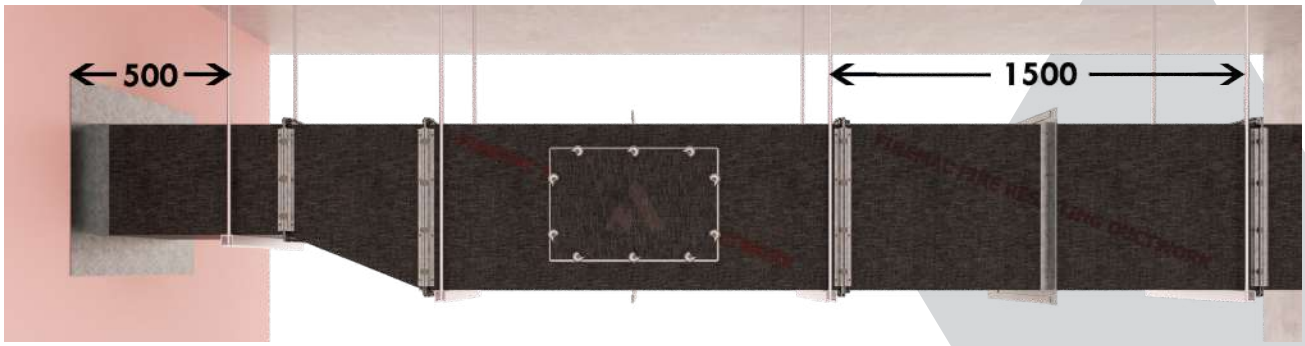


Figure 5: Firemac FM Fire Duct Horizontal Supports

Hanger systems should be secured to walls and floors using suitable, fire-tested, steel anchors. Please consult your preferred anchor manufacturer for guidance on the suitable anchor. Details of some manufacturers:

Manufacturer	UK Telephone Number
Fischer	01491 827 900
Hilti	0800 886 100
Simpson Strong Tie	01827 255 600
ITW Construction Products	0800 731 4924

Table 11: Anchor Manufacturers

The length of unprotected hanger rods, within 500mm of fire resisting walls / partitions should not exceed 1500mm. The first set of hangers rods must be fire protected if they are longer than 1500mm. For further guidance, contact Firemac.

Vertical Firemac FM Fire Duct Systems should be supported:

1. at each floor level; and
2. at maximum 5000mm centres.



Figure 6: Firemac FM Fire Duct Horizontal Supports

Steel bearers should span across the floor opening, along the two longest sides of the duct. If this is not possible, contact Firemac. Bearers should be secured to the upper surface of the floor on both sides of the opening, with suitable steel fire tested anchors. The bearer should be connected to the Firemac FM Fire Duct Section with M10 nuts/bolts/washers at maximum 250mm centres. If cantilevered supports are required, contact Firemac Ltd.

In order to prevent self-damage from the buckling of vertical ducts, where the ratio between the length of the duct exposed in the compartment and the smallest lateral dimension across the outside face of the duct (or outer diameter) exceeds 8:1, additional supports are required. In cases where additional supports have to be provided, the ratio of the distance between the additional supports, or the distance between the additional supports and the supporting construction, and the smallest lateral dimension across the outside face of the duct, or outer diameter, shall not exceed 8:1

Section 5.4: Cross Joints

All cross joints should be flanged and sealed with Firemac FM Butyl Tape, or a ceramic tape.

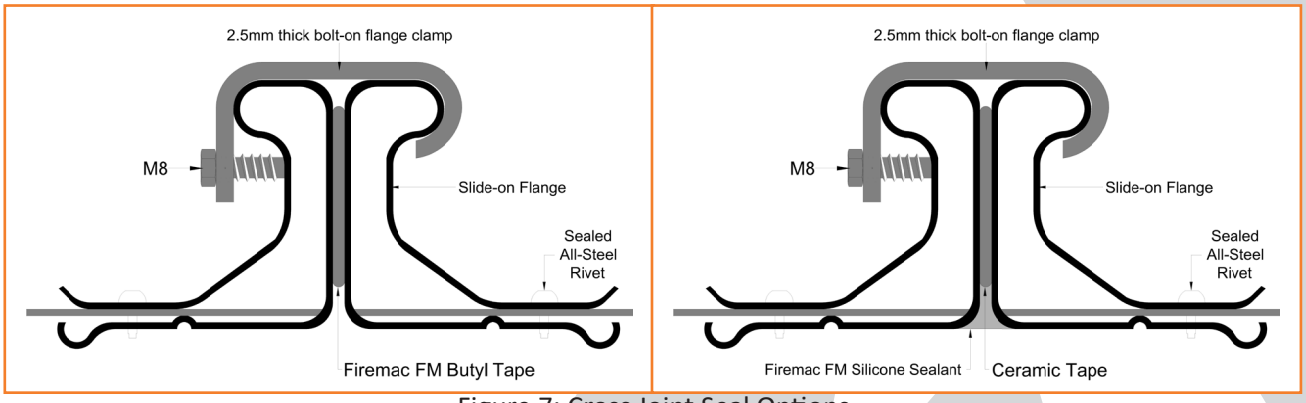


Figure 7: Cross Joint Seal Options

Please note: Firemac FM Butyl Tape has a maximum working temperature of 90°C, and so may not be suitable for use near a kitchen canopy. If exposure is expected to higher temperatures, then a ceramic tape purchased from Firemac should be used in such locations, along with an internal bead of Firemac FM Silicone Sealant, to prevent grease seeping into the ceramic. Cross joints should be connected using minimum 2.5mm thick bolt-on flange clamps, no more than 75mm from corner bolts, and at maximum 150mm centres for kitchen extract ducts, or 200mm centres for all other ducts.

Section 5.5: Ancillary Items

When installing components such as attenuators, or volume control dampers that are wrapped in Firemac FM Fabric, such components should be independently supported from the Firemac FM Fire Duct System. The unit should normally be connected to the adjoining duct using the same jointing detail as per standard Firemac FM Fire Duct Sections. However, this method should be checked with Firemac, and the component manufacturer to ensure both systems operate as required under ambient and fire conditions. Some components may be upgraded, however some may require to be encased within a fire resisting enclosure.

Section 5.6: Firemac FM Access Panels

Only Firemac FM Access Panels can be used in Firemac FM Duct Systems. These panels should be purchased directly from Firemac Ltd.

The size and position of access panels should be per guidance given by the ductwork cleaning company and the manufacturer of any ancillary items, e.g. dampers. If this is not available, one may refer to guidance in the relevant design codes e.g., DW/172 and TR/19.

To install Firemac FM Access Panels, see the guidance below:

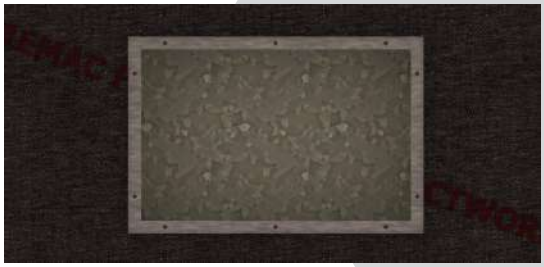
Step	Action	Figure
1	Cut an opening in the duct, designed to fit the steel frame.	
2	Trim back Firemac FM Fabric (10mm) from the aperture – for kitchen extract ductwork systems.	
3	Insert frame into cut hole, and fold back tabs appropriately.	
4	Ensure the frame is square in the aperture, and mechanically fasten the frame of the access panel to the duct using sealed steel rivets, through the pre-punched holes.	
5	Insert the Firemac FM Access Panel into the frame and ensure all camlocks are in a lock tight position.	
6	Mechanically fix the safety chain to the Firemac FM Fire Duct System.	
7	Neatly seal around the outer perimeter of access panels with Firemac FM Acrylic Sealant or Firemac FM Silicone Sealant (as appropriate).	

Table 12: Firemac FM Access Panel Installation Instructions

6. Installation (Fire-stopping)

Section 6.1: General Information

The ASFP Blue Book states "*The primary reason for providing fire-resisting ductwork systems is to maintain the fire resistance of a compartment wall or floor of a building. It is therefore critical that the correct method of sealing any gaps around the ductwork is used as it passes through any penetration in a fire resisting compartment wall or floor. This detail is one of the most common reasons for the failure of a ductwork system in a fire resistance test.*" It is important that the fire-stopping system tested with the duct, is the one that is used in practice. If this is not possible, consult Firemac.

If the fire-stopping package is carried out by a separate contractor, a copy of this section should be passed to said person(s). If requested, Firemac can liaise with the contractor to ensure the correct fire-stopping system is installed. The fire-stopping should be carried out strictly in accordance with the tested solution outlined within this section, or following the principles of the system in the case of the timber floor system. If a variation of this system is installed, it is the responsibility of the fire-stopping contractor to justify their installation.

A Firemac FM Fire Duct System should pass through an opening independent of other services. Methods given are suitable for ducts passing through framed partitions at least 160mm thick, masonry walls at least 150mm thick, or concrete or timber floors at least 150mm thick, which have at least the same fire resistance required by the Firemac system. The gap between the duct and surrounding construction should not exceed 50mm.

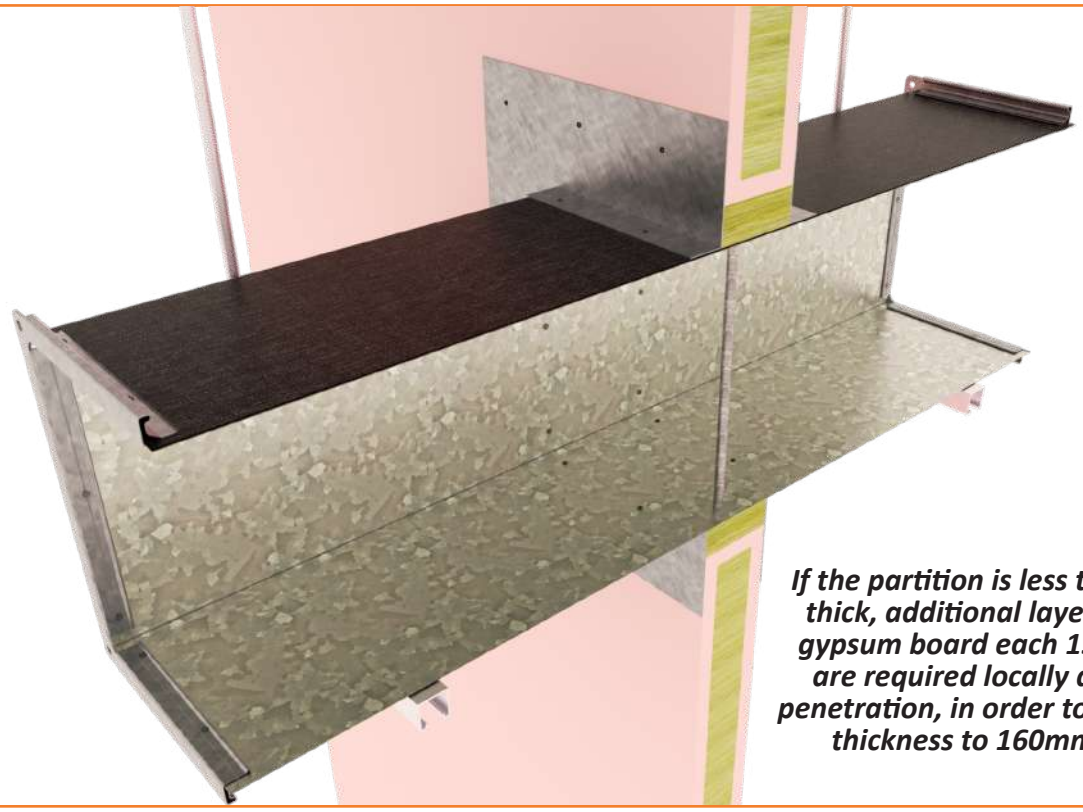
If the duct does not require to be fire resisting on one side and a fire damper is not installed then the length of Firemac FM Fire Duct should be installed up to the first set of hangers within this compartment. It is good practice to connect the Firemac FM Fire Duct System to the non-fire resisting duct length using aluminium fixings. This will enable the non-fire resisting duct to distort and collapse without applying noticeable stress on the fire resisting duct section or firestopping.

If / where a fire resisting damper is installed within a fire resisting wall or floor, then the fire-stopping around the damper should be in accordance with the damper manufacturer's instructions.

Section 6.2: Firemac FM Fire Duct Firestopping Drawings (for periods up to 120 minutes)

Using the below key, figures 8 to 11 provide guidance on the most common areas fire-stopping is required around the Firemac FM Fire Duct System. In areas not referenced in which a Firemac FM Fire Duct passes through, or for ducts requiring over 120 minutes fire resistance, consult Firemac on a project-by-project basis.

Key	
1	Masonry/concrete wall (at least 150mm thick).
2	Fire resisting partition (at least 160mm thick). Opening formed using partition studwork, faced with at least one layer of partition lining board, or the equal number of lining boards applied.
3	Timber floor (at least 150mm thick). Opening formed using timber sections on all four sides. The timber sections should be the same size as the joists used in the main structure. Each timber section that forms the opening should be faced on the opening side using at least one layer of Type F plasterboard
4	Concrete floor (at least 150mm thick).
5	Opening lined with one layer of Type F plasterboard abutting the ductwork section.
6	Firemac FM Fire Duct System, running in horizontal orientation (6a) and vertical orientation (6b) adequately supported in accordance with the relevant Firemac Construction Manual.
7	Maximum 50mm aperture, packed with rock mineral wool (min 140kg/m³ density).
8	1.2mm galvanised steel collar. 150mm leg mechanically fixed to the substrate (1-4) using suitable all-steel fixings at maximum 150mm centres. 50mm leg mechanically fixed to the duct, using all-steel closed head, sealed rivets at maximum 150mm centres.
9	Internal tie bar required, where a horizontal Firemac FM Fire Duct System penetrates fire resisting walls or partitions, at maximum 500mm centres across the width of the duct.
10	The appropriate insulation material and thickness (see section 7), installed for at least the first 500mm above the existing timber floor structure for uninsulated Firemac FM Fire Duct Systems, or throughout for insulated Firemac FM Fire Duct Systems.



If the partition is less than 160mm thick, additional layers of type F gypsum board each 150mm wide are required locally around the penetration, in order to increase the thickness to 160mm, locally.

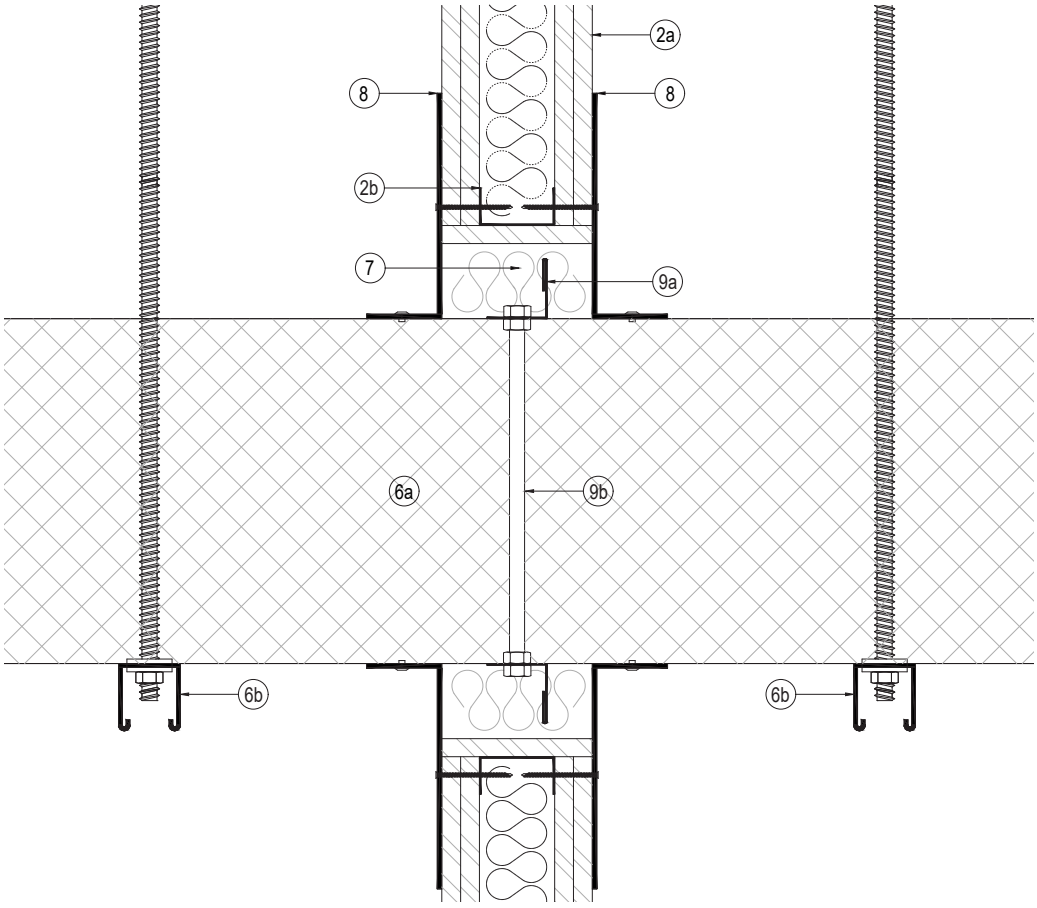
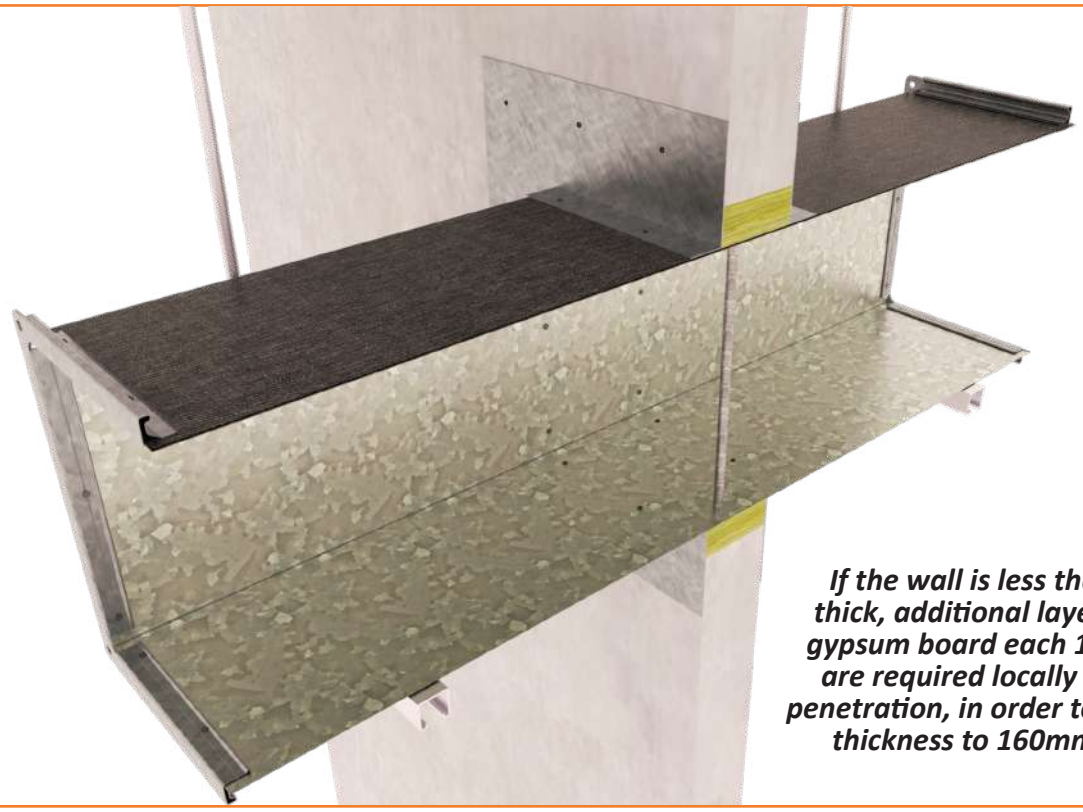


Figure 8: Firestopping Detail at a Plasterboard Partition (up to 120 minutes)



If the wall is less than 160mm thick, additional layers of type F gypsum board each 150mm wide are required locally around the penetration, in order to increase the thickness to 160mm, locally. .

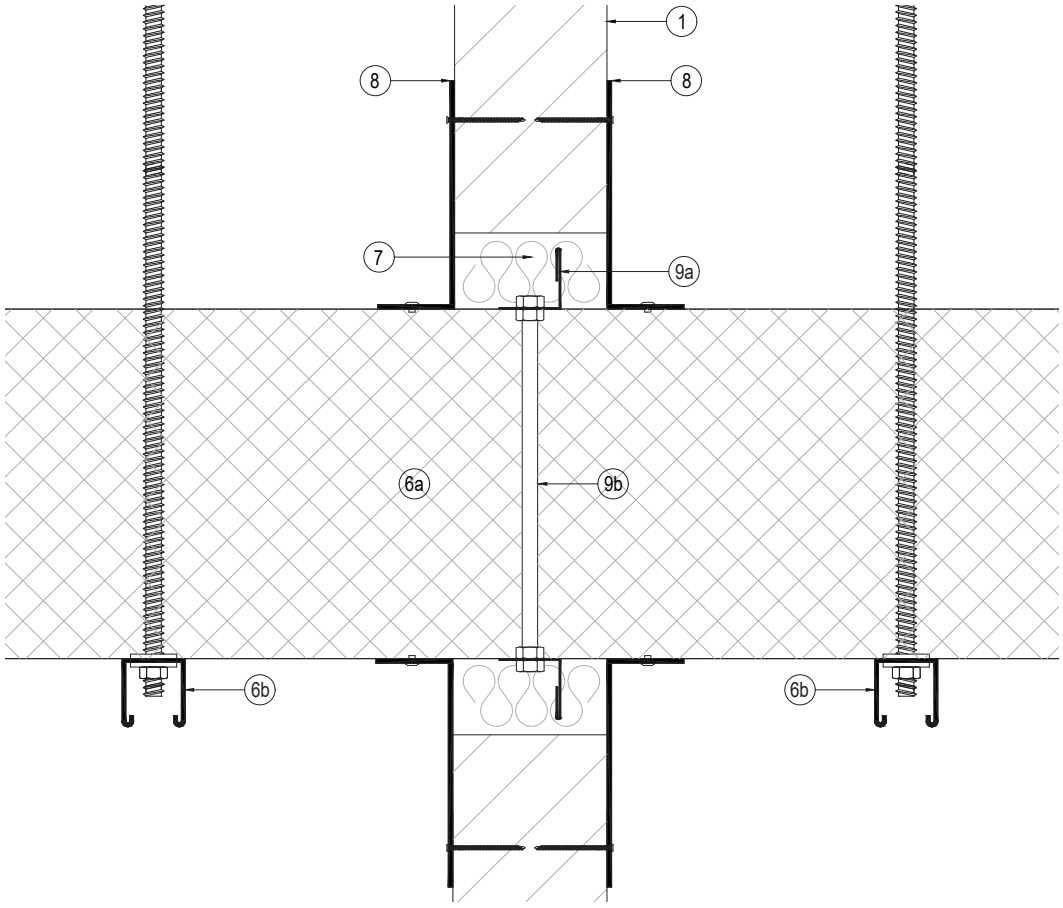


Figure 9: Firestopping Detail at a Concrete / Masonry Wall (up to 120 minutes)

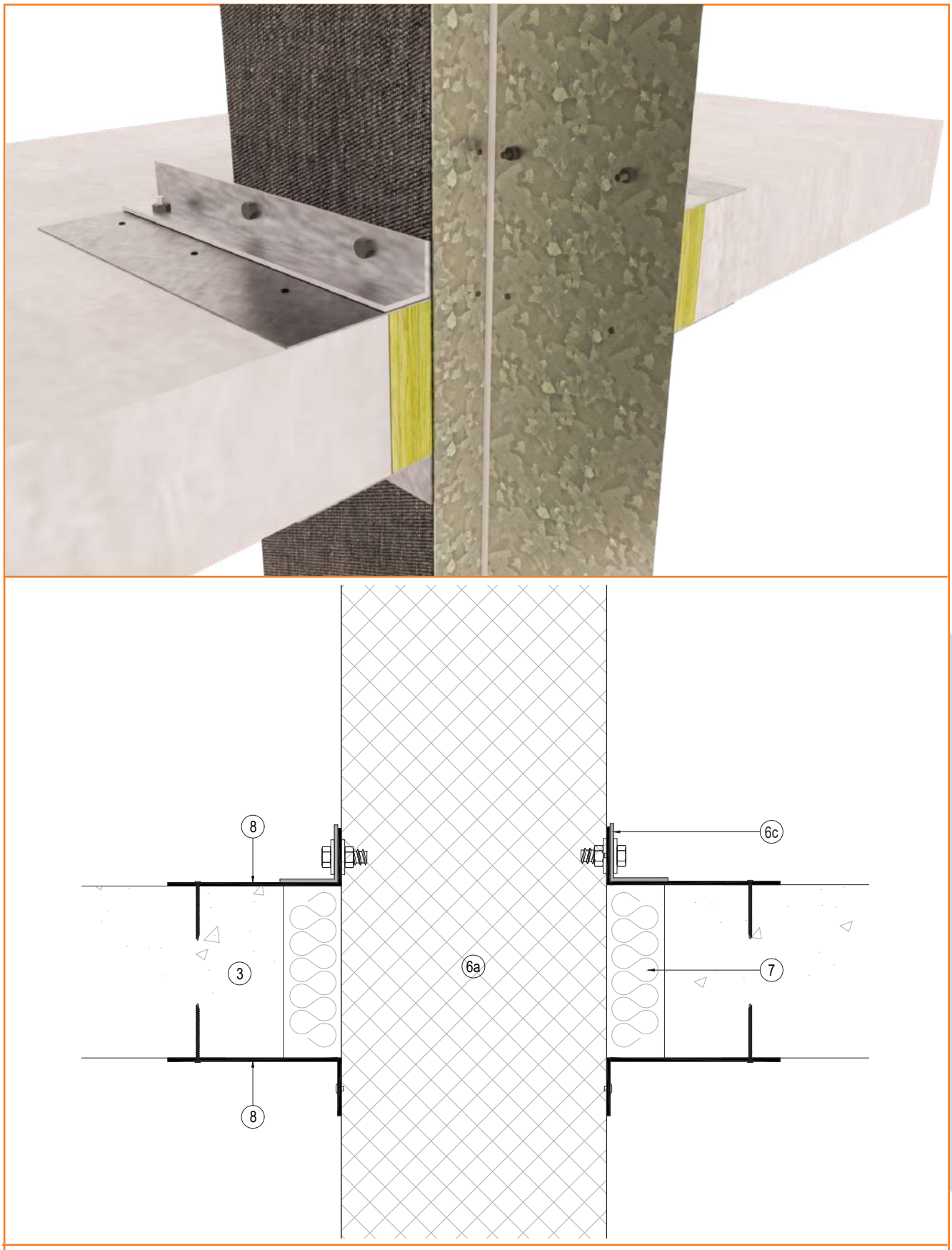
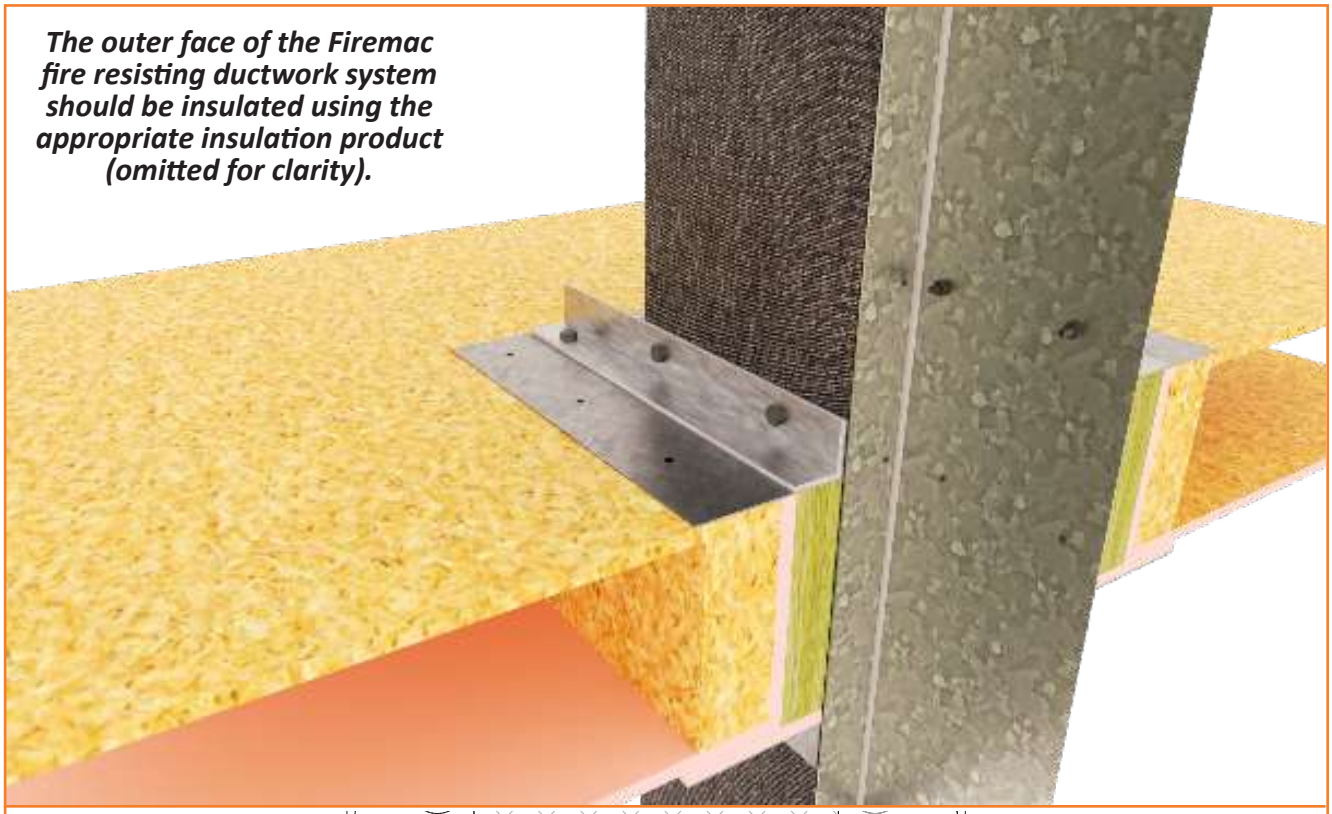
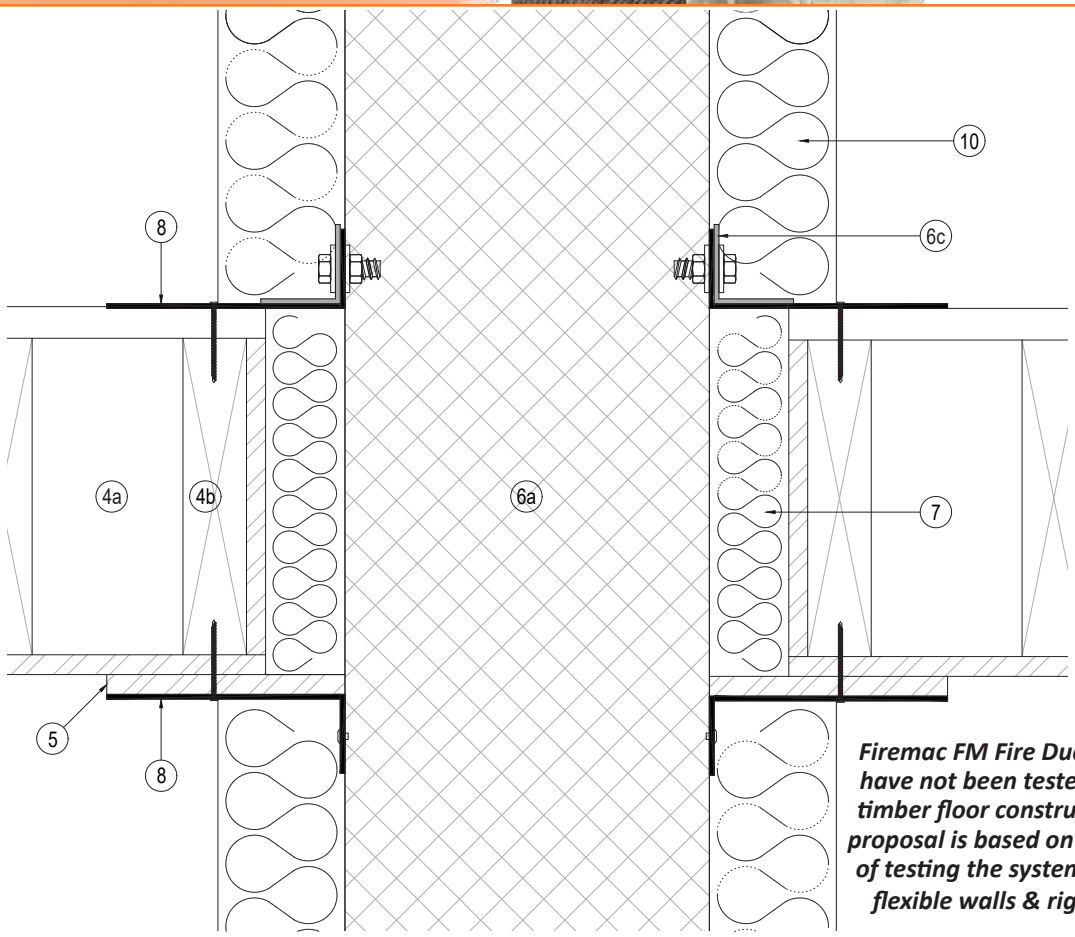


Figure 10: Firestopping Detail at a Concrete Floor Slab (up to 120 minutes)



The outer face of the Firemac fire resisting ductwork system should be insulated using the appropriate insulation product (omitted for clarity).



Firemac FM Fire Duct Systems have not been tested through timber floor construction. This proposal is based on experience of testing the systems through flexible walls & rigid floors.

Figure 11: Firestopping Detail at a Timber Floor System (up to 120 minutes)

7. Installation (Insulation)

Section 7.1: General Information

If the installation of the insulation is carried out by a separate contractor, a copy of this section should be passed to said person(s). If requested, Firemac can liaise with the contractor to provide guidance, if required.

IMPORTANT NOTE: If a 'Firemac headed Certificate of Conformity' is required, Firemac should be requested to attend site to inspect the installation of the Firemac FM Fabric coated ductwork - prior to the installation of the insulation. Failure to do so may prevent the issue of any such 'Firemac headed Certificate of Conformity'.

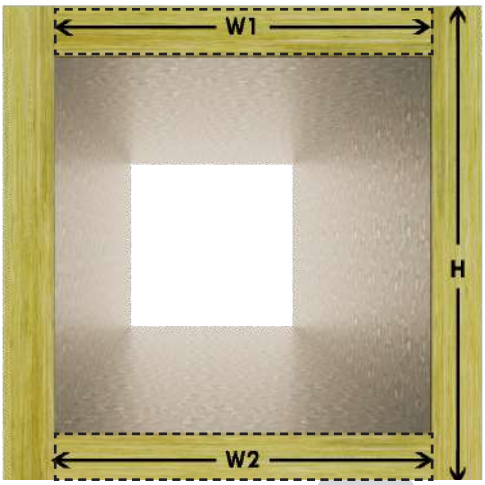
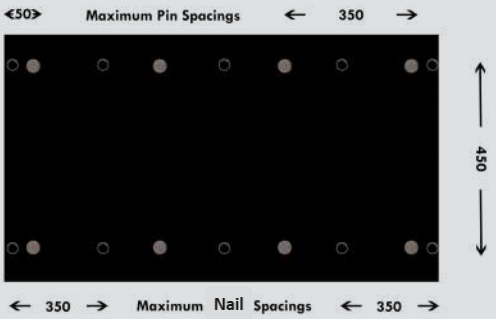
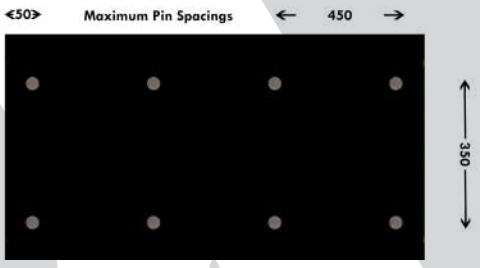
Once Firemac are satisifed with the installation of the Firemac FM Fabric coated ductwork, a Firemac inspector can then provide written confirmation, which would then permit the insulation contractor to proceed with the installation of the insulation. Please note that photographs should be taken at each stage of the installation of the insulation, to enable Firemac to cerify the complete installation, including insulation. See section 9 for further guidance on the sign-off procedure for the Firemac FM Fire Duct System.

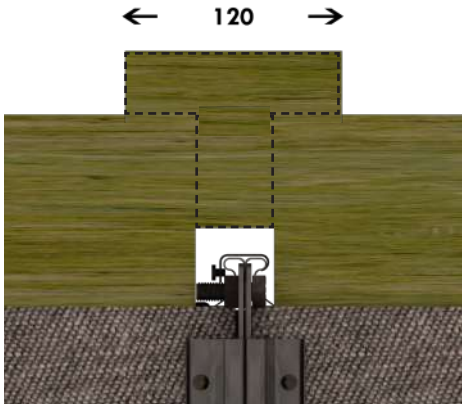
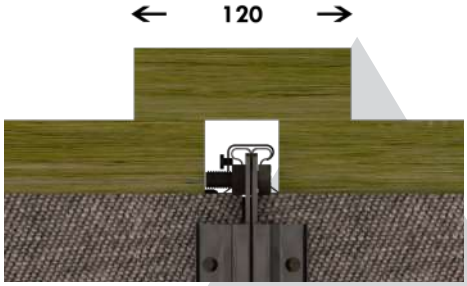
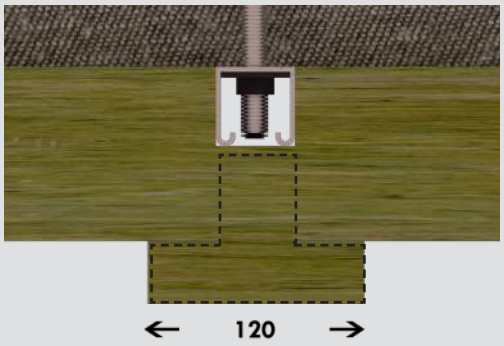
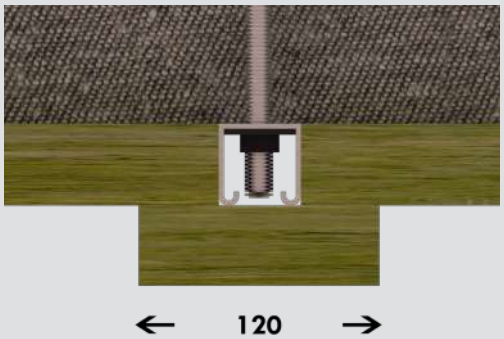
Insulation Materials for rectangular ducts (for circular ducts, contact Firemac Ltd)	
Product	60mm Rockwool DuctRock range, for up to 60 minutes. 90mm Rockwool FirePro range, for up to 120 minutes. A Knauf product may also be used for use with this system. If this is of interest, please contact Firemac Ltd for further information.
Installation fixing method	'Lenne' pins with a minimum 2.7mm diameter shaft may be used for general purpose ventilation / smoke extract ducts. 'Stick' pins (all-steel) with a minimum 2.7mm diameter shaft and square plate base, are required throughout all kitchen extract systems, and within 1m of access openings in all ductwork systems. These are to be secured to the ductwork using at least one all-steel, blind, sealed rivet.
Nails	5mm diameter nails to be two times the length of the thickness of the insulation, e.g. for 90mm insulation, the length of the nail would be 180mm.
Glue / Adhesive	Rockwool FirePro Glue
Aluminium Foil Tape (Optional)	Aluminium foil tape with a reaction-to-fire classification of A1 or A2 in accordance with BS EN 13501-1, may be used to cover ‘exposed’ edges of the insulation.

Table 13: Insulation Product Range

Section 7.2: Main Lining Boards

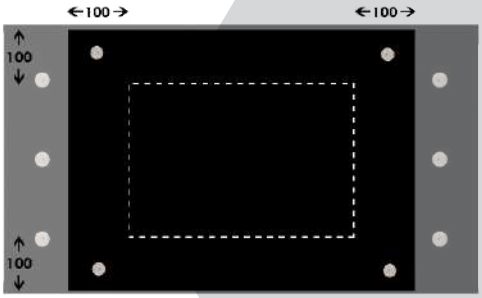
The principles of the installation of the main lining boards, are outlined within this section.

Step	Action	Figure
1	Pre-cut the insulation panels to suit. Top panels (W1): Duct width exactly Side panels (H): Duct height + (2 * insulation thickness) Bottom panels (W2): Duct width exactly The same principles may be followed when installing horizontal and / or vertical ductwork systems.	
2	Side Panels: Insulation pins to be located no more than 50 mm from the edges, at maximum 350mm centres along the length, and at maximum 450mm centres in the width of each duct face.	
3	Bottom Panels: Insulation pins to be located no more than 50 mm from the edges, at maximum 350mm centres along the length, and at maximum 450mm centres across the width of each duct face. Top panels do not require installation of pins.	
4	Longitudinal and transverse joints: All longitudinal and transverse joints should be cut straight, and fully filled with Rockwool FirePro Glue. Corners are then connected using 125mm long x 5mm diameter nails at maximum 350mm centres.	

Step	Action	Figure
5	**Cross Joints, using 90mm slab.** Any gaps in the protection of the duct due to cross-joints are covered by T-Pieces, minimum 90mm thick with the head of the 5 being at least 50mm thick, and overlapping the protection on either side by a minimum of 40mm. Secure the cover strip to the main lining boards using two rows of nails, with each row positioned at maximum 350mm centres.	
	Cross Joints, using 60mm slab. Install the insulation so on each side it abuts the flange at each side. Install a 120mm long cover strip centrally over the top, Secure the cover strip to the main lining boards using two rows of nails, with each row positioned at maximum 350mm centres.	
6	**Bearer, using 90mm slab.** At bearers, cover strips are fitted over the bearers and glued to the main boards such that the overlap between the strip and the main studs is at least 40mm. The bearer should be covered by an insulation thickness of at least 60mm. Secure the cover strip to the main lining boards using two rows of nails, with each row positioned at maximum 350mm centres.	
	Bearer, using 60mm slab. Install the insulation so on each side it abuts the flange at each side. Install a 120mm long cover strip centrally over the top, Secure the cover strip to the main lining boards using two rows of nails, with each row positioned at maximum 350mm centres.	

Section 7.3: Firemac FM Access Panels

Where Firemac FM Access Panels are installed, additional work is required to (a) enable access; and (b) to reinstate any potential localised failure of insulation which may occur at / around the Firemac FM Access Panel. This section outlines the principles to be followed, when installing insulation around a Firemac FM Access Panel.

Step	Action	Figure
1	A section of the Rockwool product should be cut, so that overlaps the adjoining duct walls by 100mm on all four sides. For example, for a 600mm x 400mm Firemac FM Access Panel, an 800mm x 600mm section of insulation would be required. The white dashed line annotates the position of the Firemac FM Access Panel portrayed in 'step one'.	
2	The section of the Rockwool product should then be secured in each of the four corners, using one of the two following methods: Method 1: Similar insulation pins used in 7.2, are used in each of the four corners, with spring washers, to enable the insulation to be secured in position; OR Method 2: M6 threaded rod may be installed in each of the four corners, secured to the base duct using M6 steel nuts and washers, with the insulation then retained in position using similar washers (minimum 38mm diameter), and nuts.	
Notes	It is good practice here, to protect the cut edges using an aluminium foil tape (see section 6.1 for the required product guidance). The aluminium foil tape is not shown in the image, for clarity. It is also good practice to apply a label to the front face of the outer section of the 'Rockwool' panel. This should at least include the 'installer name', 'installation date', and 'contact number'. If you would like a template for this item – please contact Firemac.	

8. Decoration & External Use

Section 8.1: Decoration

Firemac FM Fabric is dark grey in colour, which helps it to blend in with surrounding services in certain environments. If it is requested to paint the fabric covered duct, then most water-based paints are suitable after consultation with the paint manufacturer for their advice on painting a glass fibre fabric. We would, however, suggest a small area of the fabric covered duct is painted and checked by the client – prior to painting the full system. In all instances, Firemac should be made aware of such projects. Once painted, the system may not be clearly identifiable as a Firemac FM Fire Duct System. Documenting this helps provide clarity for all persons involved in a project.

If there is a requirement to overpaint / overcoat the insulated systems please contact Firemac for guidance.

Solvent based coatings should not be used – as their combustible content may lead to the emission of excessive fumes or even flaming when there is a fire inside the duct. Under ambient conditions, solvent based coatings may also be detrimental to the adhesive backing of the Firemac FM Fabric product.

Section 8.2: External Use

Firemac FM Fire Duct Systems are normally designed for internal or sheltered external areas. If it is proposed to install the duct in exposed external areas, it is recommended to enclose the duct in suitable weatherproof cladding. This protects the duct from fading and prevents the steel ductwork and seals from deteriorating. If left unprotected, the duct system will still provide the required period of fire resistance for as long as the steel components and seals remain intact, assuming that the Firemac FM Fabric has not been subject to physical damage.

If the duct is left unprotected, guidance per the Operations and Maintenance guidance (Section 10) should be adhered to. DW/144, Chapter 26, should also be considered as it includes additional guidance.

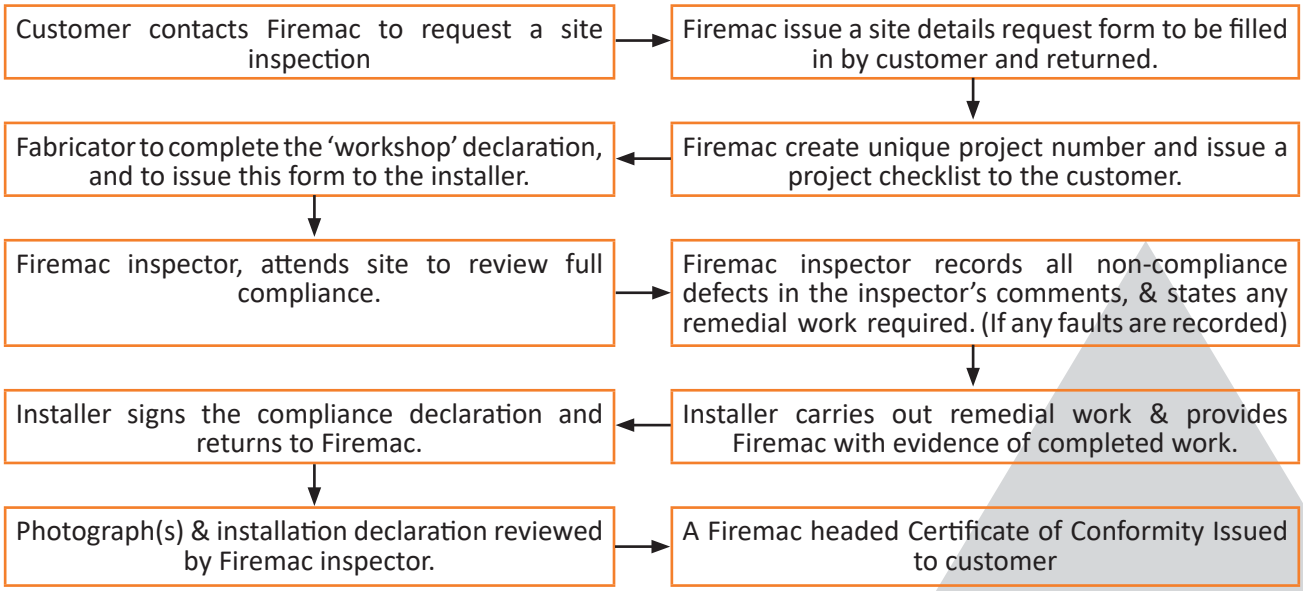
9. Project Sign-off Procedure

Section 9.1: Procedure

Once the ductwork has been fabricated and installed, a Firemac representative can attend site at the request of the ductwork contractor. This section outlines the procedure in which one should follow in line with Firemac's latest Quality Management System (QMS). Failure of the customer to follow the relevant steps may result in certification not being possible for a project.

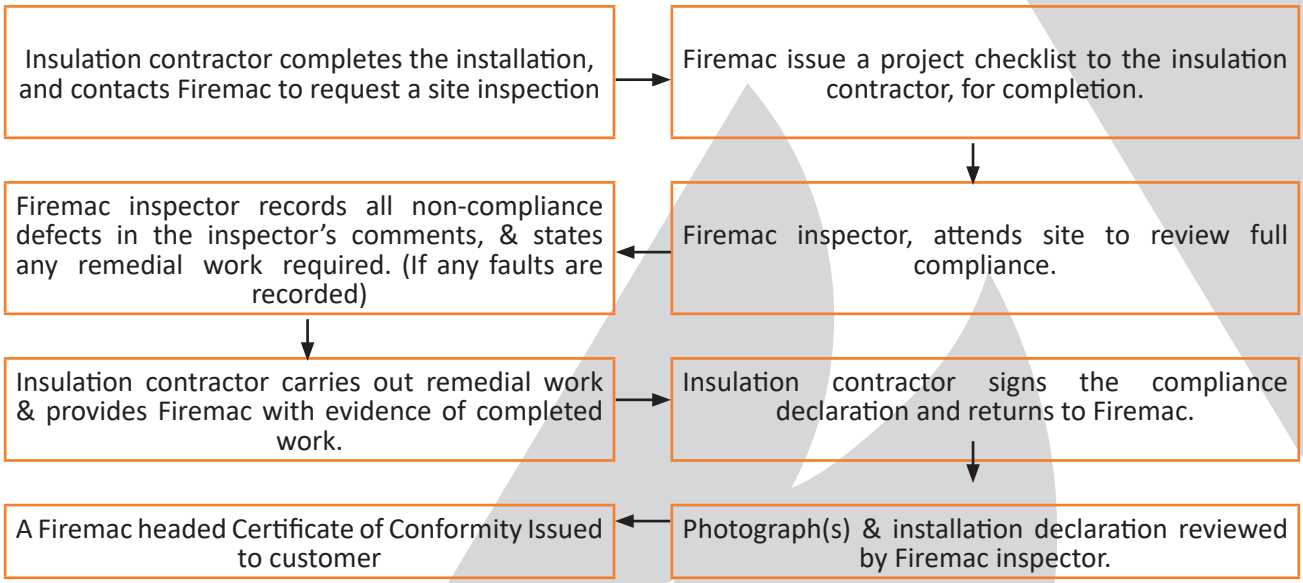
Section 9.2: Uninsulated Firemac FM Fire Duct Systems

If an uninsulated Firemac FM Fire Duct System is accepted by the approval authority, the Firemac customer should follow the below steps to enable issue of a Certificate of Conformity on the full system.



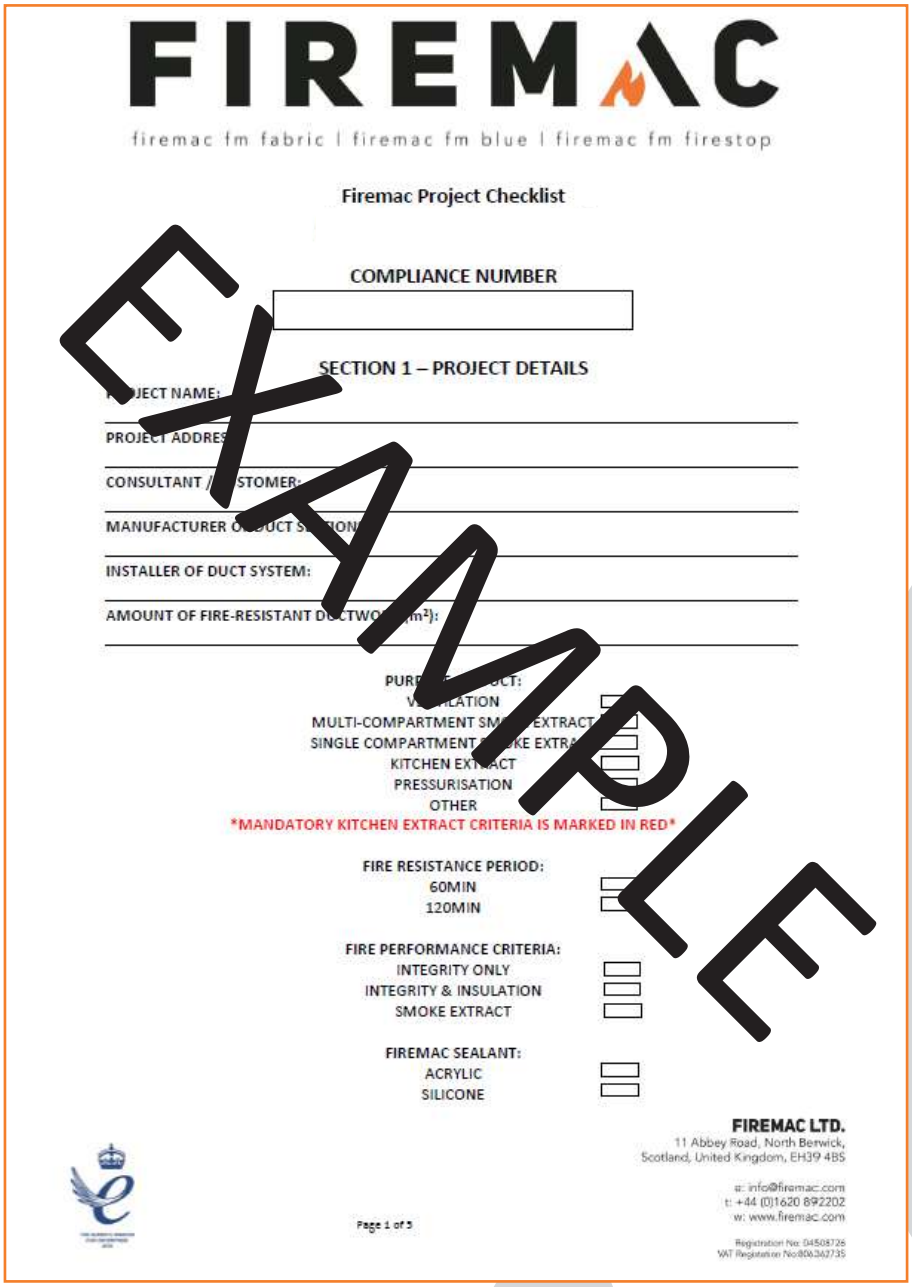
Section 9.3: Insulated Firemac FM Fire Duct Systems

If the contractor is required to install a proprietary insulation product, the above steps should first be followed to ensure compliance of the base Firemac FM Fire Duct System is achieved. Once complete, one should follow the additional steps outlined below, to enable issue of a Certificate of Conformity on the full system.



Section 9.4: Example Project Checklist

Please contact Firemac on a project-by-project basis – to enable a unique project number to be raised.



FIREMAC

firemac fm fabric | firemac fm blue | firemac fm firestop

Firemac Project Checklist

EXAMPLE

COMPLIANCE NUMBER

SECTION 1 – PROJECT DETAILS

PROJECT NAME:

PROJECT ADDRESS:

CONSULTANT / CUSTOMER:

MANUFACTURER OF DUCT SYSTEM:

INSTALLER OF DUCT SYSTEM:

AMOUNT OF FIRE-RESISTANT DUCTWORK (m²):

PURPOSE OF DUCT:
VENTILATION
MULTI-COMPARTMENT SMOKE EXTRACT
SINGLE COMPARTMENT SMOKE EXTRACT
KITCHEN EXTRACT
PRESSURISATION
OTHER

MANDATORY KITCHEN EXTRACT CRITERIA IS MARKED IN RED

FIRE RESISTANCE PERIOD:
60MIN
120MIN

FIRE PERFORMANCE CRITERIA:
INTEGRITY ONLY
INTEGRITY & INSULATION
SMOKE EXTRACT

FIREMAC SEALANT:
ACRYLIC
SILICONE

FIREMAC LTD.
11 Abbey Road, North Berwick,
Scotland, United Kingdom, EH39 4BS

e: info@firemac.com
t: +44 (0)1620 892202
w: www.firemac.com

Registration No: 04508726
VAT Registration No:806362735

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Section 9.5: Certificate of Conformity

When a 'Certificate of Conformity' is issued for a Firemac FM Fire Duct System, the system is deemed to satisfy a required period of fire-resistance at the time of the inspection. The fire resistance performance of the Firemac FM Fire Duct System is, however, dependent upon no subsequent modifications or damage to the system. This should be outlinedin any operations and maintainence documentation.

FIREMAC

firemac fm fabric | firemac fm blue | firemac fm firestop

CERTIFICATE OF CONFORMITY
COC 0000

EXAMPLE

Project:	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Duct Installer:	Firemac trained company (individual names in brackets)
Duct Fabricator:	Firemac trained company
Duct location:	From XXXXX to XXXXX
Drawing no's:	
Comments:	Firemac trained inspector Mick Amery attended site on XX.XX.XX, [illegible] XXXX (Position), (Company). This certificate of conformity is based upon the workshop declaration in Project Checklist Number XXXX completed by XXXXX, (Position), (Company), on XX.XX.XX, & on the installation declaration including all relevant remedial work completed by XXXXXX, (Position), (Company). Photographs of [illegible] work were issued by XXXXXX, (Position), (Company) on XX.XX.XX.
Manufacturing Standards:	Firemac Technical Manual, Issue [illegible] dated September 2016.
Fire Resistance:	System: Kitchen Extract / Ventilation / Smoke Extract Period: 60 min / 120 min / 240 min Criteria: Stability / Integrity / Insulation / Smoke Extract
Omissions	This certificate does not include fire-stopping and / or any plant equipment which has been installed.

The services detailed above have been inspected in accordance with the Firemac Technical Manual, the performance criteria of BS 476: Part 24: 1987 and BRE Global Assessment Report No. P101930-1002 Issue 1. This certificate is correct at the date of issue. Please note any subsequent modifications or damage will render this certificate invalid.

Signed:	XXXXXXXXX XXXXXXXXX XXXXXXXXX Firemac Ltd.
Date:	XX.XX.XX
For and on behalf of Firemac Ltd.	

10. Operations & Maintenance

Section 10.1: Operation

When a 'Certificate of Conformity' is issued for a Firemac FM Fire Duct System, the system is designed to satisfy a required period of fire-resistance. The fire resistance performance of the Firemac FM Fire Duct System is, however, dependent upon no subsequent modifications or damage to the system. This section shall thus discuss guidance on the on-going operation & maintenance of the Firemac FM Fire Duct System

Section 10.2: Maintenance

It is recommended that the installed Firemac FM Fire Duct system and any fire stopping where the duct penetrates fire-resisting walls, partitions, and floors, is inspected three months and six months after installation and at least annually thereafter to ensure that the ductwork and fire stopping have not been damaged and that additional services have not been connected to the Firemac duct.

If the fabric has been damaged, then a repair plate should be secured across the damaged area. The size of the plate should ensure that at least 75mm of the plate overlaps onto undamaged fabric. The plate comprises of a galvanised steel panel at least the same thickness as the wall of the duct with Firemac FM Fabric adhered to the outer face of the plate using Firemac adhesive. The plate is secured over the damaged area using all-steel, blind, sealed rivets at maximum 200mm centres (at least 4 rivets per plate) and bedded on a continuous bead of Firemac FM Acrylic Sealant or Firemac FM Silicone Sealant.

Any damage to the fire stopping where the duct penetrates a wall, partition or floor should be reported to a specialist fire-stopping contractor so that suitable remedial work can be carried out.

For kitchen extract systems, to enable access for cleaning, Firemac FM Access Panels are generally required at spacing centres specified by the relevant cleaning company. If there is no specification for cleaning, guidance from the relevant design codes should be followed. For example, DW/172 and TR 19. Similar would apply to the frequency of cleaning, listed within the schedule, depending on system use.

The method of cleaning should not be detrimental to the seals used within the Firemac FM Fire Duct System. General guidance would require the use of non-caustic chemicals, and softer cleaning hardware i.e. limited use of wire brushes especially around areas which are susceptible to damage.

Where there is any sign of damage to seals within the Firemac FM Fire Duct System, it should be clearly stated said damaged areas should be resealed using the appropriate Firemac ancillary product. Only Firemac products, are acceptable for use in a Firemac FM Fire Duct System. For kitchen extract systems – the correct product is generally 'Firemac FM Silicone Sealant'.

11. Regulations, codes & standards

Throughout this document, reference has been made to various standards. This section outlines the full title given to documents referenced throughout this manual, along with additional documents useful for reference when considering fire resisting and smoke control ducts.

Technical Documents

Approved Document B (2020), for England and Wales.
Technical Handbook (2019), for Scotland.
Techncial Guidance Document B, for Ireland.

Codes of Practice

BS 9999: 2017 Code of Practice for fire safety in the design, management and use of buildings

British Standards

BS 476: Fire Tests on Building Materials and Structures
Part 20 Method for determination of the fire resistance of elements of construction (general principles)
Part 24 Method for determination of the fire resistance of ventilation ducts

International Standards

ISO 834: Fire resistance tests – Elements of building construction
ISO 834-1 Fire resistance tests – Elements of building construction: Part 1 General requirements
ISO 6944-1 Fire Resistance Tests – Elements of building construction: Part 1 Ventilation ducts
ISO 9000 Quality management systems – Fundamentals and vocabulary
ISO 9001 Quality management systems – Requirements

European Standards

BS EN 1366 Fire resistance tests for service installation -
BS EN 1366-1 Ventilation ducts
BS EN 1366-2 Fire dampers
BS EN 1366-8 Multi-compartment smoke control ducts
BS EN 1366-9 Single compartment smoke control ducts
BS EN 1366-10 Smoke control dampers
BS EN 13501 Fire classification of construction products and building elements:
Part 1: Classification using data from reaction to fire tests
Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers
Part 4: Fire classification of construction products and building elements. Classification using data from fire resistance tests on components of smoke control systems
BS EN 15882-1 EXAP rules for fire resisting ducts tested to EN 1366-1
BS EN 12101-7 Smoke and heat control systems. Smoke Duct Sections

ASFP Documents

ASFP Blue Book (British Version) Volume 1-3
ASFP Blue Book (European Version) Volume 1

BESA Documents

DW/143: 2013 Good practice guide to ductwork leakage testing
DW/144: 2013 Specification for Sheet Metal Ductwork Low, medium and high pressure/velocity air systems
DW/145: 2010 Guide to good practice for the installation of fire and smoke dampers
DW/172: 2020 Specification for kitchen ventilation systems

FIREMAC

Notes

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