FIRMA®

Technical Support
Made Simple®

Revision 1.1

DATASHEET

Masonry Support Systems

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www.firma.co.uk

MADE IN BRITAIN

UK CA

bsi ISO 9001 Quality Management Systems CERTIFIED ISO 14001 Environmental Management CERTIFIED

Our ‘Made Simple’ methodology is applied to everything we do through Commercial Transparency, Smarter Design and Agile Delivery.

Ensuring the right specification and details for masonry support is a crucial decision that impacts the safety, longevity, cost and overall aesthetics of your project.

Masonry support systems are engineered to transfer the load of the masonry façade back to the primary structure, whether concrete or steel, and are designed to accommodate typical building tolerances and allow for on-site adjustments as needed, working in coordination with expansion joints to accommodate thermal expansion, shrinkage, and structural movement.

Typically used on alternative floors on buildings over 12m in height, masonry support may be required at every level depending on the specific application.

We provide 3D drawings, project-specific calculations, and Finite Element Analysis (when required) to ensure the system’s suitability for your project.

For further information visit:
www.firma.co.uk/masonry-support

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INTRODUCTION

1.1 **FMS**

Masonry Support System

The FMS Masonry Support System is a bespoke welded system, generally used for cavity depths from 40mm and above. Although every project is different and as such is custom designed, through the Made Simple® methodology, the FMS system pulls together a number of standard components to form the bespoke masonry support system for your project.

See page 07

FIRMA FMS Masonry Support System

1.2 **FSA**

Folded Support Angle

The FSA type is designed for use where the cavity depth is less than 40mm, or where there is a requirement for the cavity to be closed at the support point. It consists of a single stainless steel angle, manufactured to suit the specified cavity depth.

See page 09

FIRMA FSA Folded Support Angle

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DESIGN CONSIDERATIONS

2.1 Fixing Substrates

With a concrete frame, the masonry support system can be fixed in place either using the FIRMA Cast-In Channel systems (**See page 11**), or Post-fixed with site drilled fixings such as expansion bolts. This is specified in line with site specific structural requirements.

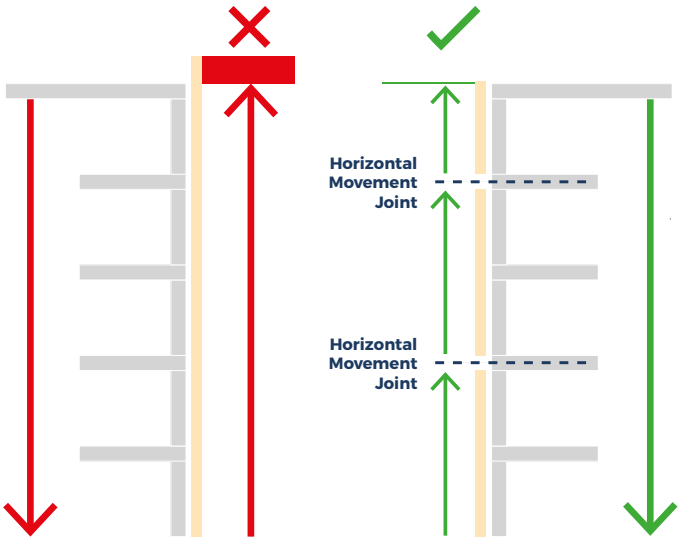
For steel frames, there are two main options available. Where it is possible to access both sides of a fixing surface, a Hex Screw (or Set Screw) is generally suitable. Where access is only possible from one side, for example with a hollow section beam, a Blind Bolt is usually suitable. (**See page 14**).

2.2 Differential Movement

With masonry panel design, allowances must be made for differential movement between materials. This is particularly critical when combining clay brickwork with concrete blockwork and a concrete frame, as these elements expand and contract at different rates.

- For buildings up to three storeys or 12m in height (whichever is less), the outer leaf may typically remain uninterrupted for its full height.
- For taller structures, the outer leaf should be supported at vertical intervals not exceeding 9m or three storeys (whichever is less), in line with the guidance of BS 5628: Part 1, which, despite its withdrawal, is still recognised as best practice.

To accommodate vertical movement (typically ~1mm per metre), movement joints are generally introduced at every storey or every second storey. These joints are also commonly incorporated in buildings of less than four storeys to ensure long-term stability and façade performance.



Comparison of excessive vs. controlled differential movement in a façade

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2.3 Horizontal Movement Joints

Masonry Support systems should be installed directly above horizontal movement joints. These joints provide the necessary allowance for brickwork expansion below the support and for any shrinkage or deflection of the structural frame. There are some points to consider:

- Joints typically contain a compressible filler sized to suit expected movement.
- The support angle should be 1.5–2.5mm above the filler to avoid deflection into the joint under load.
- On completion, the open joint at the panel face should be sealed with mastic.
- Thin support angles can be hidden within a standard mortar joint; thicker angles may require a rebate or pistol cut in the brick. Pistol bricks should be bedded on mortar not exceeding 5mm.
- To prevent excessive deflection, build no more than 1.5m of masonry on a support angle per day.
- The clear joint beneath the support should be ≥10mm for single-storey brickwork, or sized to suit anticipated movement for two or more storeys.
- Expansion of brickwork should be considered in the movement joint design to allow for 1mm of expansion per metre height of brickwork.
- This should be added to the potential deflection of the masonry support and the compressible filler to compress to 50% of its original thickness.
- Damp-proofing is typically placed at the support level, with wall ties installed within 300mm above and below.

2.4 Structural Tolerances

Structural and masonry tolerances must be considered before finalising support design. Standard systems offer limited tolerance, so adjustments must be built in prior to manufacture.

Cavity width
Variances in the slab or frame edge position can be accommodated by +/- 10mm. If the frame edge falls short, the masonry support bracket can be packed out by up to 12mm (including the 2mm Thermal Shim), or the diameter of the fixing (whichever is less). Any shimming greater than 12mm will require suitability approval from FIRMA.

Vertical adjustment
Designed to allow +/- 15mm vertical adjustment, using the FIRMA Locking Washer. Minimum edge distances for fixing positions will vary based on the substrate type, size and fixing type. Contact FIRMA technical support for more information.

Fixings
Only supplied fixings should be used. Locking washers should be aligned so their teeth engage with the bracket teeth.

Lateral adjustment
Systems are designed with a 10mm nominal gap between angle lengths. Continuous lateral adjustment can be achieved by fixing to Cast-in Channels.

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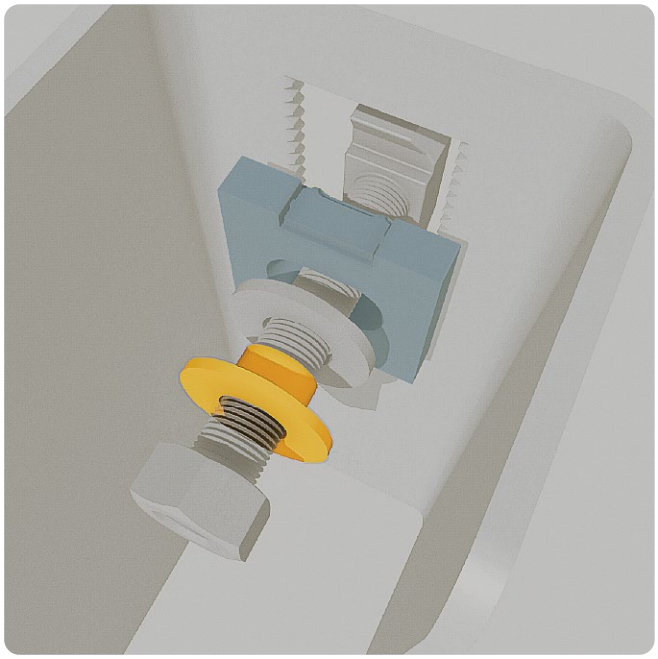
2.5 Corrosion

FIRMA Masonry Support Systems are manufactured from grade 1.4301 (304) stainless steel, suitable for most building applications. In particularly aggressive or visible environments, grade 1.4401 (316) stainless steel can be specified.

Bi-metallic corrosion may occur where stainless steel components are in contact with mild steel in damp conditions. While the stainless steel is unaffected, the mild steel may experience slightly accelerated corrosion. To prevent this, the stainless steel support system should be isolated from the structural steel.

This is achieved by using the FIRMA Thermal Shim (provided as standard with all systems) and, where non-stainless steel fixings are being used, FIRMA Isolation Washers.



FIRMA Isolation Washer

2.6 External Certification

FIRMA Masonry Support Systems carry a UKCA certificate of conformity and are designed to the requirements of EN1993, Eurocode 3 and manufactured to the standard EN1090-1:2009+A1:2011 execution class 2.

FIRMA Ltd are also certified to ISO9001 and ISO14001 and internal monitoring is done through the FIRMA QC Portal and RopeWeaver prioritisation software.

UKCA

EN1993
Eurocode 3
EN1090-1:2009+A1:2011

bsi ISO 9001 Quality Management Systems CERTIFIED

ISO9001
Quality Management Systems

bsi ISO 14001 Environmental Management CERTIFIED

ISO14001
Environmental Management System

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PRODUCT DETAILS

3.1 FMS

Masonry Support System

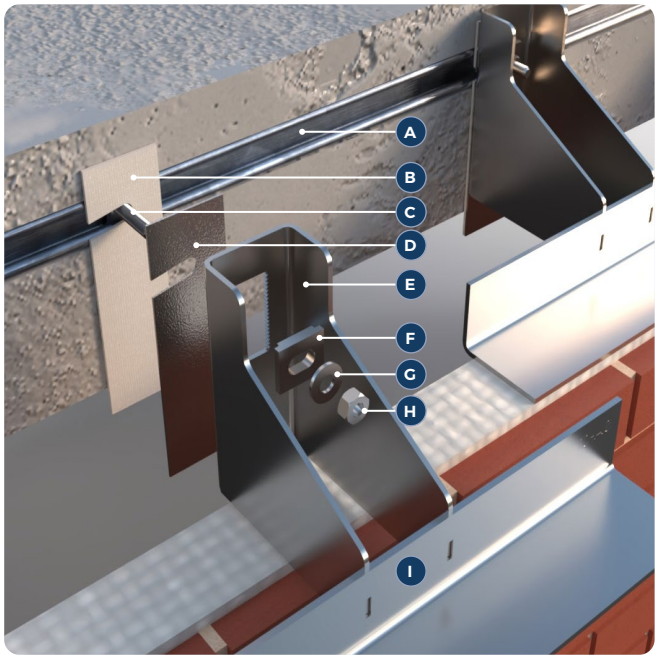
The FIRMA FMS Masonry Support System is a bespoke welded system. Every project is different, and to make sure the façade is designed as efficiently as possible, the FMS system is designed and engineered bespoke to the requirements of each project.

Each masonry support assembly (fully fabricated unit) will range in length up to 1500mm. This is usually dictated by site/installation restraints, structural requirements and design efficiencies.

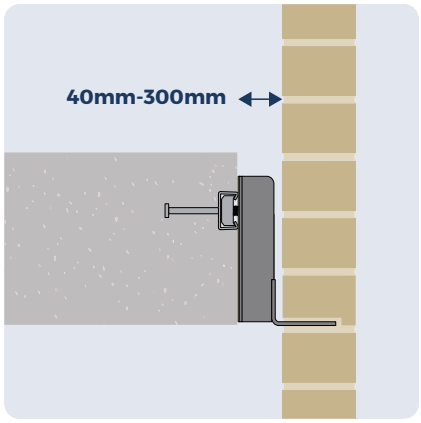
The brackets are fixed in place using the patented FIRMA Locking-washer which is designed to allow easy vertical adjustment during installation, before being tightened to the specified torque setting.

The FMS system is suited to both Cast-in Channel and Post-fixed fixing options.

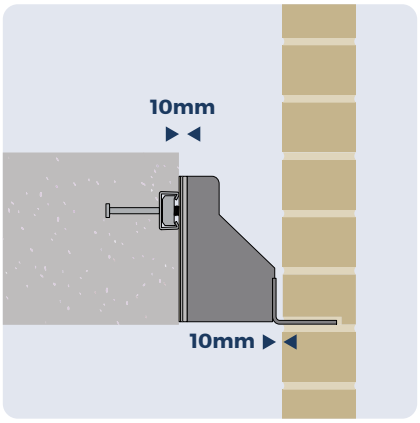
See page 14



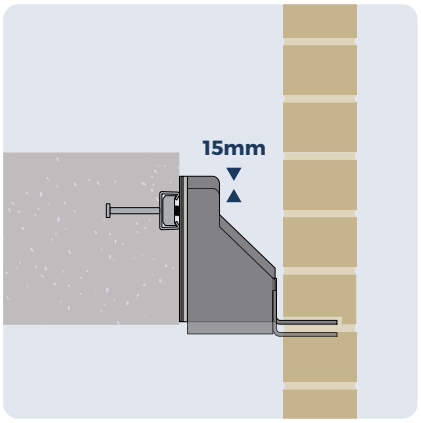
A. Cast-in Channel
B. Thermal Shim
C Threaded Captive-bolt
D. Stainless Steel Shim
E. Bracket
F. FIRMA Locking-washer
G. Load-spreading Washer
H. Securing Nut
I. Support Tray



The FMS system is generally used for cavity depths from 40mm to 300m. Where the cavity depth is less than 40mm, our FSA Masonry Support System would be applicable.



In and out adjustment of the masonry support tray should be such that the bracket is not packed out by more than the diameter of the fixing, which is typically 12mm.



FMS Masonry Support brackets are designed for up to +/- 15mm vertical adjustment with the FIRMA Locking-washer.

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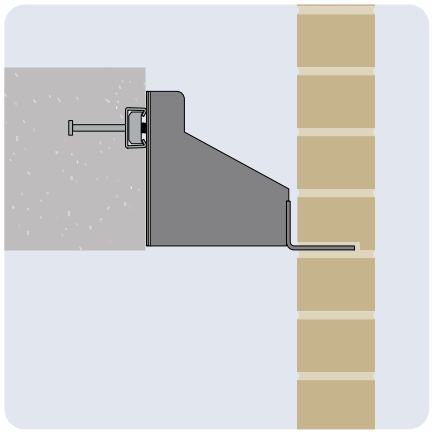
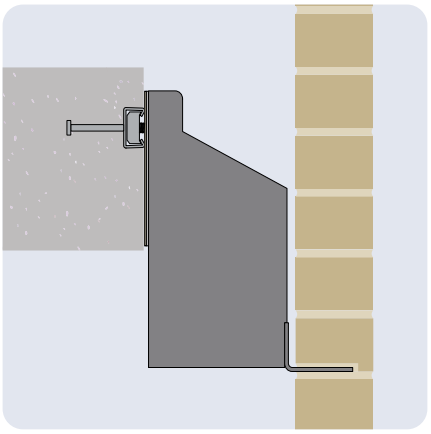
3.2 **FMS Variations**

Masonry Support System



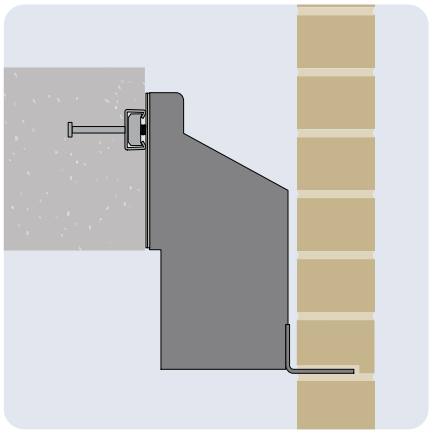
FMS Standard

Specification reference: **FMS**



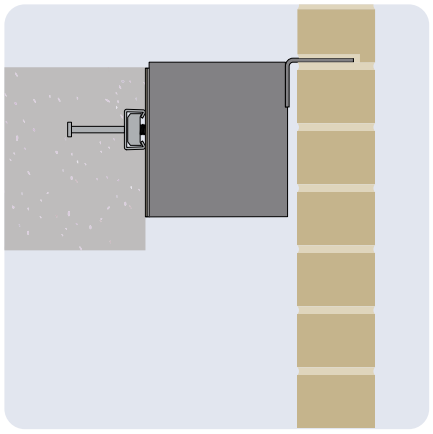
FMS Projected

Specification reference: **FMS-P**



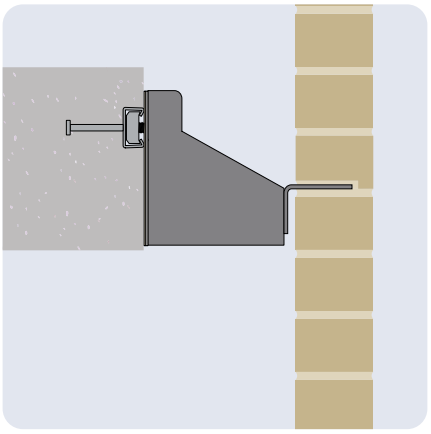
FMS Projected & Notched

Specification reference: **FMS-PN**



FMS Inverted

Specification reference: **FMS-IN**



FMS Reversed Angle

Specification reference: **FMS-RA**

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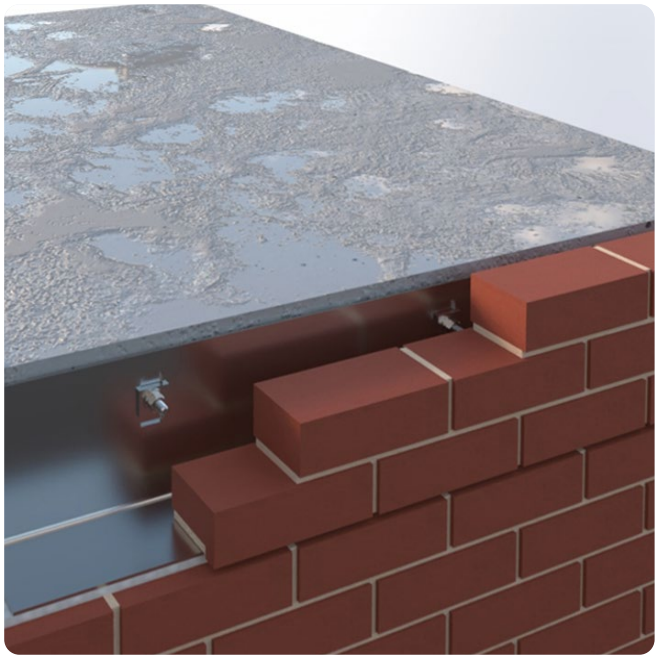
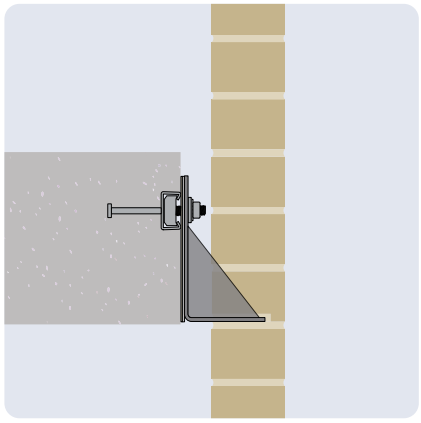
3.3 **FSA**

Folded Support Angle

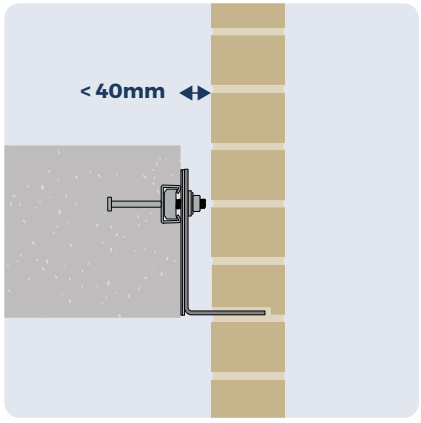
The FSA type is designed for use where the cavity depth is less than 40mm, or where there is a requirement for the cavity to be closed at the support point. It consists of a single stainless steel angle, designed and manufactured to suit the specified cavity depth. Like the FMS system, the FSA system uses the FIRMA Locking-washer to provide +/- 15mm vertical adjustment.



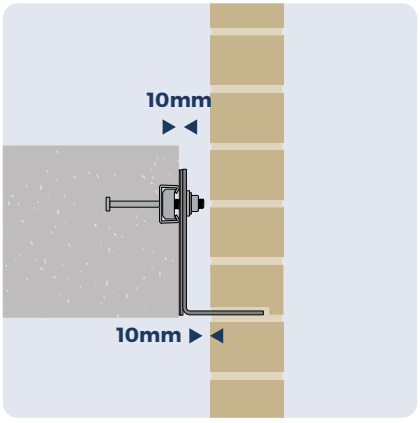
FSA installed to concrete slab with Cast-in Channel



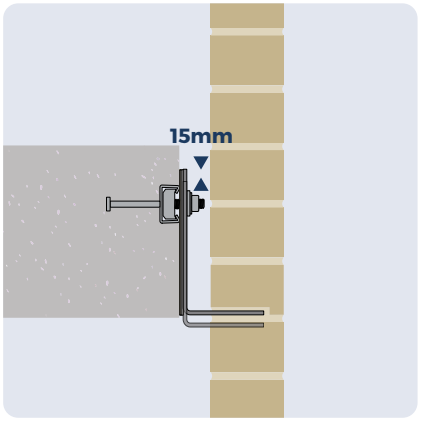
With higher loads, it is sometimes necessary to design the FSA system with gussets to strengthen the system. This may also be coupled with thicker material for extreme loads.



The FSA Support Angle system is suitable for cavities up to 40mm.



In and out adjustment of the masonry support tray should be such that the bracket is not packed out by more than the diameter of the fixing, which is typically 12mm.



FSA Masonry Support brackets are designed for up to +/- 15mm vertical adjustment.

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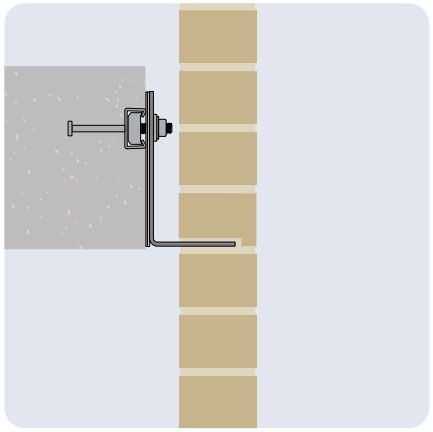
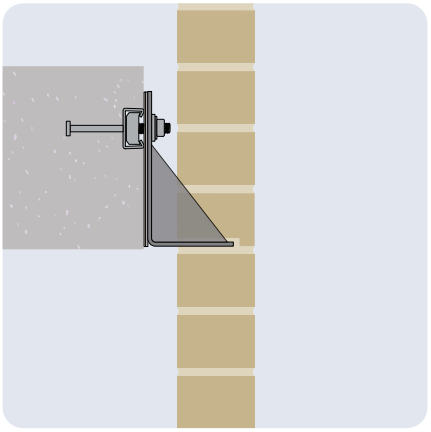
3.4 **FSA Variations**

Folded Support Angle



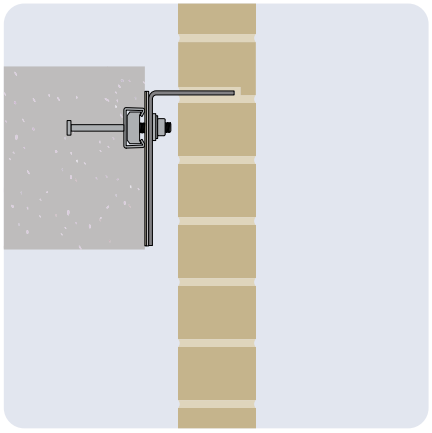
FSA Standard

Specification reference: **FSA**



FSA Standard Gusseted

Specification reference: **FSA-GU**



FSA Inverted

Specification reference: **FSA-IN**

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3.5 Cast-In Channel

FIRMA Cast-In Channel is available in three sizes, to suit a wide range of specifications and loadings.

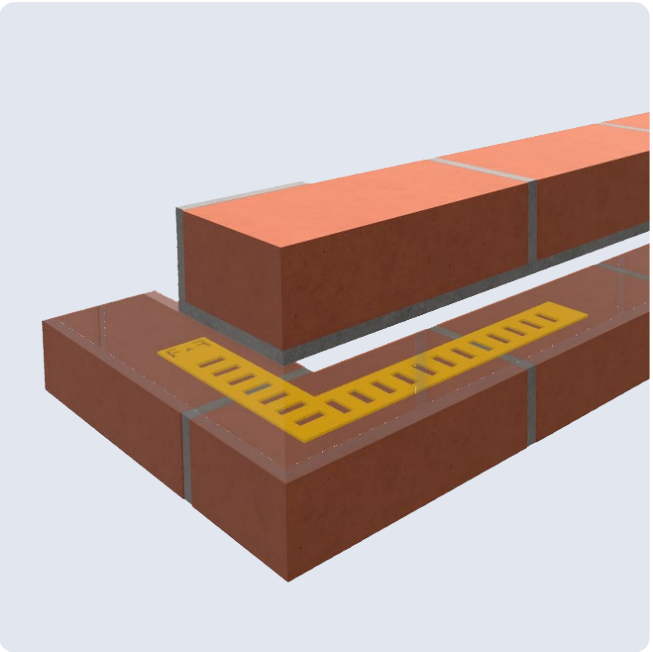
This is typically specified as part of the overall masonry support package, however FIRMA Cast-In Channel is also available as a stand-alone product where required.

FIRMA Cast-In Channel

3.6 Reveal Plates

FIRMA Cast-In Channel is available in three sizes, to suit a wide range of specifications and loadings.

This is typically specified as part of the overall masonry support package, however FIRMA Cast-In Channel is also available as a stand-alone product where required.



FIRMA Reveal Plate

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3.7 Shims

FIRMA Thermal Shims are to be used on all brackets, to reduce thermal bridging between the substrate and the external façade via the masonry support system.

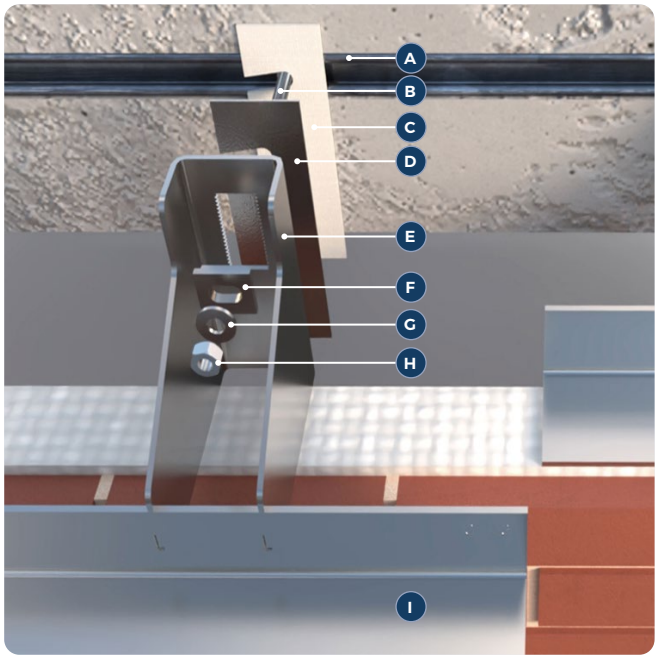
These are made from a high temperature material and have been tested to BS EN 13501-1:2018, and are certified as A1 fire rated.

The FIRMA Thermal Shims are available from stock but can also be made to suit specific design requirements outside standard tolerances.

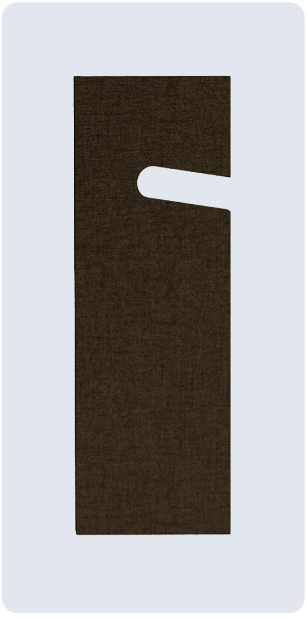
FIRMA Stainless Steel Shims are available in 304 stainless steel or 316 stainless steel depending on site specifications. Standard thickness's available are 2mm, 3mm and 5mm.

The maximum shimming allowed is the outer diameter of the primary fixing or 16mm, whichever is smaller. In most cases, M12 fixings are used, so the maximum total shimming allowed would be 12mm. This includes the 2mm Thermal Shim, as illustrated below.

Where the accepted frame tolerances are exceeded (normally +/- 5mm), and shimming of more than 12mm is necessary, it may be possible to install a welded shim. This will be determined by the loadings.



A. Cast-in Channel
B. Threaded Captive-bolt
C. Thermal Shim
D. Stainless Steel Shim
E. Bracket
F. FIRMA Locking-washer
G. Load-spreading Washer
H. Securing Nut
I. Support Tray



FIRMA Thermal Shim

FIRMA Stainless Steel Shim

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FIXINGS & SUBSTRATES

4.1 Fixing Methods

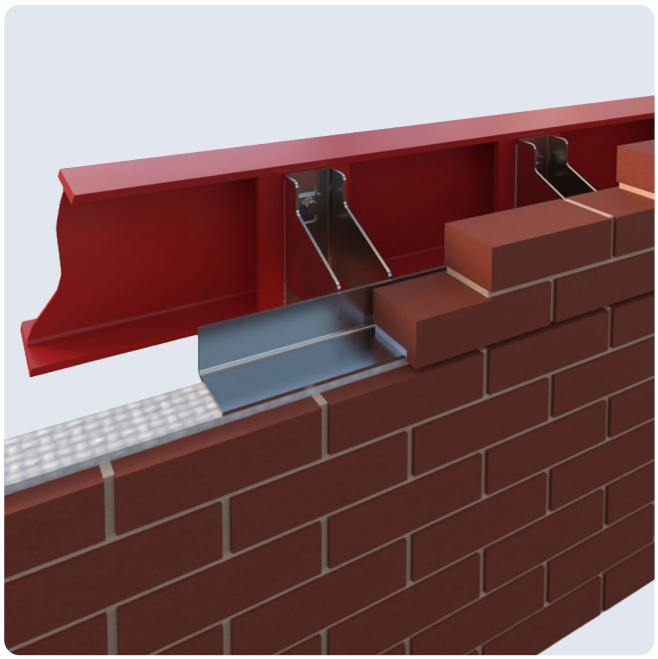
There are number of methods used for fixing Masonry Support in place and these are normally determined by the fixing substrate (concrete, Cast-in Channel, steel), structural requirements, and commercial efficiencies.

4.2 Steel Frame Fixing

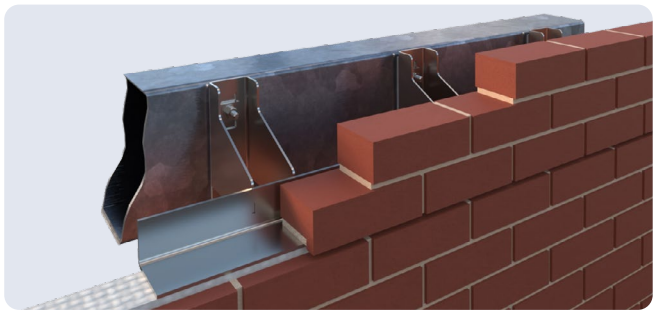
FIRMA FMS and FSA can be fixed directly to exposed structural steel frames. Generally, fixing positions will be pre-determined and coordinated with the structural steel frame contractors to simplify installation.

When fixed to an edge beam, Stiffeners need to be provided, as shown in the illustration. It is recommended that horizontal slots in the Stiffeners are provided to allow for lateral adjustment. The most common fixing used for this substrate is a Hex Screw.

Where the system is fixed to hollow steel beams, it is recommended that the holes are drilled on site to ensure correct fixing positioning. The most common fixing used for this substrate is a Blind Bolt.



FMS fixed to steel edge beam with Stiffeners



FMS fixed to hollow Steel Beam

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4.3 Concrete Frame Fixing

Where FIRMA Masonry Support Systems are to be fixed to a concrete frame, it is generally fixed into either the FIRMA 50/30 Cast-in Channel or 40/223 Cast-in Channel.

Where there are particularly high loads involved, the 54/33 Cast-in Channel may be necessary.

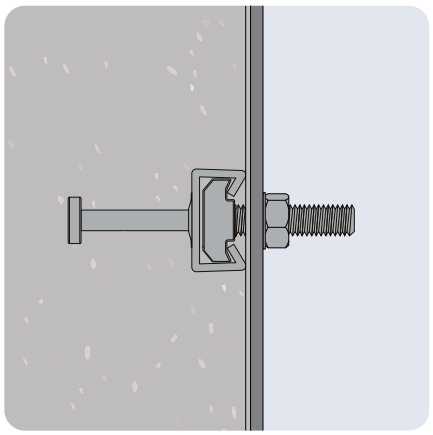
All FIRMA Cast-in Channels and related fixings are ETA certified. ETA stands for European Technical Assessment which is an independent and internationally recognised organisation which assesses technical requirements and testing carried out on fixings.

With masonry support, the most vulnerable part, structurally, of the whole system is the fixings back to the substrate, and the correct specification of the ETA certified channel or fixings is essential to the whole masonry support design. An alternative fixing option for isolated high loads could be a secondary fixing as shown below.

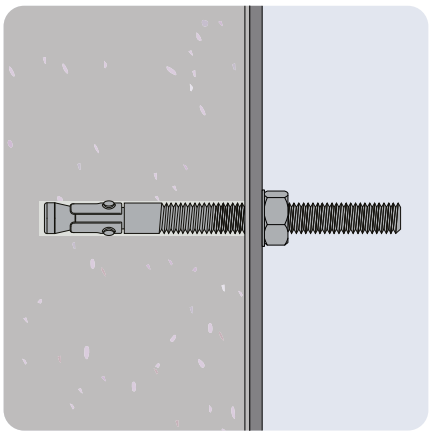
Bracket fixed to Cast-in Channel

Post-fixing

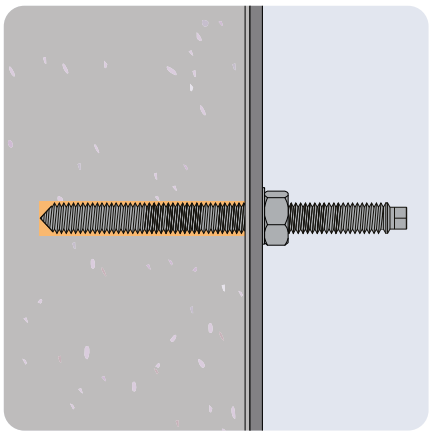
In some cases, post-fixing is required. This may be where the frame has already been cast, without the Cast-In Channel. There are a number of options available, however the most common are Expansion Bolts (Through-bolt, Knock-in Bolt). Resin Bolts may be required to achieve optimal load transfer where loadings are higher, where access is limited, or the substrate is sub-optimal.



T-Bolt
For Cast-In Channel



Through-bolt (Post-fixing)
Expansion Anchor



Stud (Post-fixing)
Resin Fixed

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4.4 Fixing Hardware

Application	Type	Material/Finish	Size	Torque	Product Code
Expansion Anchor	Through-bolt	A4 Stainless Steel	M12 x 115mm	50Nm	3.026.641.012.115
			M12 x 130mm	50Nm	TBC
Channel Fixing	T-Bolt V28/15	A2 Stainless Steel	M12 x 50mm	25Nm	9000.TBOLT.012.050
	T-Bolt V50/300	HDG Steel	M12 x 60mm	25Nm	9000.TBOLT.012.060
	T-Bolt V40/223	HDG Steel	M12 x 60mm	25Nm	9000.TBOLT.012.070
Resin & Stud Fixing	Stud	A4 Stainless Steel	M12 x 140mm	40Nm	3.038.601.380.000
For Accessible Plates	Hex Head Bolt		M12 x 50mm	70Nm	3.033.641.012.050A4
For Non Accessible RHS	Blind Bolt	HDG Steel	M12 x 70mm	30Nm	9000.BLIND.M12.070

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HOW TO SPECIFY

STEP 1

FIRMA System	Code
FMS Standard	**FMS**
FMS Projected	**FMS-P**
FMS Projected & Notched	**FMS-PN**
FMS Inverted	**FMS-IN**
FMS Reversed Angle	**FMS-RA**
FSA Standard	**FSA**
FSA Standard Gusseted	**FMS-GU**
FSA Inverted	**FMS-IN**

STEP 2

Cavity Depth / Loading	Code
Cavity Depth (mm)	eg. **215**
Loading (N/m)	eg. **14**

STEP 3

Fixing Substrate	Code
Reinforced Concrete	**RC**
Steel Frame	**SF**
Hybrid RC/Steel	**RCS**
Pre-cast Concrete	**PC**

Typical order spec: **FMS-IN/215/14/RC**

= **FMS Inverted, 215mm Cavity, 14kN/m loading, Reinforced Concrete**

NBS Specifications

Scan the QR code, or click the button to view FIRMA NBS Specifications.

NBS Source

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