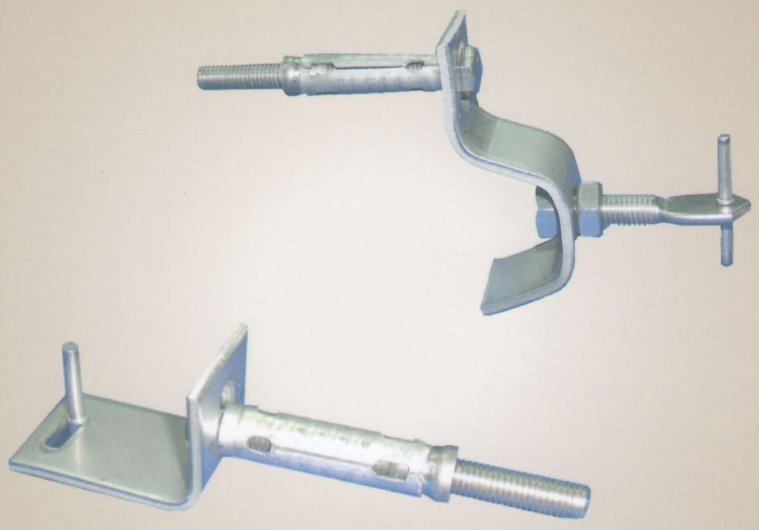
EXPANDED METAL MANUFACTURING CO.



CLADDING FIXING SYSTEM

BUREAU VERITAS

Bureau Veritas Certification

EXPANDED METAL MANUFACTURING COMPANY W.L.L

ZONE 81, BUILDING 455, STREET NO. 29, STREET J, NEW INDUSTRIAL AREA, P.O. BOX: 17840, DOHA, STATE OF QATAR

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

MANUFACTURING, MARKETING AND SUPPLY OF PLASTERING AND BLOCK ACCESSORIES, GYPSUM ACCESSORIES FOR DRY WALL PARTITION AND CEILING SYSTEM, CLADDING FIXING SYSTEM, CABLE TRAY AND CABLE TRUNKING FOR BUILDING CONSTRUCTION MATERIALS. FABRICATION, MARKETING AND SUPPLY OF SHELVING AND RACKING SYSTEM.

Original Cycle Start Date:	06-06-2011
Expiry date of previous cycle:	NA
Certification / Recertification Audit date:	NA
Certification / Recertification cycle start date:	18-04-2023
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	05-06-2026

Certificate No.: QA003228 Rev: 1 Issue date: 18-04-2023

Sarah Nahal – Certification Manager

UKAS MANAGEMENT SYSTEMS
0008

Certification Body Address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom

Local Office: Bureau Veritas International Doha W.L.L, First Floor, D-Ring Road, Building No. 35, Street No. 250, Zone 45, Old Airport Area, P.O. Box 22157, Doha, State of Qatar

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +97440329729

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  - Aluminum Substructure System **14**
- Anchor Bolt **20**
- Tile Movement Joint **22**

The facing of the building is the most important element to the Engineers as well as the owner, it will reflect the beauty of the design and gives the protection of the building.

Facades can be fixed in different ways. The most reliable and effective way is the mechanical fixing. In this way, we use the steel systems to support and fix the required facing elements such as stone, marble, granite etc.

MECHANICAL FIXING COMPARED TO CONVENTIONAL FIXING:

MECHANICAL FIXING	CONVENTIONAL FIXING
1. Time-saving	1. Time-consuming
2. Labor Saving	2. Labor Consuming
3. Design: Staggered or stacked	3. Design: Staggered
4. Straightness: Easy to adjust when mistakes arise due to adjustability features	4. Straightness: Difficult to correct
5. Maintenance: Easy maintenance	5. Maintenance: Require extensive work

EXMET provides a full system of mechanical cladding fixing with all needed support. Starting from the design concept, the necessary load requirements, down to the manufacturing of the high quality components and followed up by a good after sales service.

MATERIALS USED:

SPECIFICATIONS

BS EN 10088-2 – Stainless Steels. Grade 304 and 316

LEED INFORMATION

LEED Clause	LEED Requirement	EXMET Compliance
MR Credits 2.1 and 2.2	Construction Waste Management. Divert construction and demolition debris from disposal in ladfills and incinerators	EXMET products are made of steel associated wastes generated should be included in the construction waste management plan on each of the project.
MR Credits 4.1 and 4.2	Recycled Content. Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.	EXMET products are made of steel and as widely known, 88% to 100% of steel used in the construction a recycled into new steel products at the end of their useful life.
MR Credits 5.1 and 5.2	Regional Materials. Increase demand for building materials and products that have been extracted, harvested or recovered, as well as manufactured, within 800 km of the project site.	EXMET manufacturing plant is located in Qatar and Oman and most of our raw material suppliers are in close proximity to our location.

DESIGN PRINCIPLES

I - METHOD OF DESIGN IS LRFD (Load and Resistance Factor Design)

Design Codes:

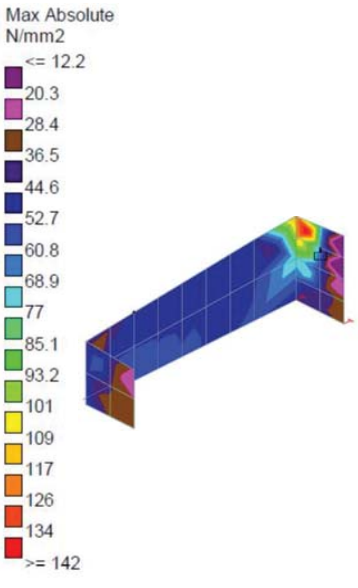
AISC-360-10 : Actions on Structures
ASCE 7-10 : Minimum Design Loads for Buildings
AISI S 200-07 : North American Specification for design of Cold Form Structural Steel Members
QCS 2014 : Qatar Construction Specification
BS 6399 : Loading for Buildings
IBC 2006 : International Building Code

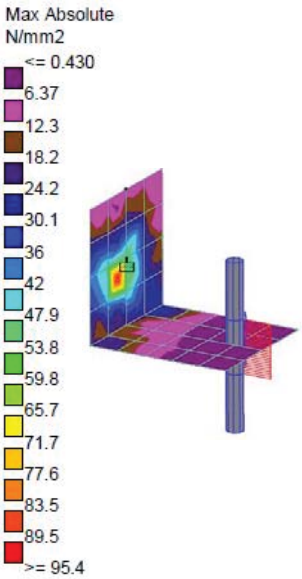
Analysis of Loads

Dead Load : Weight of Stone / Marble.
Wind Load : For wind speed as per QCS 2014, in accordance to ASCE 7-10 or BS 6399.
Seismic Load : In Accordance to ASCE 7-10 or UBC 1997.
Thermal loads : For Thermal Expansion of Stone.

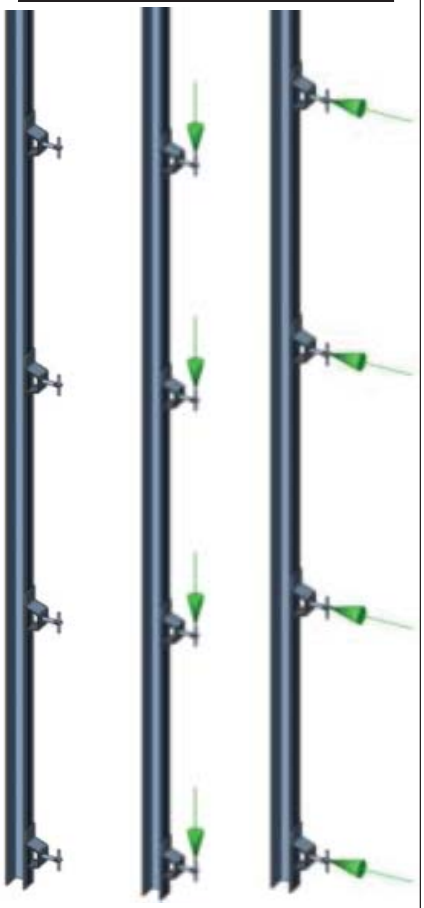
Design Steps:

1 - Designing Section by considering combination of loads for Limit State of Flexure, Shear & Tension.
2 - Comparing the stresses with allowable strength of sections based on the yield stress of materials.
3 - Checking for Limit state of Serviceability, Governed by Deflection criteria.

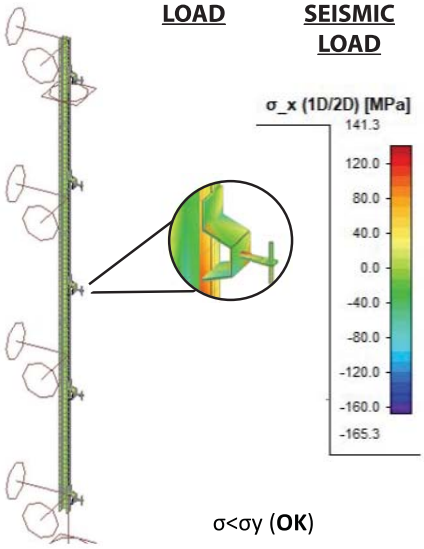




CHANNEL FIXING SYSTEM



DEAD LOAD **WIND + SEISMIC LOAD**



σ<σy (**OK**)

• Detailed Calculation report for Specific case of cladding fixing can be provided upon request.

II - FIXING DETAILS

1. Types of Load:

   a. Dead Load - refers to the load of the cladding itself

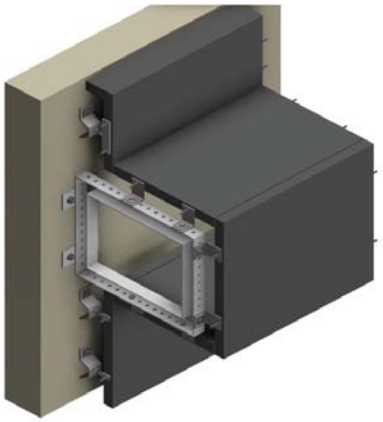
   b. Variable Load - refers to live load, wind, seismic loads and thermal expansions

2. Fixing Systems:

a.) Load- bearing Fixing

b.) Restraining Fixing

c.) Indirect Fixing (Frames and Channels



III - SYSTEM COMPONENTS

I. Brackets (Stainless Steel Plates / Coils)

MECHANICAL TEST REQUIREMENTS					
Designation Standard	Grade	Alloying Elements	Minimum 0.2% Proof Stress	Ultimate Tensile Strength	Elongation after Fracture
			R_p – 0.2	R_m	%
ASTM A 240M	SS316 / SS 316L	Molybdenum – Chromium-Nickel Austenitic Stainless Steels	170 (L) 205	485 (L) 515	40
	SS 304 / SS 304L	Basic Chromium – Nickel Austenitic Stainless Steel			
BS EN 10088-2	1.4301 (304)	Basic Chromium – Nickel Austenitic Stainless Steel	210	520 – 720	45
	1.4404 (316L)	Molybdenum – Chromium-Nickel Austenitic Stainless Steel	220	520 – 670	40

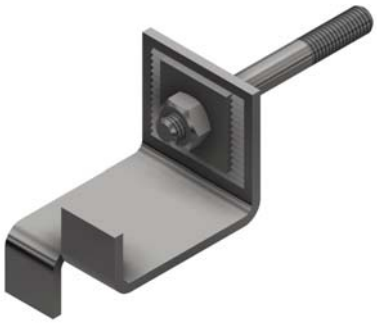
NOTE: For design calculation, Rp and Rm values will be taken from the Mill Test Certificate divided by 1.2 (As per SCI P-291, published by the Steel Construction Institute, UK)

II. Fasteners

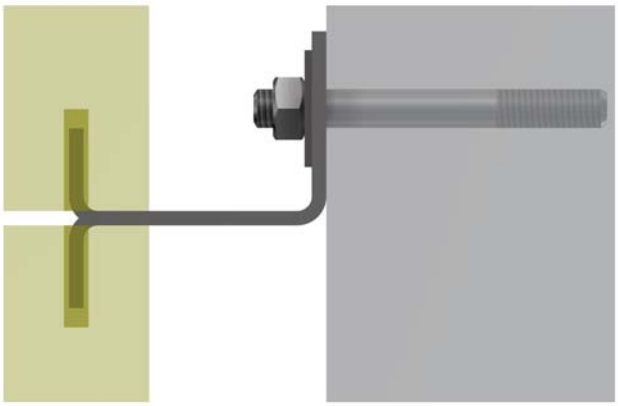
Mechanical Test Requirements				
Stainless Steel Grade	Bolts, Pins			Nuts
	Property Class	Minimum 0.2% Proof Stress Rp	Ultimate Tensile Strength Rm	Ultimate Tensile Strength Rm
A2 (SS304) & A4 (SS316)	50	210	500	500
	70	450	700	700

NOTE: For design calculation, Rp and Rm values will be taken from the Mill Test Certificates issued by suppliers for coils and plates. (As per SCI P-291, published by the Steel Construction Institute, UK)

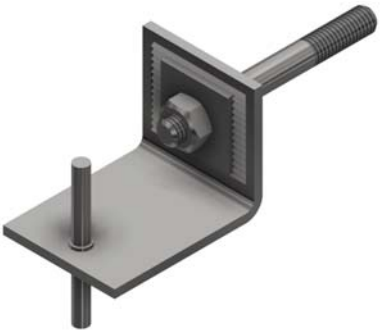
DIRECT FIXING: ANGLE BRACKET (L-BRACKET)



Item Code - FLR



- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical



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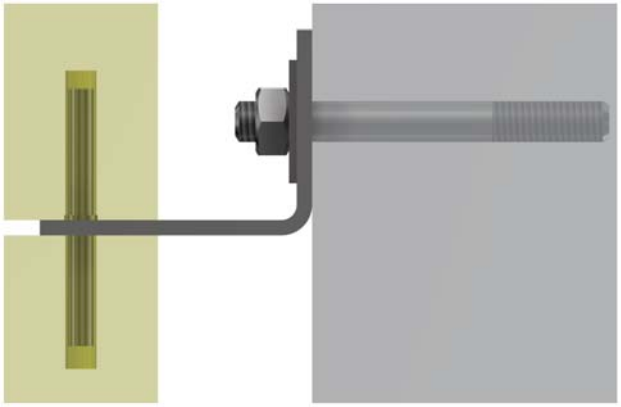
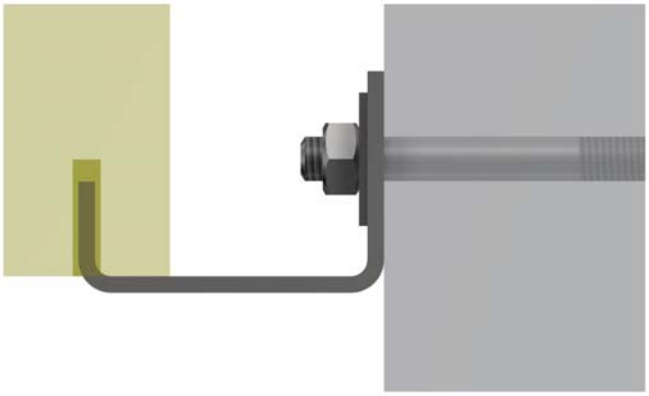


- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

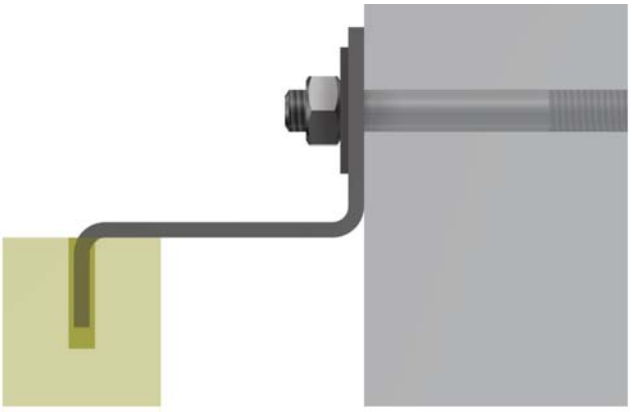
DIRECT FIXING: ANGLE BRACKET (L-BRACKET)

Item Code - FLU



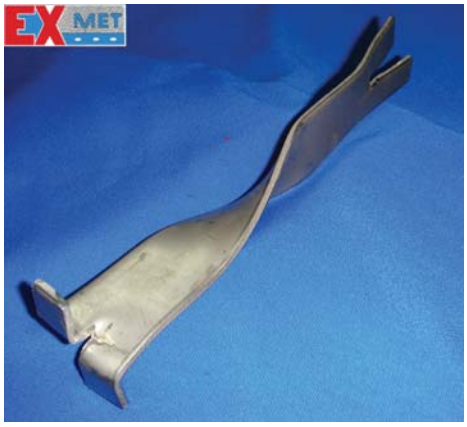
- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

Item Code - FLD

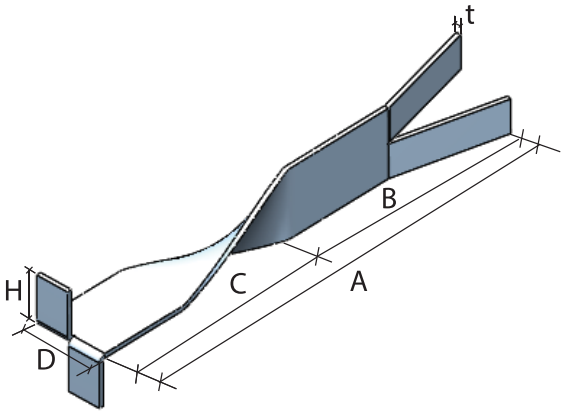


- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

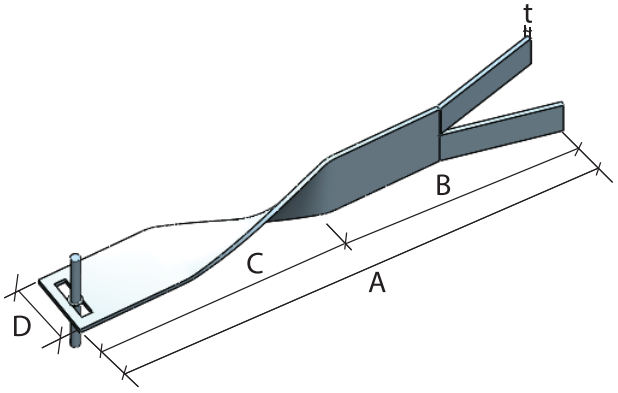
DIRECT FIXING: FISH TAIL BRACKETS



Item Code - FFTR

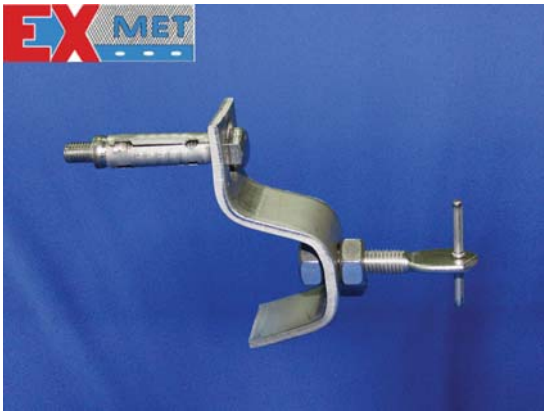


Item Code - FFTP

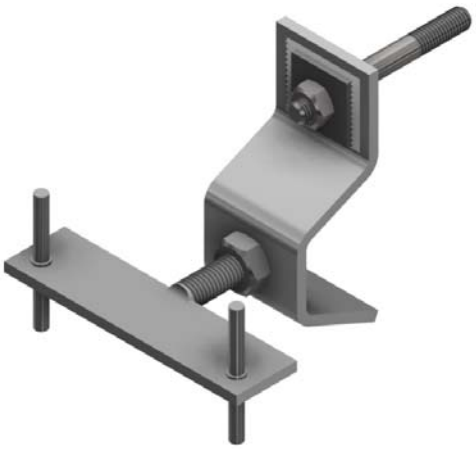


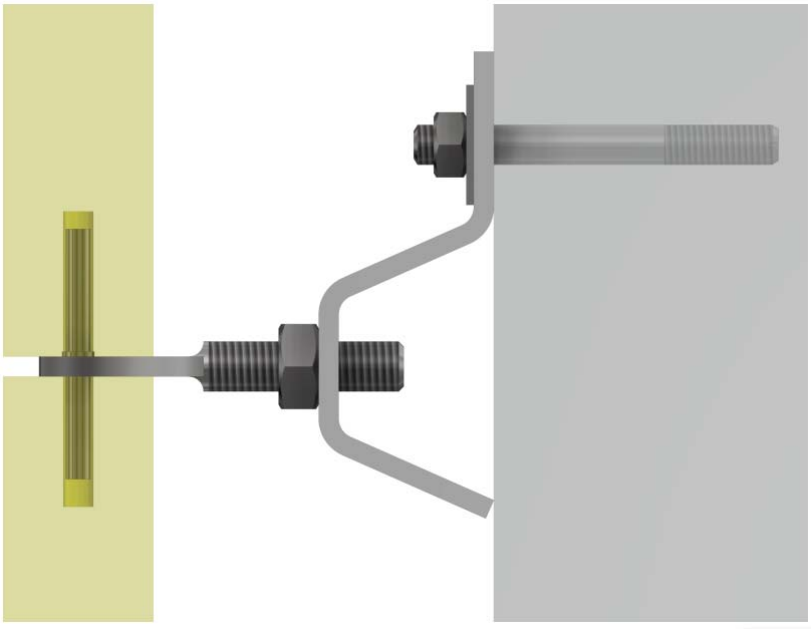
Item Code	A mm	B mm	C mm	t mm	Maximum Load (N)
FFTR / FFTP - 201	130	90	40	2	62
FFTR / FFTP - 202	140	90	50	2	46.5
FFTR / FFTP - 203	150	90	60	2	37.0
FFTR / FFTP - 301	130	90	40	3	175
FFTR / FFTP - 302	140	90	50	3	131
FFTR / FFTP - 303	150	90	60	3	105

DIRECT FIXING: Z - BRACKET (VERTICAL JOINT)



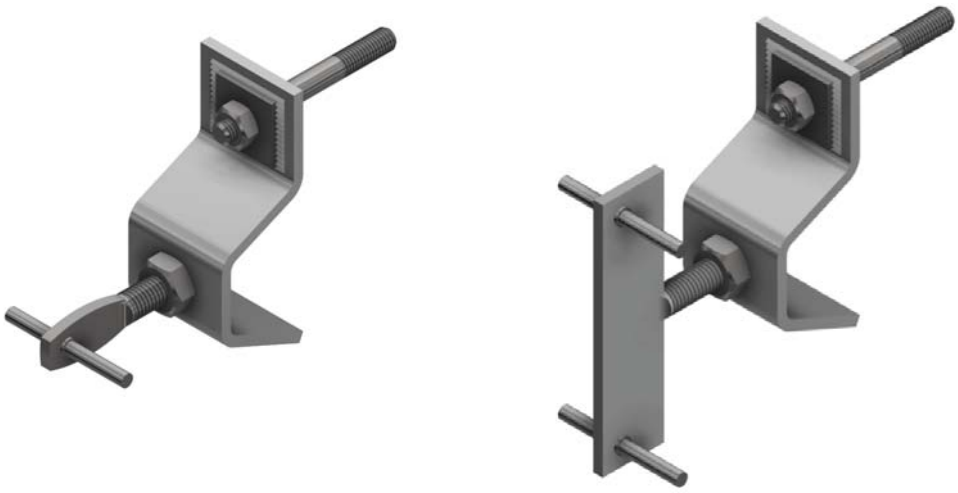
- Used generally for cavities up to 100mm
- Easy installation, economical
- Adjustability up to ± 25mm

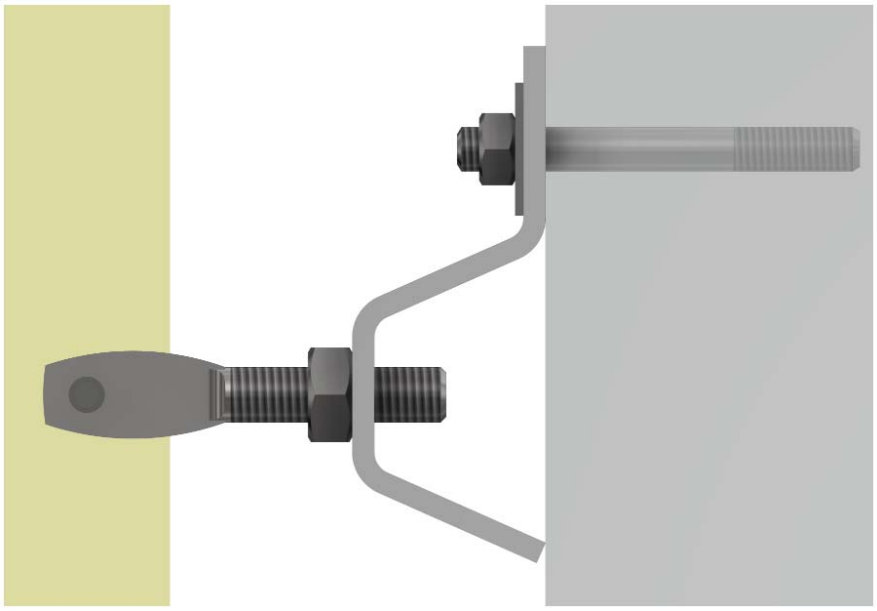




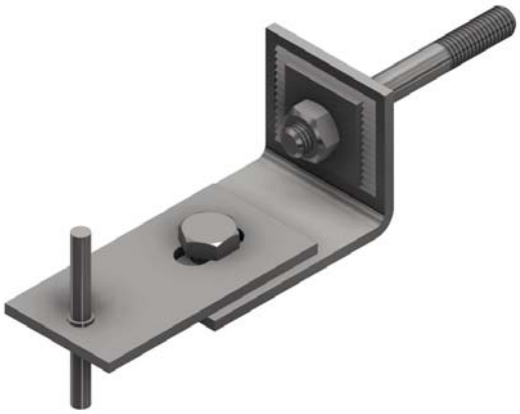
DIRECT FIXING: Z - BRACKET (HORIZONTAL JOINT)

- Used generally for cavities up to 100mm
- Easy installation, economical
- Adjustability up to ± 25mm





DIRECT FIXING: OTHER TYPES



Angle Bracket with Plate (Single - Fixing)

* used for longer spacing distance from the wall

Adjustability up to ± 15mm

C- Bracket

* Heavy duty bracket used in bigger cavity distance from the wall or heavy cladding.
* Loads are submitted based on full design.

Adjustability up to ± 25mm

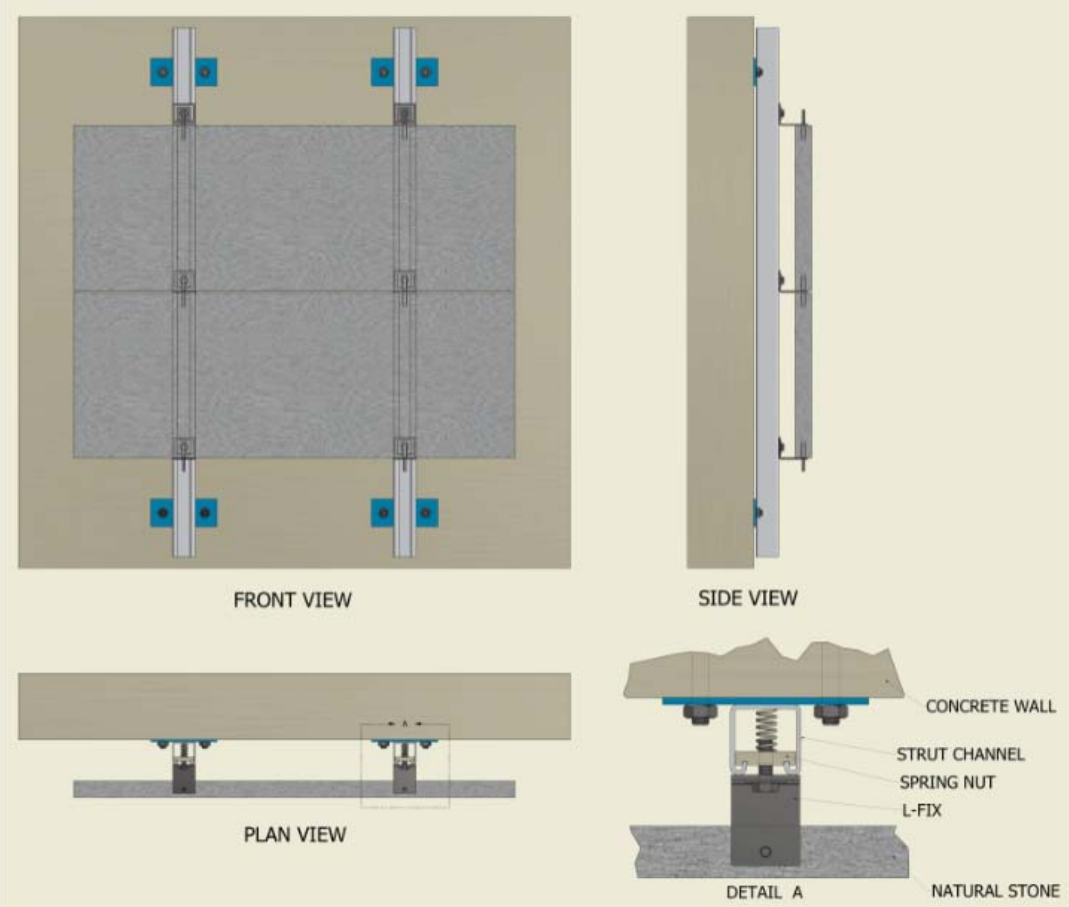
Corner Bracket, used to fix small pieces of stones on corners.

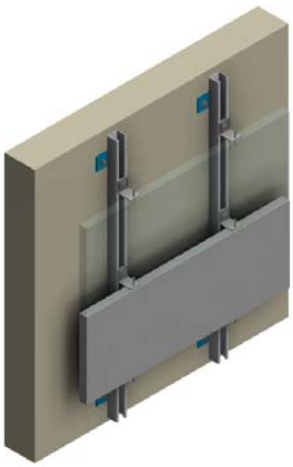
INDIRECT FIXING

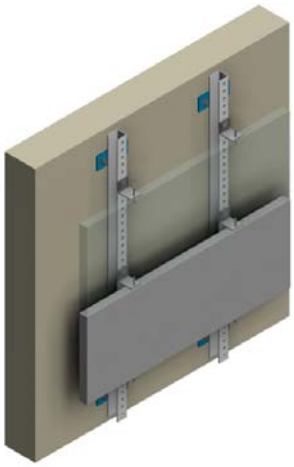
In some areas the cladding is to be attached to the walls by means of framing systems or channels. EXMET provides a complete solutions for your special requirements case by case.

Channel Fixing

EXMET provides channels to be fixed on the walls, the brackets will be carried by the channel. Channels will have several punched holes for flexible fixing at any location.



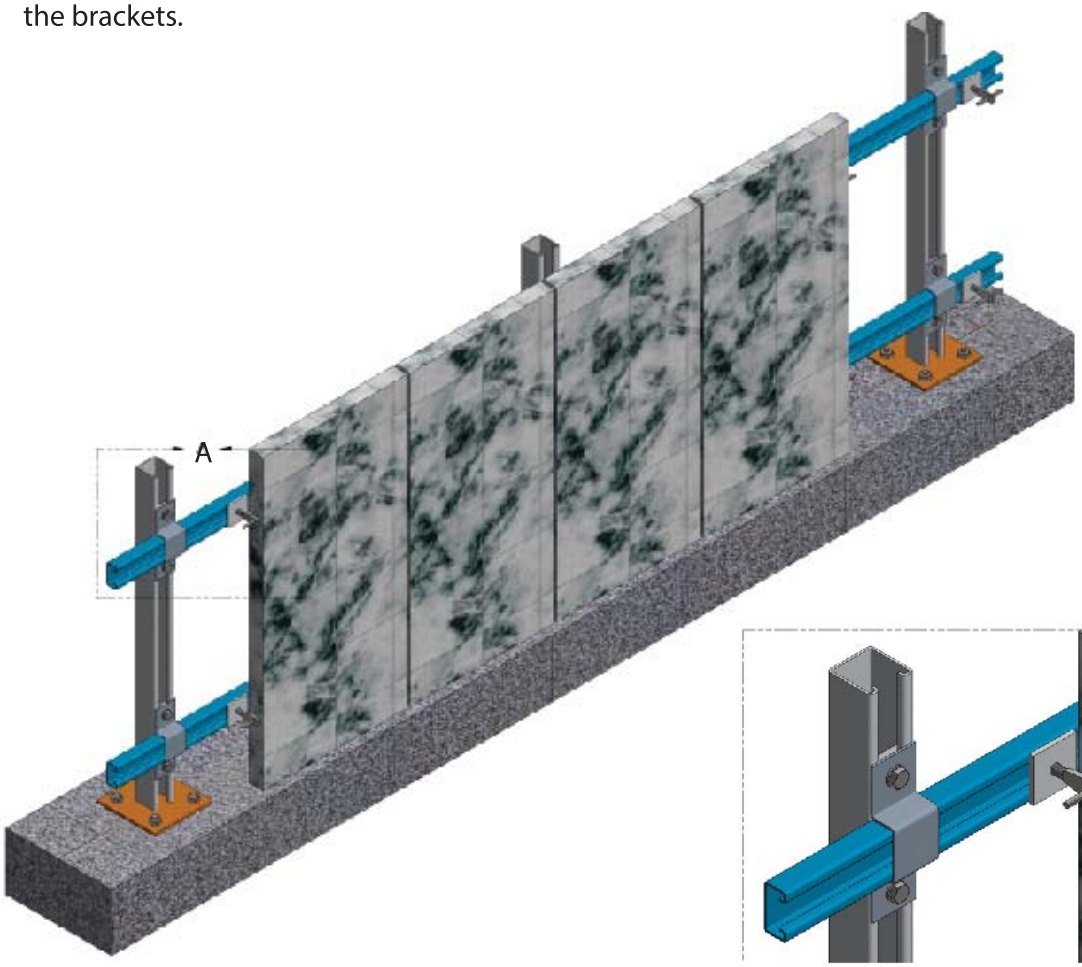




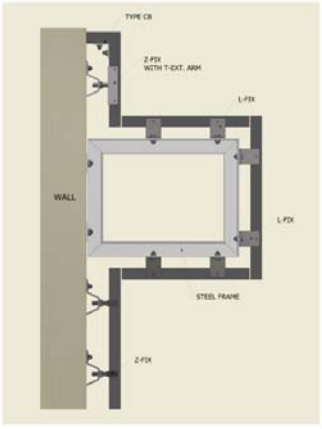
INDIRECT FIXING

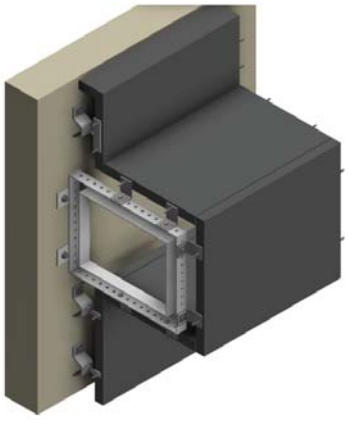
Fixing on Framing System

For bigger cavity widths or at corners and canopies we can provide a framing system to carry the brackets.



DETAIL A





INDIRECT FIXING

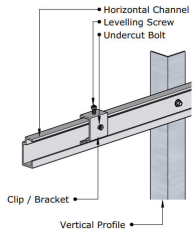
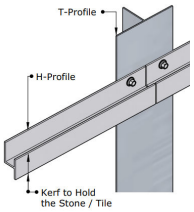
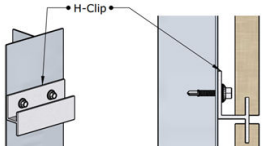
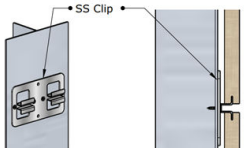
ALUMINUM SUBSTRUCTURE SYSTEM

A modern, ventilated & insulated cladding system that uses extruded aluminum profiles as a substructure to hold most types of cladding (stone panels, ceramic tiles, Porcelain tiles, Cement boards, Terracotta. etc.) on building façades.

A. Types of Fixing system:

1- Undercut or Concealed system
2- Kerf or Slot System with continuous rails
3- Kerf or Slot System with segmented Clips
4- Rivet fixing system

B. Application of Various fixing systems for cladding material:

Fixing System		Cladding Material				Advantages
		Cement Board	Ceramic Tile	Stone 10-15mm	Stone 15-30mm	
1- Undercut or Concealed system		✓	✓	✓	✓	* Versatile. * Fixing system fully hidden. * Possible to have Zero Joint.
2- Kerf system with rail			✓	✓	✓	* High load bearing. * Can be used for any thickness of panel. * Can be used for: o Very wide panels. o Terracotta Tiles.
3- Kerf system with clip	a. *H-Clip* 		✓	✓	✓	* High load bearing. * Can be used for any thickness of panels.
	b. *SS Clip* 		✓	✓		* Specially for very thin stones & tiles. * Require less groove width in panels.
4- Rivet fixing		✓				* Easy to install. * Very economical.

TYPES OF FIXING SYSTEM:

1. Undercut or concealed System:

The undercut anchor is the most widely used and reliable concealed mechanical fixing method for natural stone panels (granite, marble, limestone, sandstone) and cement board in ventilated rainscreen façades. It provides high load bearing system while keeping all fixings completely hidden from view with possibility to have ZERO joint between panels when required.

Suitability:

- Stone Panel
- Ceramic tile
- Porcelain tile
- Fiber cement board

FIXING SYSTEM DETAILS:

A- Primary framing system: consisting of below detailed components,

a. Vertical extruded aluminum profiles (typically 6063-T6 or similar alloy)
b. Load Bearing Brackets (The Anchors)
c. Restraint Brackets (Sliding Point)
d. Thermal Break: A hard PVC or rubber pad

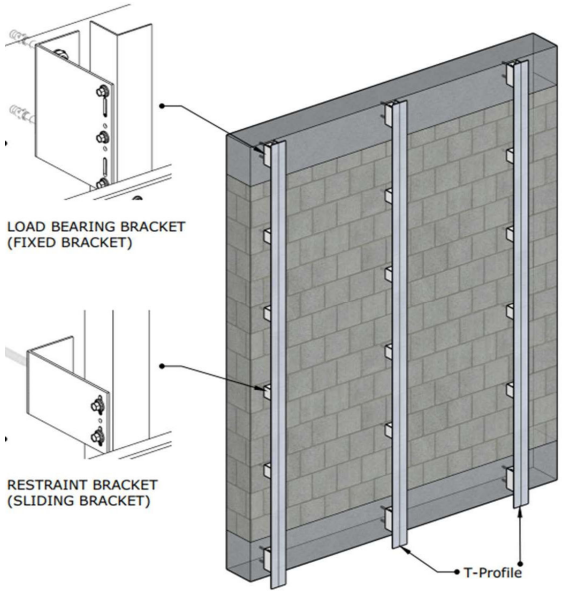


Figure 1.1 – PRIMARY ALUMINIUM FRAMING

Item Code	Description	Size (mm)	Thickness (mm)	Material	Length
ATX	T-Profile	120x50	2.0 & 2.2	AL-6063	3.0 m
ALX	L-Profile	50x50	2.0	AL-6063	3.0 m
AWB-L	Loading Bracket	-	3.0	AL-6061	150 mm
AWB-R	Restraint Bracket	-	3.0	AL-6061	80 mm
XST	Sleeve Anchor	M6, M8, M10	-	SS-316	-

B- Horizontal Profile with inverted clips fixed to panels by Undercut anchors: (check below details)

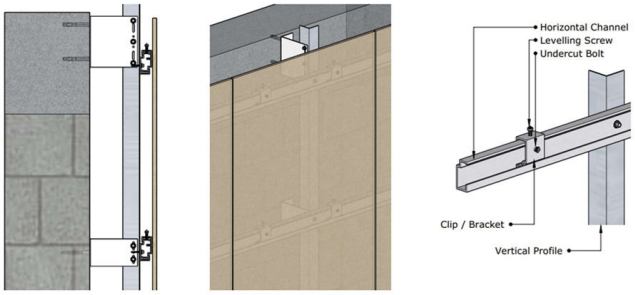


Figure 1.2 – UNDERCUT FIXING SYSTEM DETAILS

Item Code	Description	Size (mm)	Thickness (mm)	Material	Length
ZMP	Horizontal Profile	29x62	Varies	AL-6063	3.0 m
ZMC	ZM-Clip	29x62	Varies	AL-6063	50 mm
UBX	Undercut Bolt	M6, M8, M10	-	Galvanized / Stainless	-
LSX	Levelling Screw	M6	-	Galvanized / Stainless	-
DSX	Self-Drilling Screw	M4.5, M5.5	-	Galvanized / Stainless	-

*Drill Equipment for undercut shall be supplied upon request

C. Drilling & Fixing of Undercut Bolt

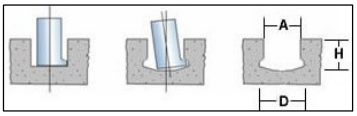


Figure 1.3 - Undercut Drilling

On the back face of each panel, conical undercut holes are drilled with special tipped undercut drill bits. The hole is wider at the bottom, creating a dovetail shape that locks the anchor mechanically.
Anchor and bolt length have to be matched to the hole depth required and to the panel bracket chosen. When the central bolt is tightened, the sleeve expands and perfectly fills the conical undercut. creating a strong form-locked connection.

Figure 1.4a

Figure 1.4b

Figure 1.4c

Installation of panel on horizontal channel.

Figure 1.5 Product Assembly

Scan QR or *Click here* for detail installation video

2. Kerf or Slot System with continuous rails:

The Kerf or Slot System with rails is a mechanical fixing method primarily used for attaching natural stone, thick ceramic, or concrete panels to a facade's aluminum substructure. It provides a secure, attachment by utilizing precision-cut grooves in the cladding material.

Suitability:

- Stone Panel, Ceramic tile, Porcelain tile, Terracotta tiles.

FIXING SYSTEM DETAILS:

A- Primary framing: consisting of below detailed components,

a. Vertical extruded aluminum profiles (typically 6063-T6 or similar alloy)
b. Load Bearing Brackets (The Anchors)
c. Restraint Brackets (Sliding Point)
d. Thermal Break: A hard PVC or rubber pad

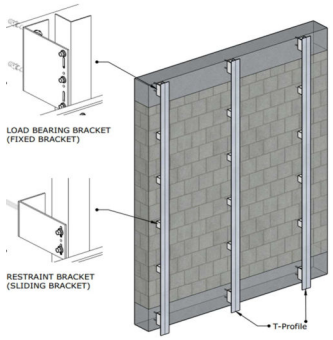


Figure 2.1 – PRIMARY ALUMINIUM FRAMING

B- Horizontal H-Profile / Rail with kerf to hold the panel with groove in top and bottom edge: (check below details)

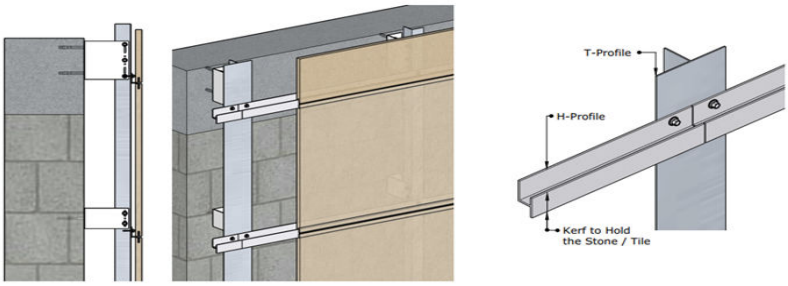


Figure 2.2 – KERF SYSTEM WITH CONTINUOUS RAIL

Item Code	Description	Size (mm)	Material	Length
HPX	h-Profile	Varies	AL-6063	3.0 m
DSX	Self-Drilling Screw	M4.5, M5.5	Galvanized / Stainless	-
DSX	Self-Drilling Screw	M4.5, M5.5	Galvanized / Stainless	-

3. Kerf or Slot System with segmented Clips:

The Kerf or Slot System with segmented clips is a mechanical fixing method primarily used for attaching stone or ceramic panel to a facade's aluminum substructure. It provides a secure, attachment by utilizing precision-cut grooves in the cladding material.

Suitability:

- Stone Panel, Ceramic tile, Porcelain tile.

FIXING SYSTEM DETAILS:

A- Primary framing: consisting of below detailed components,

a. Vertical extruded aluminum profiles (typically 6063-T6 or similar alloy)
b. Load Bearing Brackets (The Anchors)
c. Restraint Brackets (Sliding Point)
d. Thermal Break: A hard PVC or rubber pad

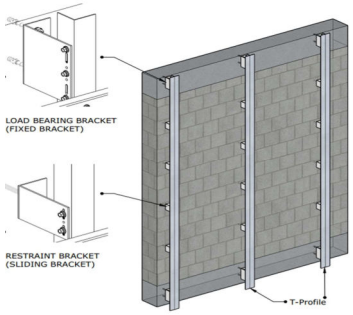


Figure 3.1 – PRIMARY ALUMINIUM FRAMING

B- Clips with H-Profile or standard SS Clips with kerf to hold the panel with groove in top and bottom edge: (check below details)

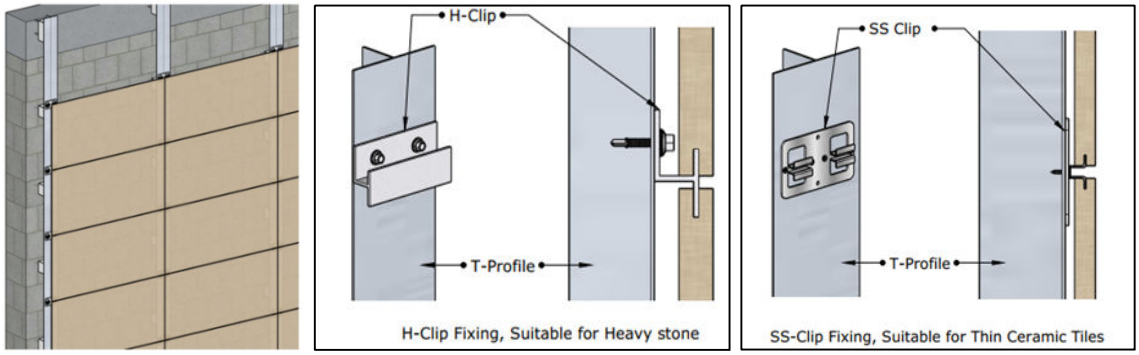


Figure 3.2 – KERF SYSTEM WITH CLIP

Item Code	Description	Size (mm)	Material	Length
HCX	h-Clip	Varies	AL-6063	100 mm
CSX	SS Clip	100x60	Stainless Steel	-
DSX	Self-Drilling Screw	M4.5, M5.5	Galvanized / Stainless	-

4. Rivet fixing system:

This is a Façade system where fiber cement panels are mechanically attached directly to a vertical aluminum grid using rivets. It is a cost-effective, lightweight, and easy-to-install solution commonly used for institutional and residential facades. The rivets remain visible on the facade but are usually colored to blend with the panel.

Suitability:

- Fiber Cement Board

FIXING SYSTEM DETAILS:

A- Primary framing: consisting of below detailed components,

a. Vertical extruded aluminum profiles (typically 6063-T6 or similar alloy)
b. Load Bearing Brackets (The Anchors)
c. Restraint Brackets (Sliding Point)
d. Thermal Break: A hard PVC or rubber pad

B- Direct fixation of panel on vertical profiles using rivets: (check below details)

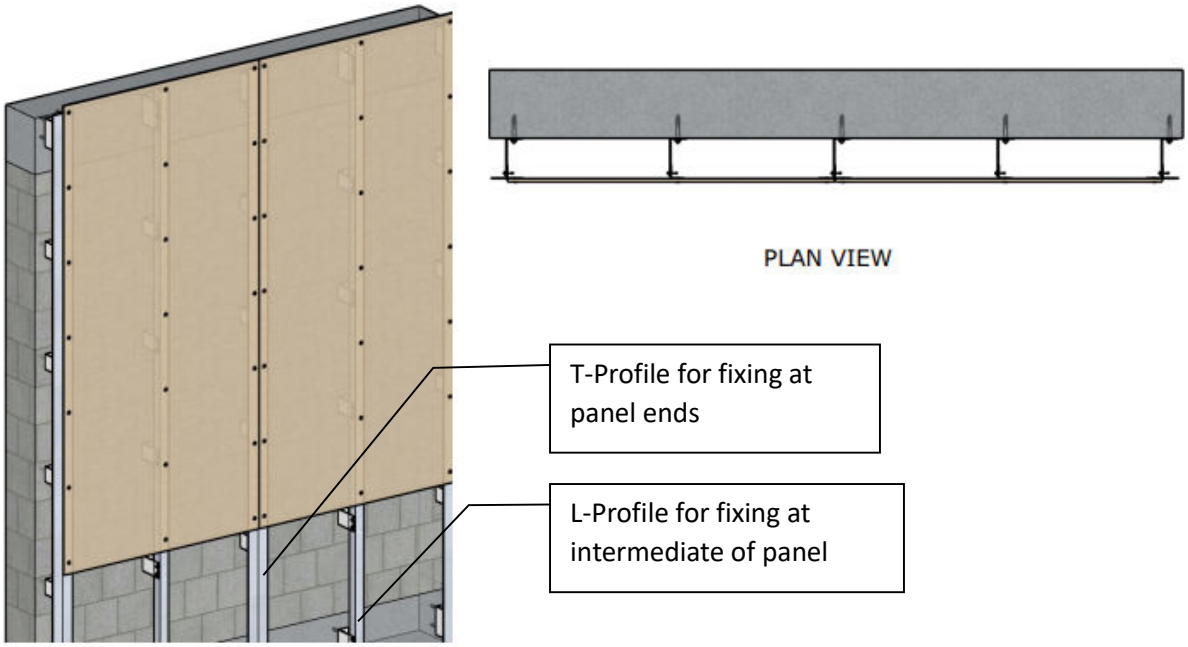


Figure 4.1 – RIVET FIXING SYSTEM DETAILS

ANCHOR BOLT

SLEEVE ANCHOR BOLT:

DESCRIPTION:

A Sleeve Anchor Bolt is a Mechanical Fastener used to secure objects to concrete, brick, or masonry surfaces. It features a threaded bolt inside an expandable metal sleeve; when inserted into a pre-drilled hole and tightened,the sleeve expands against the hole's walls for a firm, reliable grip.

Item Code	XS4 - GI	XS4 - A2 / A4
Anchor		
Material	GI	SS 304 & SS 316
Applications	Dry Indoor conditions, Indoor with temporary condensation	A2: For Indoor & Outdoor A4: For Outdoor & Marine condition
Base materials	Cracked & Non-Cracked Concrete	Cracked & Non-Cracked Concrete
Thread size*	M8 / M10 / M12 M6: Non-Structural Purpose	M8 / M10 / M12 M6: Non-Structural Purpose

Approvals

European Technical Assessment — Instytut Techniki Budowlanej, Poland — ETA-25/0549 — EAD 330232-01-0601

**For M-8 & M-10 SS-316 Anchors

RECOMENDED LOAD:

Anchor Size		M6	M8	M10
Effective Anchorage depth h_{ef}	[mm]	35	43	50
Non-Cracked Concrete (C 20/25, F_{ck}-25Mpa)				
Pull Out (Tension)	N [kN]	2	4.80	8
Shear	V [kN]	3.25	6.30	14.40
Cracked Concrete (C 20/25, F_{ck}-25Mpa)				
Pull Out (Tension)	N [kN]	***	3.10	5.20
Shear	V [kN]	***	6.30	14.40

WEDGE ANCHOR BOLT:

DESCRIPTION:

Wedge Anchor Bolts is a Mechanical expansion bolt manufactured from high-strength carbon steel or stainless steel, designed for post-installation in hardened concrete. The anchor operates by mechanical expansion of the wedge at the embedded end when torque is applied, creating a secure frictional and bearing-based connection within the concrete.

Item Code	XT-G	XT-S
Anchor		
Material	GI	SS 304 & SS 316
Applications	Dry Indoor conditions, Indoor with temporary condensation	A2: For Indoor & Outdoor A4: For Outdoor & Marine condition
Base materials	Non-Cracked Concrete	Non-Cracked Concrete
Thread size*	M8 / M10 / M12 M6: Non-Structural Purpose	M8 / M10 / M12 M6: Non-Structural Purpose

RECOMENDED LOAD:

Anchor Size		M6	M8	M10
Effective Anchorage depth h_{ef}	[mm]	35	43	65
Non-Cracked Concrete (C 20/25, F_{ck}-25Mpa)				
Pull Out (Tension)	N [kN]	2	4.80	8
Shear Capacity	V [kN]	3.25	6.50	9.60

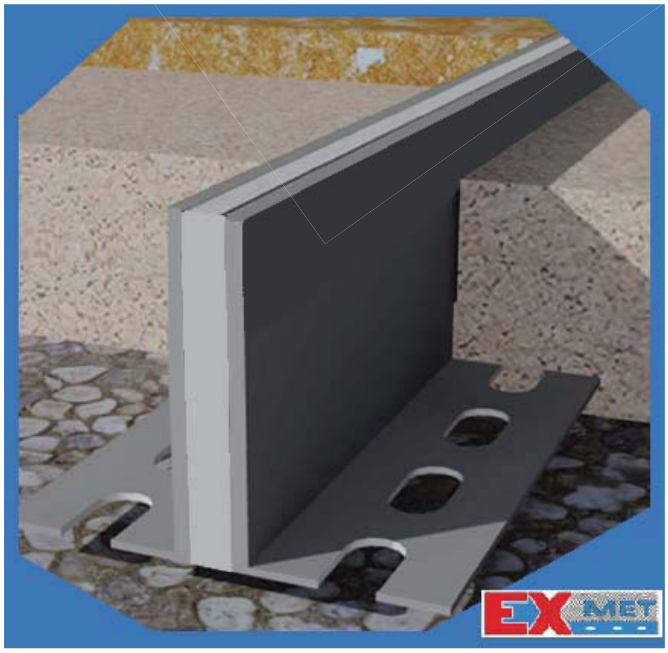
Tile movement joints are used on the floors and walls to protect edges and joints to allow differential movements and local stresses such as transient loading, shrinkage, thermal variation and others.

This is most commonly used in large tiling areas.

MATERIALS USED:

SPECIFICATIONS

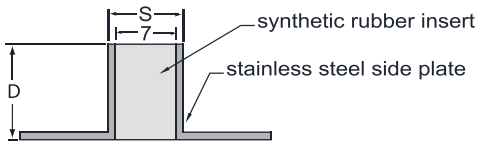
BS EN 10088 - 2 - Stainless Steels. Grade 304 and 316
* Brass is also available upon request
Available colors for rubber: Black, Gray and Beige

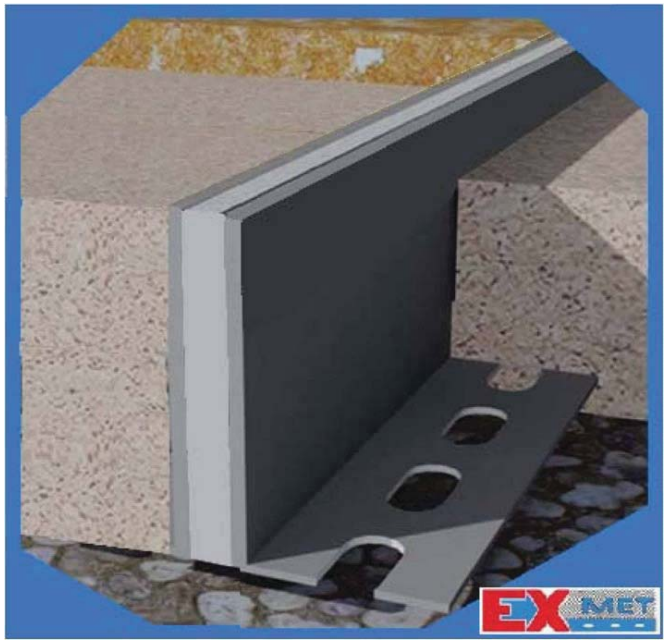


TMJ1 - Consists of two L-plates bonded firmly to a synthetic rubber insert and often used between tile joints.

MODEL	Joint Depth (D)	Joint Size (S)	Length (m)
TMJ1	25mm	10mm	2.4

* Other joint depths (D) are available upon request

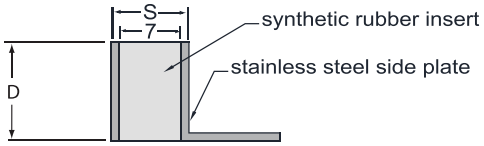




TMJ2 - Make use of one side plate on one side and an L-plate on the other and bonded firmly to the synthetic rubber insert. This is commonly used for permiter fixing.

MODEL	Joint Depth (D)	Joint Size (S)	Length (m)
TMJ2	25mm	10mm	2.4

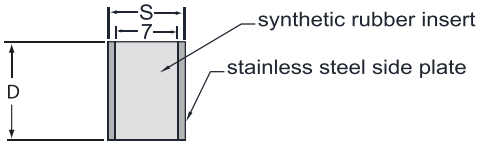
* Other joint depths (D) are available upon request



TMJ3 - Consists of side plates on both sides and firmly bonded to a synthetic rubber insert

MODEL	Joint Depth (D)	Joint Size (S)	Length (m)
TMJ3	25mm	10mm	2.4

* Other joint depths (D) are available upon request



GENERAL FIXING SYSTEM

EXMET provides many solutions for your fixing requirements.

LAVATORY FIXING SYSTEM

CABLE MANAGEMENT FIXING SYSTEM

AIR CONDITIONING FIXING SYSTEM

MATERIALS USED

SPECIFICATIONS

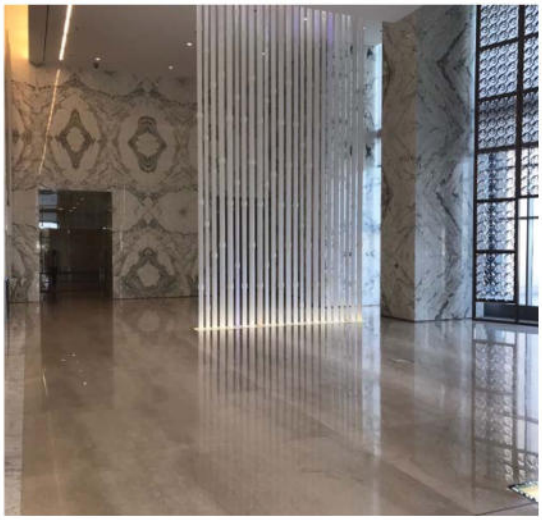
TYPE	INTERNATIONAL STANDARDS
Pre-Galvanized Steel	BS EN 10327 – DX51D + Z275 (equivalent to BS 2989, Z2, zinc coating of 275 gm / m^2
Hot Dip Galvanized Steel (afted fabrication) (HDG)	BS EN 1461: 1999 (equivalent to BS 729: 1971), zinc coating not less than 335 gm / m^2 ASTM A 123
Stainless Steel (SS)	BS EN 10088-2-1 / 4301 AISI 304, 2B finish (other grades such as 316L can be arranged)
Powder Coated Steel (PC)	Done according to BS 6496

Hamad Medical Corporation
- Trauma and Emergency Hospital

Qatar Foundation
Learning Center

Al Majed Tower - Lusail

Abraj Quartier - AQ1 and AQ2 (Interior)



Oman Projects:
- Crowne Plaza Hotel, Taminat Complex

Qatar: Telephone No. +974 44603826 Fax No. +974 44601724
email: qatarsales@exmetco.com
Oman: +968 24437746 email: omansales@exmetco.com
Kuwait: +965 25711363 email: kuwaitsales@exmetco.com
Website: www.exmetco.com