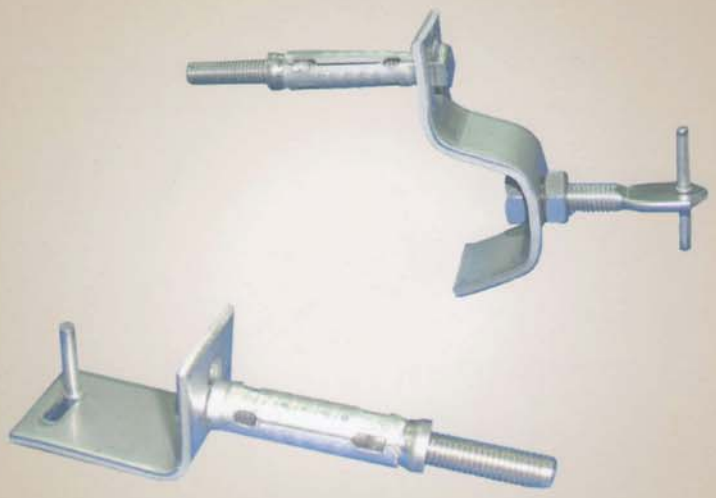
EXPANDED METAL MANUFACTURING CO.



CLADDING FIXING SYSTEM

BUREAU VERITAS
Certification

EXPANDED METAL MANUFACTURING COMPANY LIMITED

Zone 81, Street 15,
Gate 15, 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.

Original cycle start date:	**6th June 2011**
Expiry date of previous cycle:	**5th June 2017**
Re-certification audit date:	**6th May 2017**
Re-certification cycle start date:	**5th June 2017**

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: **5th June 2020**

Certificate No. IND 17.4340/U/Q Version 1, Revision date: 5th June 2017

Signed on behalf of BVCH SAS UK Branch
VISHAL BHAT - Certification Manager

UKAS MANAGEMENT SYSTEMS
0008

Certification body address: ***Bureau Veritas Certification Holding SAS – UK Branch, 5th Floor, 66 Prescot Street, London E1 8HG, United Kingdom.***
Local office: G1-G3, Ground Floor, KG Building (Bldg. No. 194, Street No. 230), C Ring Road, Opposite Gulf Times, P. O. Box: 22157 (Doha) Qatar

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call: **+974 40329729**

Table of Contents

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:

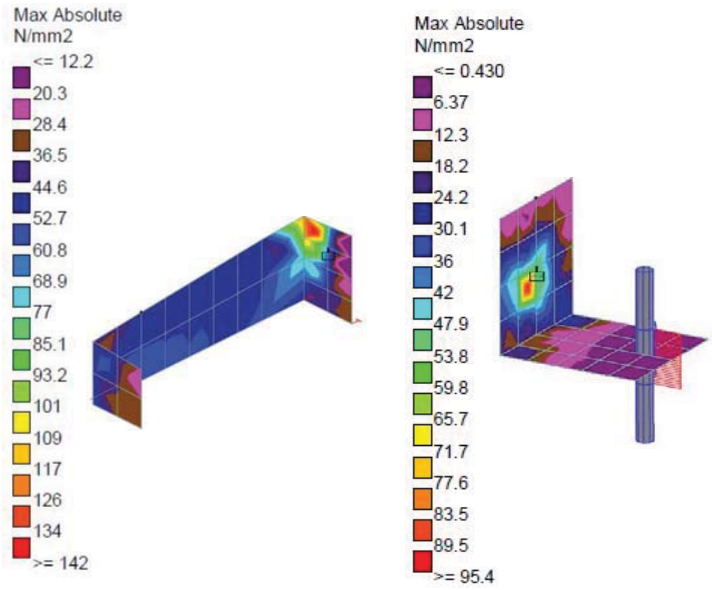
AISC-360-10 : Actions on Structures
ASCE 7-10 : Minimum Design Loads for Buildings
AISI S 200-07 : North American Specification for design of Cold Form Structural Steel Members
QCS 2014 : Qatar Construction Specification
BS 6399 : Loading for Buildings
IBC 2006 : International Building Code

Analysis of Loads

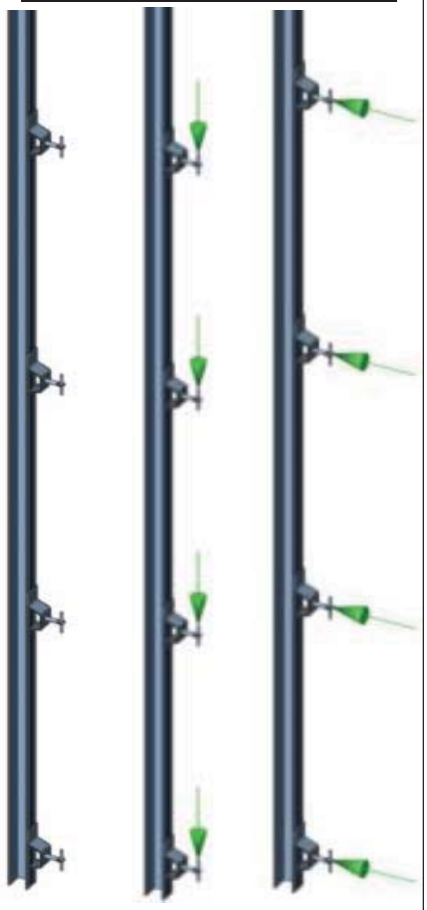
Dead Load : Weight of Stone / Marble.
Wind Load : For wind speed as per QCS 2014, in accordance to ASCE 7-10 or BS 6399.
Seismic Load : In Accordance to ASCE 7-10 or UBC 1997.
Thermal loads : For Thermal Expansion of Stone.

Design Steps:

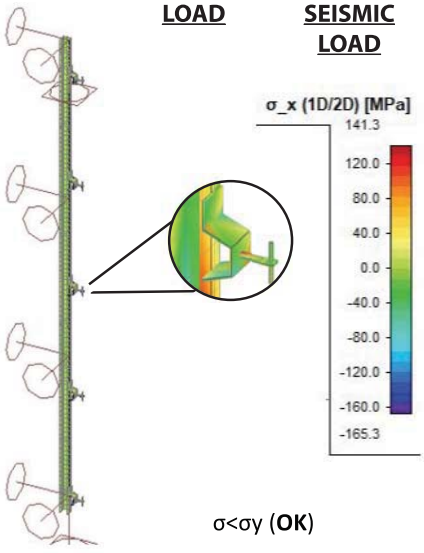
1 - Designing Section by considering combination of loads for Limit State of Flexure, Shear & Tension.
2 - Comparing the stresses with allowable strength of sections based on the yield stress of materials.
3 - Checking for Limit state of Serviceability, Governed by Deflection criteria.



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

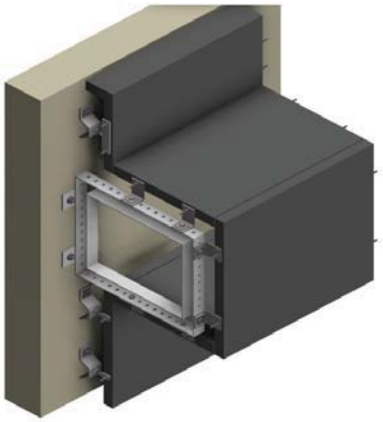
   b. Variable Load - refers to live load, wind, seismic loads and thermal expansions

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

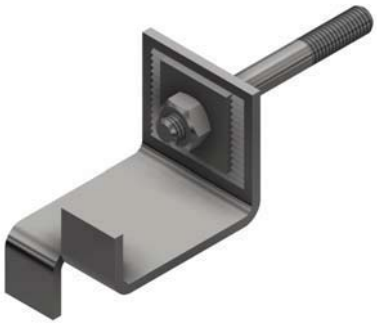
NOTE: For design calculation, Rp and Rm values will be taken from the Mill Test Certificate divided by 1.2 (As per SCI P-291, published by the Steel Construction Institute, UK)

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)



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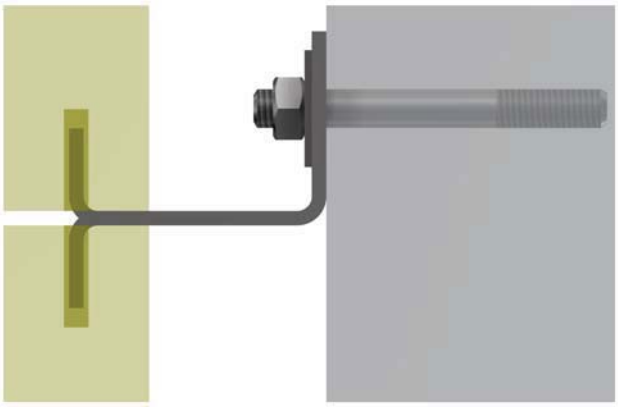
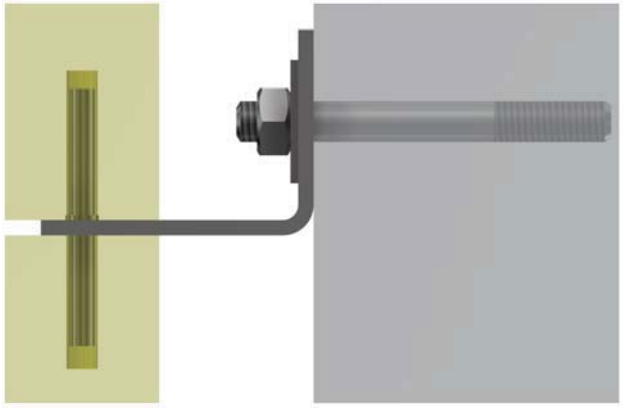


- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

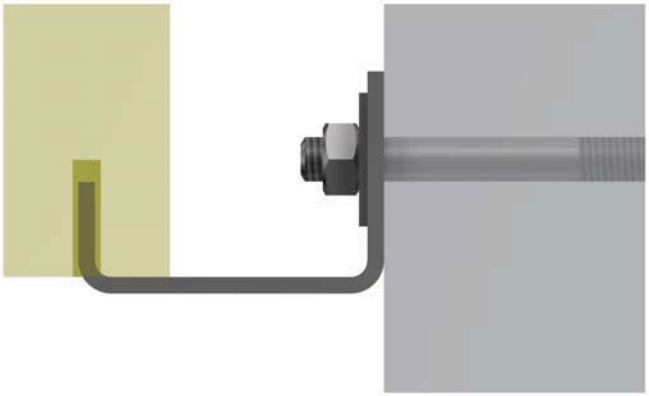
Item Code - FLP



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

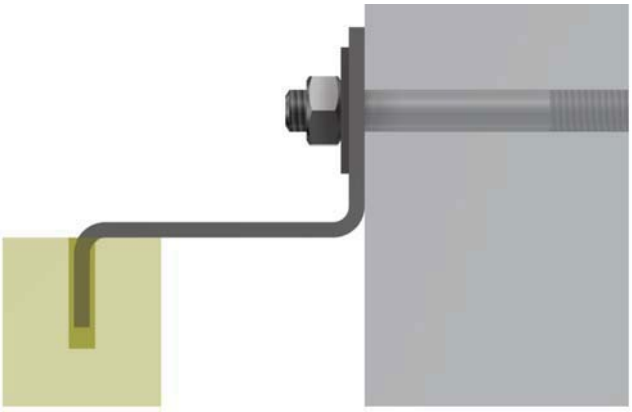
DIRECT FIXING: ANGLE BRACKET (L-BRACKET)

Item Code - FLU



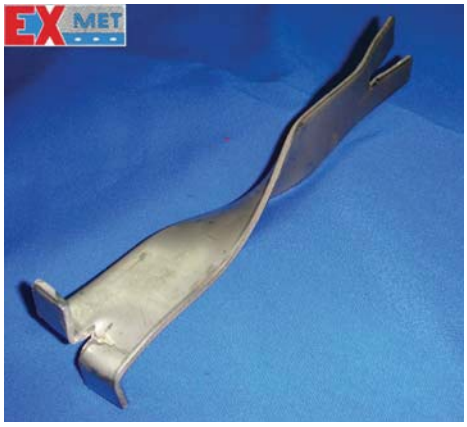
- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

Item Code - FLD

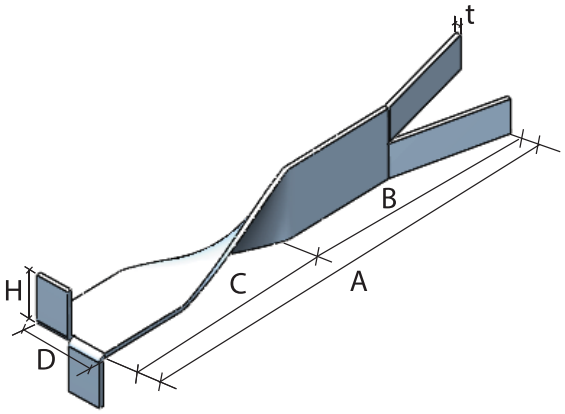


- Used generally for cavities less than 50mm
- Limited adjustability
- Easy installation, economical

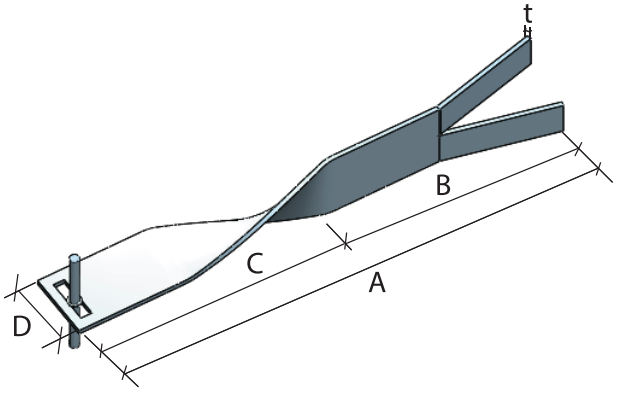
DIRECT FIXING: FISH TAIL BRACKETS



Item Code - FFTR

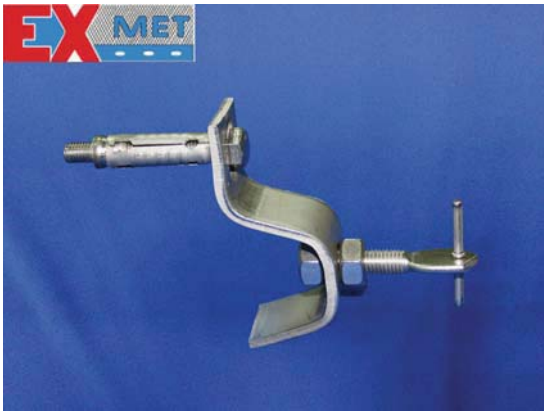


Item Code - FFTP

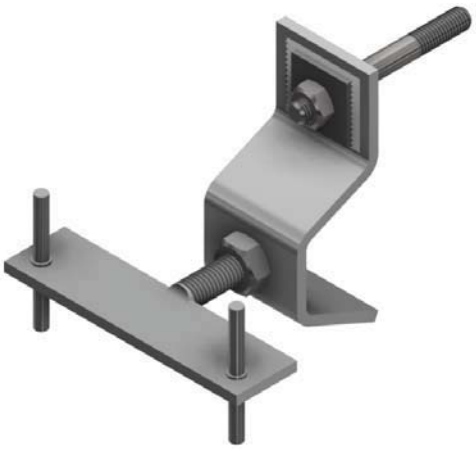


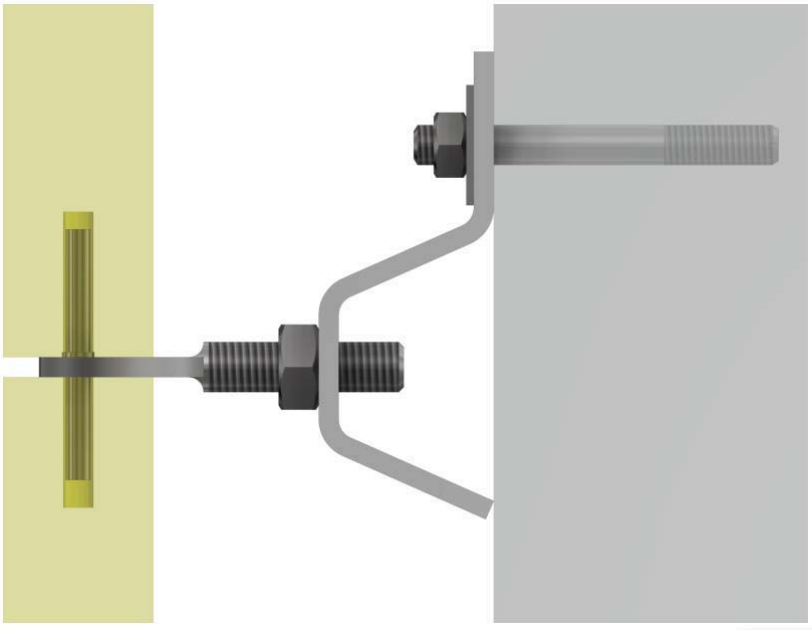
Item Code	A mm	B mm	C mm	t mm	Maximum Load (N)
FFTR / FFTP - 201	130	90	40	2	62
FFTR / FFTP - 202	140	90	50	2	46.5
FFTR / FFTP - 203	150	90	60	2	37.0
FFTR / FFTP - 301	130	90	40	3	175
FFTR / FFTP - 302	140	90	50	3	131
FFTR / FFTP - 303	150	90	60	3	105

DIRECT FIXING: Z - BRACKET (VERTICAL JOINT)



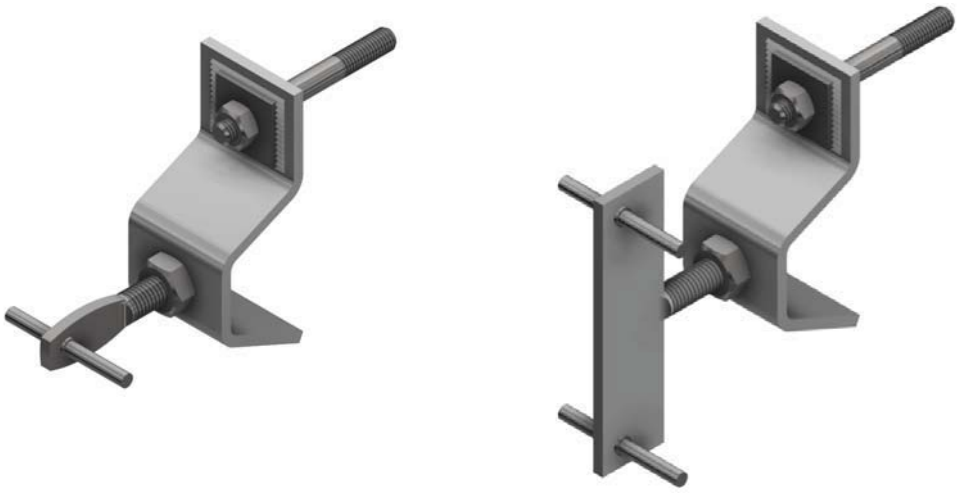
- Used generally for cavities up to 100mm
- Easy installation, economical
- Adjustability up to ± 25mm

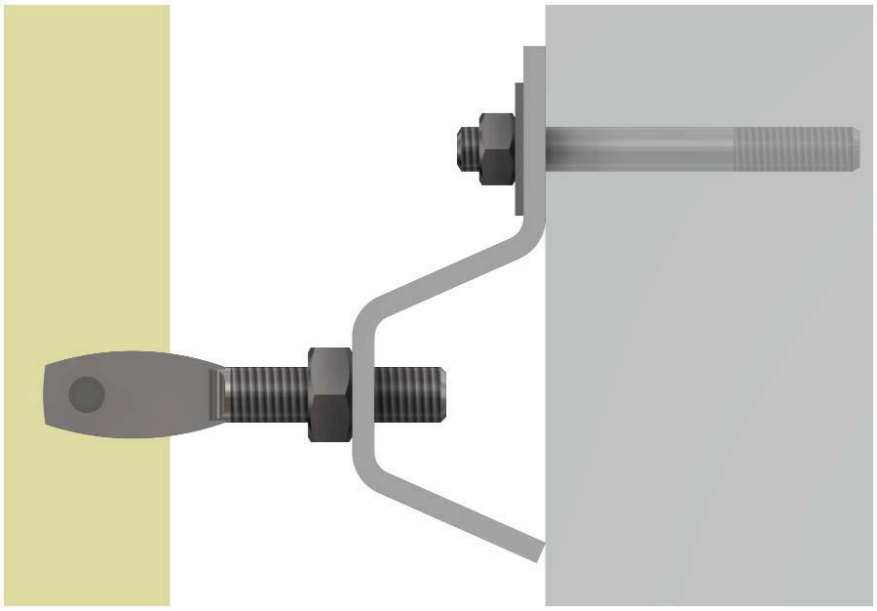




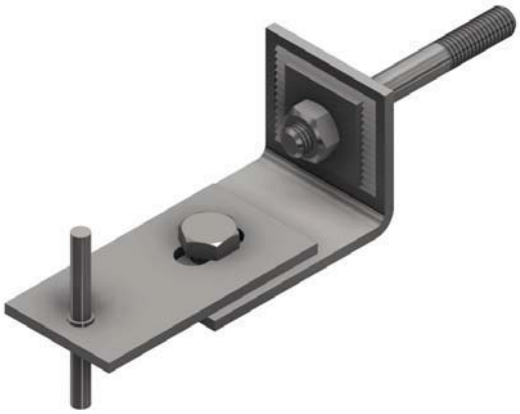
DIRECT FIXING: Z - BRACKET (HORIZONTAL JOINT)

- 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

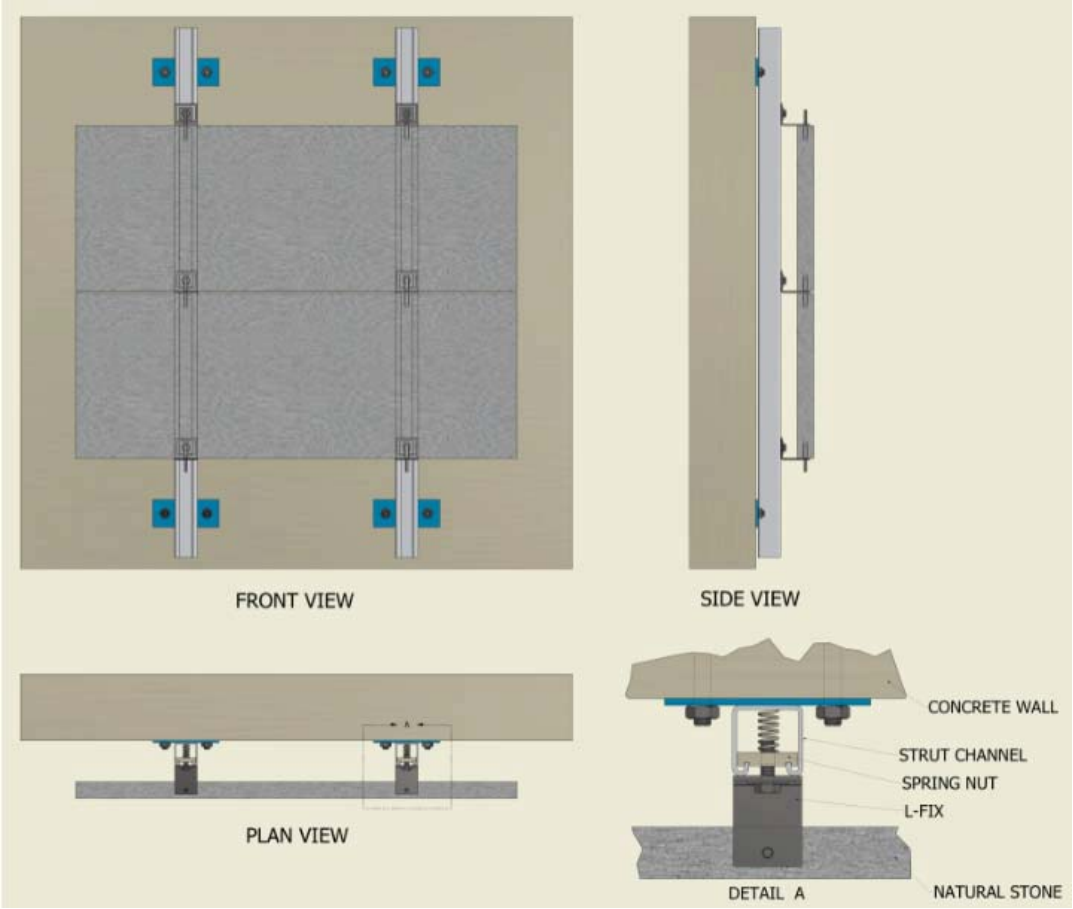
Corner Bracket, used to fix small pieces of stones on corners.

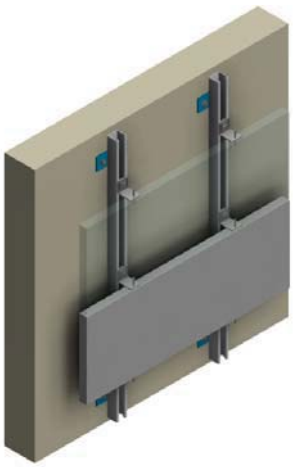
INDIRECT FIXING

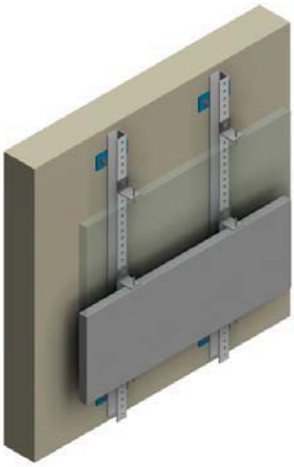
In some areas the cladding is to be attached to the walls by means of framing systems or channels. EXMET provides a complete solutions for your special requirements case by case.

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.



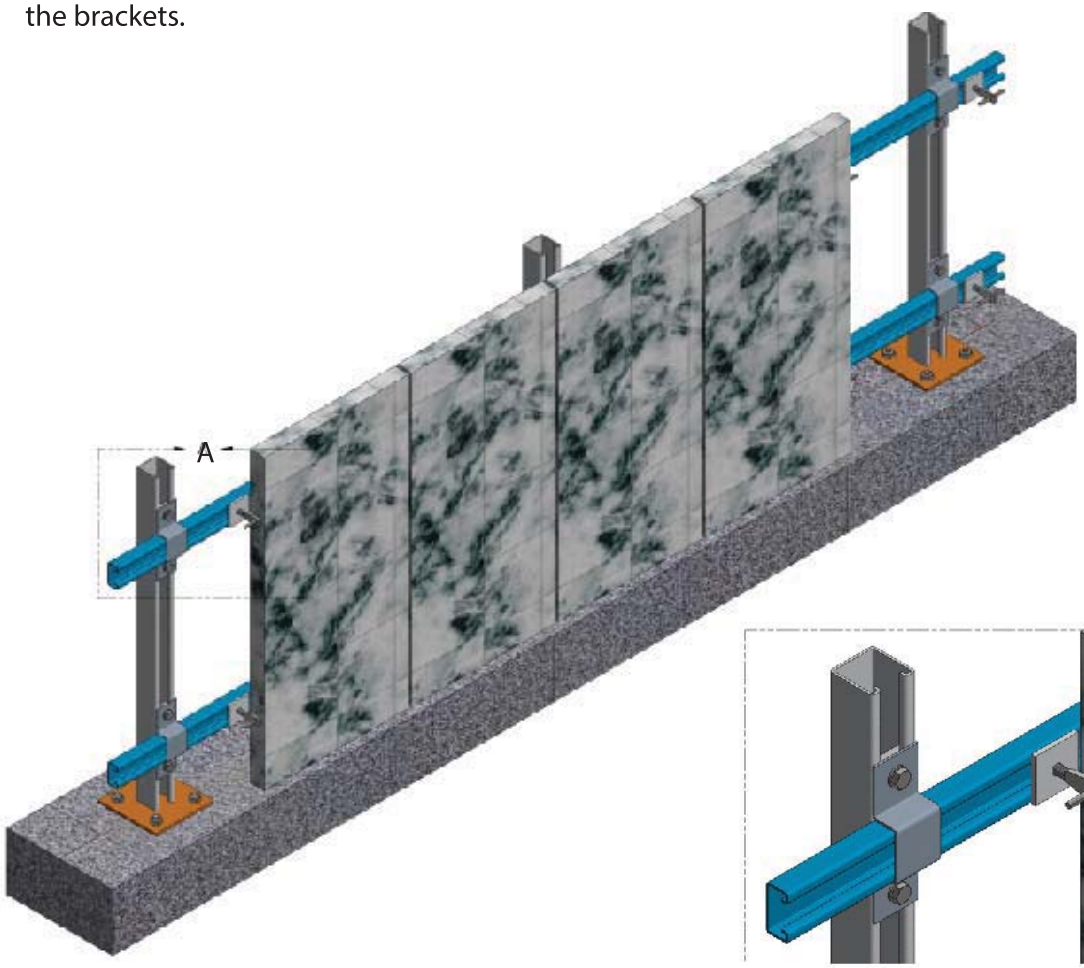




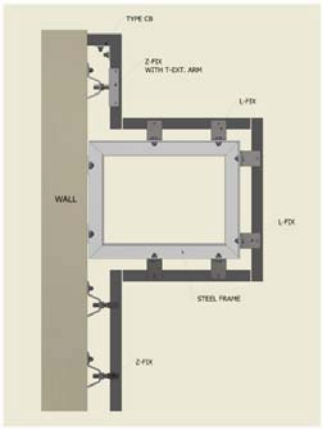
INDIRECT FIXING

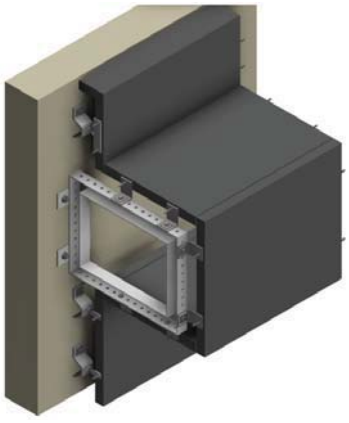
Fixing on Framing System

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



DETAIL A





ANCHOR BOLTS

Through Bolt

Suitability:

Ideal for non-cracked concrete

Material:

Stainless Steel Grade 304 and Grade 316
(as per Engineer's instructions)

Description

Composed of Tapered Bolt, Expansion Clip and Hexagonal Nut.

When the hexagonal nut is tightened, the tapered bolt is then pushed into the expansion clip causing it to expand and anchor itself on the wall thus it will not fall off or twist in the hole.

Sleeve / Shield Anchor

Suitability:

Ideal for cracked and non-cracked concrete, bricks, block, stone

Material:

Stainless Steel Grade 304 and Grade 316
(as per Engineer's instructions)

Description

Pre-assembled anchors for quick and easy installation. The half-moon shaped recesses stamped in the sleeve contracts in length when it is tightened thus permitting the item to be attached firmly to the concrete.

Pull Out Capacity of Anchor Bolts

Dia Of Bolt	Base Material	Type of Bolt	Pull Out capacity kN
M8	Solid Block Wall	Sleeve Anchor	3.50
	Concrete	Through Bolt	4.10
M10	Solid Block Wall	Sleeve Anchor	4.50
	Concrete	Through Bolt	6.50

Note:
The Ultimate Pull-out figures shown above are only indicative values, pull-out test has to be done as per site condition.

TILE MOVEMENT JOINT

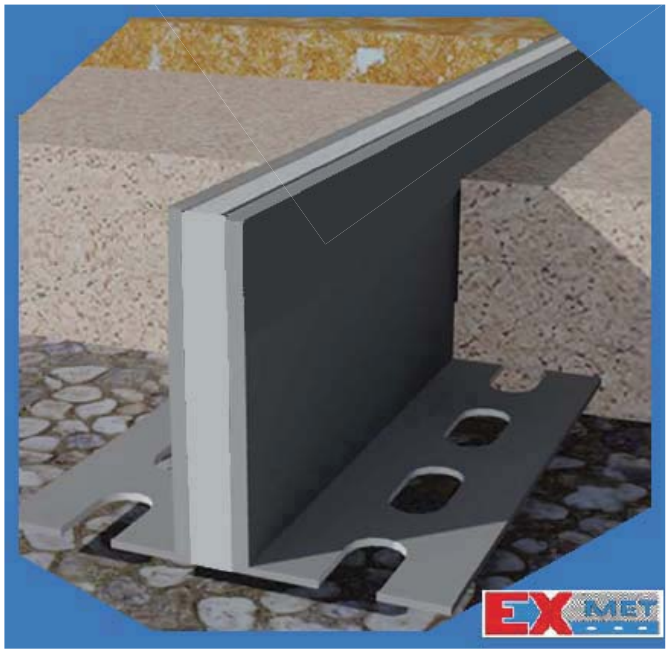
Tile movement joints are used on the floors and walls to protect edges and joints to allow differential movements and local stresses such as transient loading, shrinkage, thermal variation and others.

This is most commonly used in large tiling areas.

MATERIALS USED:

SPECIFICATIONS

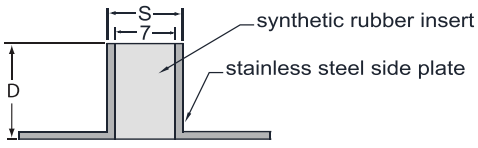
BS EN 10088 - 2 - Stainless Steels. Grade 304 and 316
* Brass is also available upon request
Available colors for rubber: Black, Gray and Beige

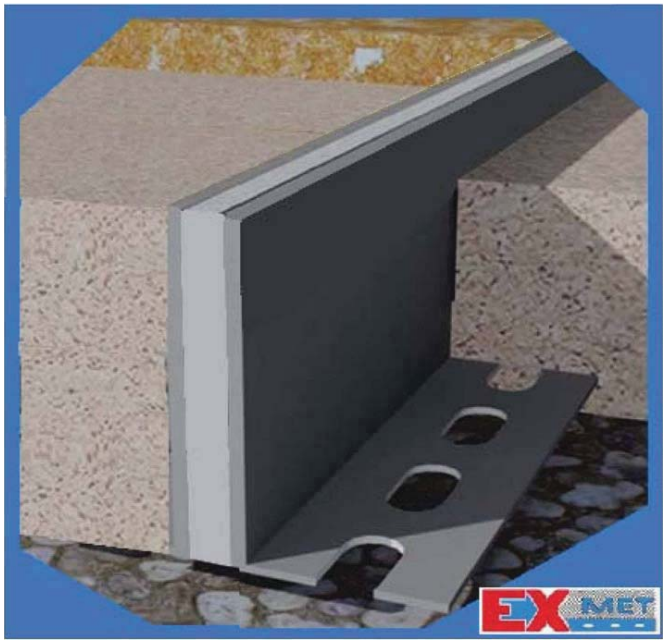


TMJ1 - Consists of two L-plates bonded firmly to a synthetic rubber insert and often used between tile joints.

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

* Other joint depths (D) are available upon request

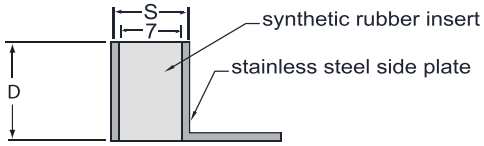




TMJ2 - Make use of one side plate on one side and an L-plate on the other and bonded firmly to the synthetic rubber insert. This is commonly used for permiter fixing.

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

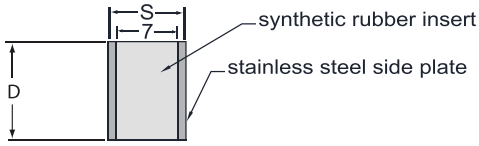
* Other joint depths (D) are available upon request



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

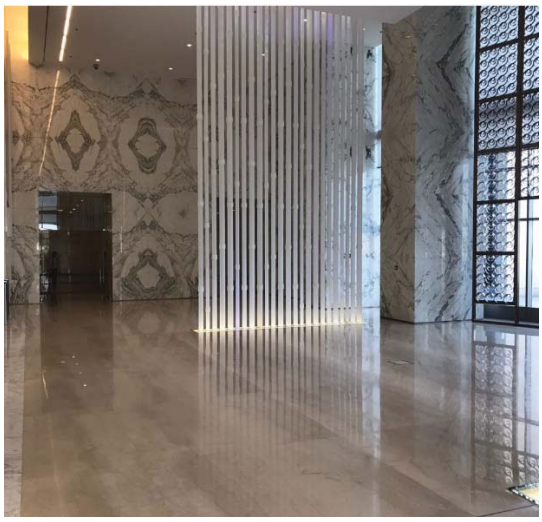
TYPE	INTERNATIONAL STANDARDS
Pre-Galvanized Steel	BS EN 10327 – DX51D + Z275 (equivalent to BS 2989, Z2, zinc coating of 275 gm / m^2
Hot Dip Galvanized Steel (afted fabrication) (HDG)	BS EN 1461: 1999 (equivalent to BS 729: 1971), zinc coating not less than 335 gm / m^2 ASTM A 123
Stainless Steel (SS)	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

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Website: www.exmetco.com