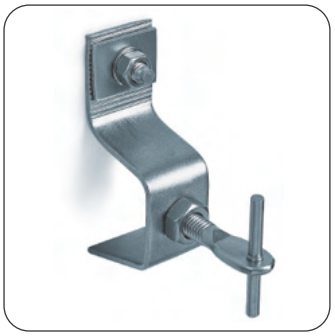
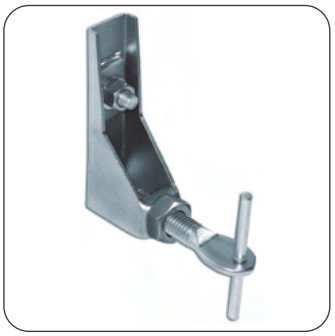
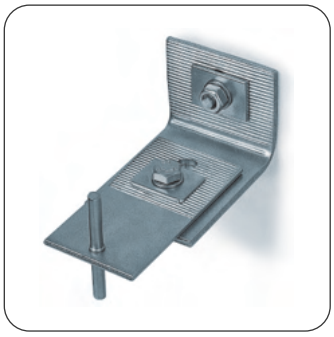
Stone Fixing Systems
Technical Catalogue
HAZ-SF-EN/04.26

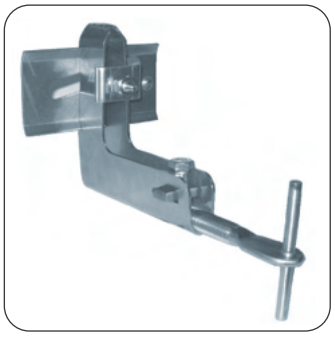
HAZ METAL

Your Fixing Systems Specialist



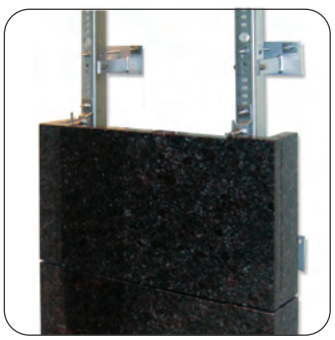






Stone Fixing Systems

Product Technical Catalogue



Four Seasons Hotel, Cairo

Contents

Stone Fixing Systems - Overview

Stone fixing anchors are used for the secure cladding of stone panels on to load bearing structures. Three dimensional adjustability feature enables fast and easy installation.

There are various types of stone fixing anchors that can be used for different applications to accommodate stone weight, cavity sizes, substrate types and stone setting.

Stone fixing anchors can accommodate all types of backing structures, whether it may be concrete walls, block work & masonry walls or steel structures.

HAZ Metal designs bespoke fixing systems according to individual project requirements.

There are a wide range of standard anchors that can be used to satisfy project requirements.

Direct fixing to substrate with AXO Body anchors using expansion bolts

Direct fixing to masonry walls with HDM mortar anchor using cement mortar or resin

Indirect fixing with HMP Sub channel system

HZ Z Anchors

AXO Body Anchors

HA L Anchors

HDM Mortar Anchors

HMP Sub Channel System

Stone Fixing Systems - Overview

HAZ Metal offers an extensive range of fixing solutions for stone wall cladding projects. It is recognized that each project is unique and that most of the time each application case requires a custom-design. Specially manufactured components are usually made to meet the specific demands of the stone cladding works. Understanding that the dimensions of stone panels and installation parameters often vary, we emphasize the importance of a detailed project examination. This ensures the selection of the most suitable fixing system. This comprehensive technical catalogue offers products for an optimal fixing solution for your stone cladding project.

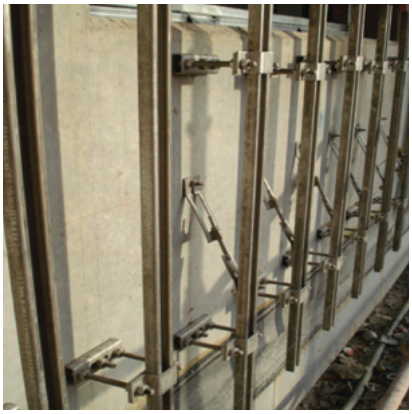
Application examples of stone anchors fixed direct to substrate

Stone fixing anchors are securely attached to load-bearing substrates, including concrete, block work, or steel structures, utilizing appropriate and tested anchor bolts or set screws.

For the installation of anchors on insulated walls, it's necessary to first cut through the insulation. Once the anchors are securely fastened, the removed piece of insulation should be reinserted. Subsequently, the sections of insulation must be thoroughly sealed to minimize cold bridging.

Application examples of stone anchors fixed on to sub channel systems

The channel sections are securely attached to support brackets, which are anchored to the floor beams using expansion bolts. Natural stone panels are then mounted using anchors, which are attached to the channels with hex. bolt sets. This configuration enables the installation process to be independent of the backing wall, streamlining the installation. The use of lower anchoring points not only accelerates the installation process but also diminishes cold bridging.



HZ Z Anchors - Introduction

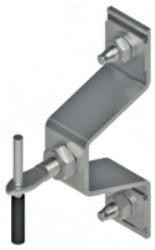
- Direct fixing on to load bearing walls with expansion bolts
- Indirect fixing on to sub channel system with hex bolts or lock nuts
- Three dimensional adjustability - quick and easy fixing
- Installation at horizontal and vertical joints
- Recommended projection sizes up to 150 mm & loads up to 800 N

HZ01
Z Anchor

HZ02
Z Anchor

HZ05 Z Anchor
With riveted nut

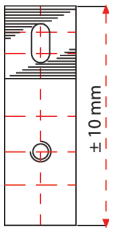
HZ07
Soffit Anchor



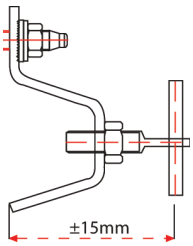
HZ08
Z Anchor

HRS1
Restraint Anchor

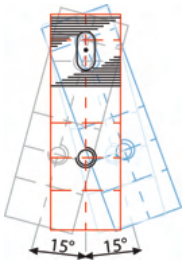
Three dimensional adjustability



1) Vertical adjustment is provided by the slotted hole. The anchor is fixed on to the bolt with the serrated washer at the desired level.

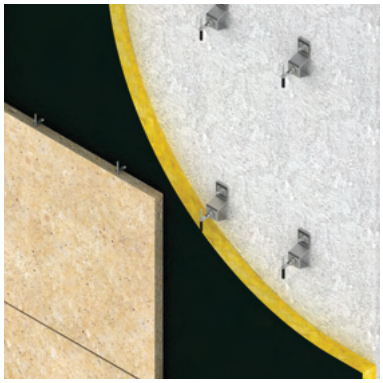


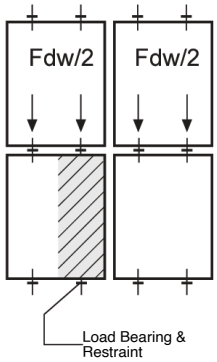
2) Adjustment of the projection size is provided by rotating the adjustable arm. The adjustable arm is locked with the hexagon nut.



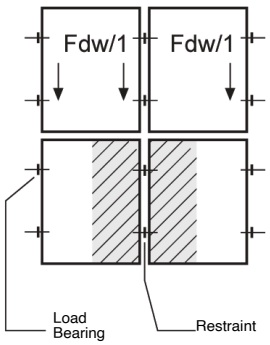
3) Adjustment of the anchor left and right is provided by sliding the body up to 15 degrees side ways.

Installation at horizontal joints





Installation at vertical joints



System features

- Suitable for fixing to load bearing substrates. Stone anchors are fixed directly to backing walls with expansion bolts.

- Recommended projection size between 45 mm to 135 mm and loads up to 800 N.

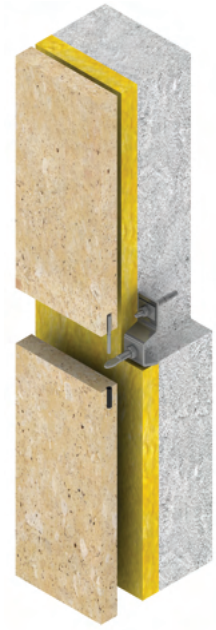
- In horizontal joint installation, slabs are pinned on the bottom and upper sides. Anchors act as load bearing carrying half the weight of the slabs above. Anchors also act as restraints, holding the slabs below and restraining against wind suction and pressure.

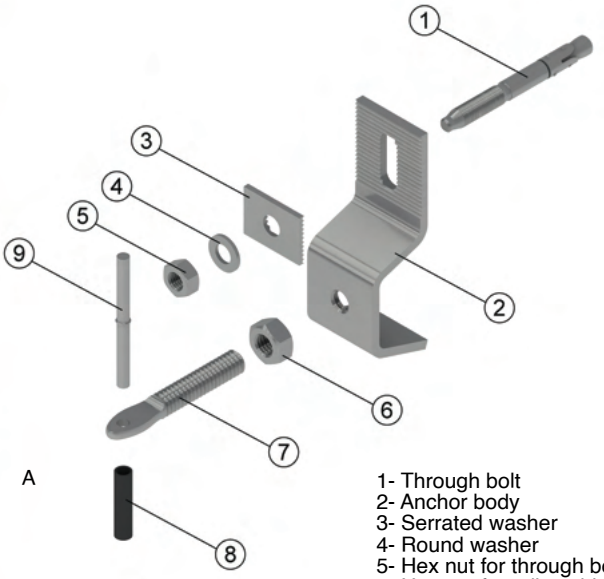
- In vertical joint installation slabs are pinned on the left and right sides. Anchors on the bottom are load-bearing anchors carrying the whole weight of the slab. Half the weight of the slab on the left and half the weight of the slab on the right. Anchors on the top are restraint anchors holding the slabs and restraining against wind suction and pressure.

- Three - dimensional adjustability allows quick and easy installation.

- The design and structural calculations of these anchors are made in our technical department. Special design and manufacturing can be made for the requirements of each project.

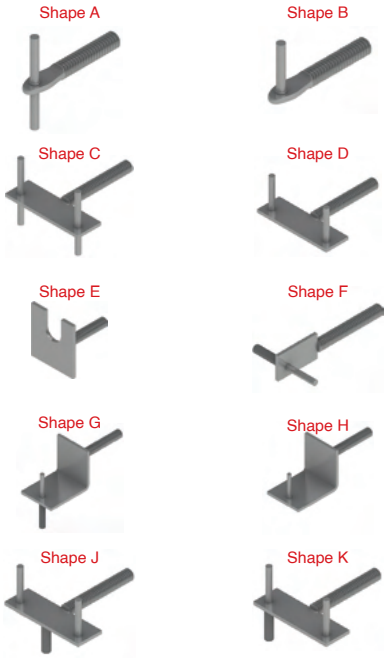
HZ Z Anchors - Installation Details





1- Through bolt
2- Anchor body
3- Serrated washer
4- Round washer
5- Hex nut for through bolt
6- Hex nut for adjustable arm
7- Adjustable arm
8- Plastic tube
9- Flanged pin

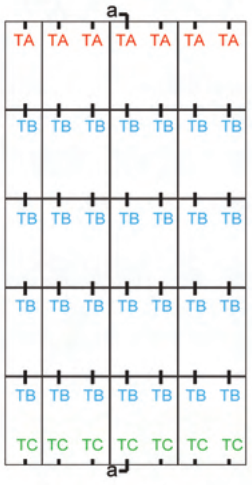
Adjustable arm variations



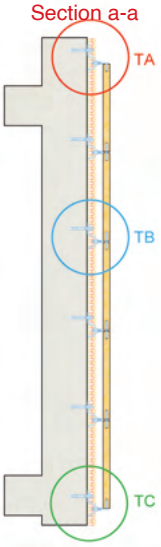
Installation at horizontal joints

HZ02 Z Anchor

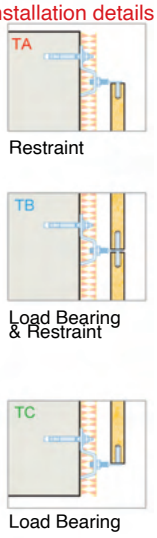
Elevation view



Section a-a



Installation details

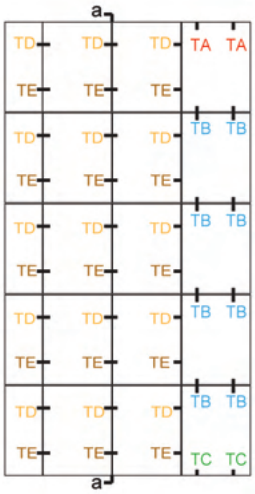


Installation at vertical joints

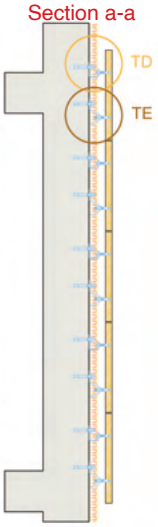
HZ02 Z Anchor

HRS01 Restraint Anchor

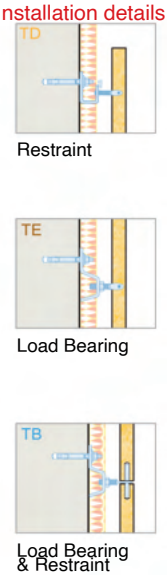
Elevation view



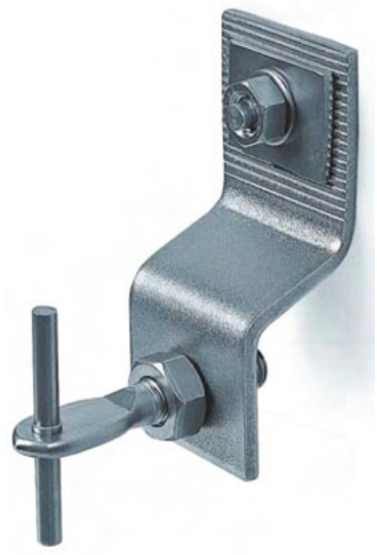
Section a-a

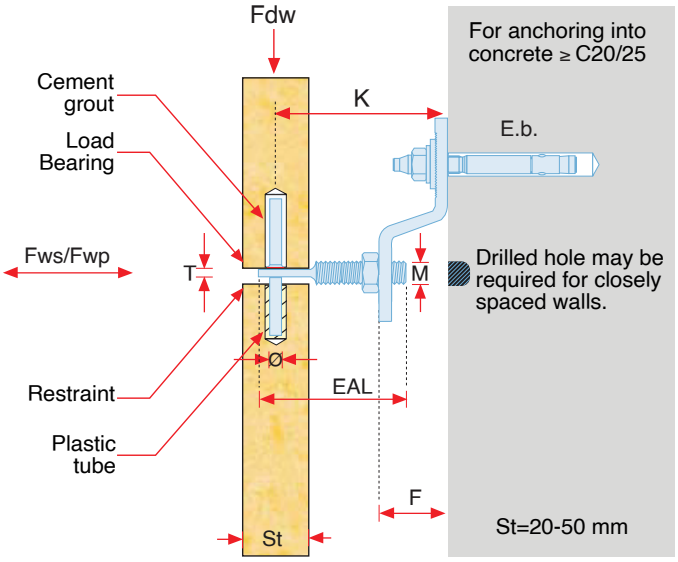


Installation details



HZ01 Z Anchors - Product Details





Product Code	Technical details											
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ01-452	45	40	55	200	10	312	219	M8X80	5	M10	3.5	60
HZ01-552	55	45	70		20							60
HZ01-752	75	60	90		40							60
HZ01-952	95	80	110		60							60
HZ01-553	55	50	70	300	20	468	328	M8X80	5	M10	3.5	60
HZ01-753	75	60	90		40							60
HZ01-953	95	80	110		60							60
HZ01-1153	115	100	130		80							60
HZ01-554	55	50	65	400	10	624	437	M10X90	5	M12	4.5	70
HZ01-754	75	60	90		20							90
HZ01-954	95	80	110		40							90
HZ01-1154	115	100	130		60							90
HZ01-755	75	60	90	500	20	780	546	M10X90	5	M12	4.5	90
HZ01-955	95	80	110		40							90
HZ01-1155	115	100	130		60							90
HZ01-1355	135	120	150		80							90

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standards.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

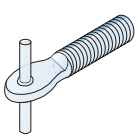
HZ01 Z Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 45 and 150 mm
- Suitable for horizontal & vertical joints
- Loads up to 500 N
- Stone thickness 20-50 mm

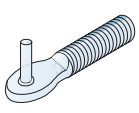
Product Code Description

HZ01 - 45 2 A
- A: Shape
- 2: Dead Load (x10 Kg)
- 45: Projection (mm)
- HZ01: Type

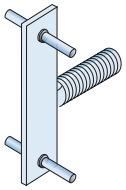
Shape A



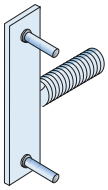
Shape B



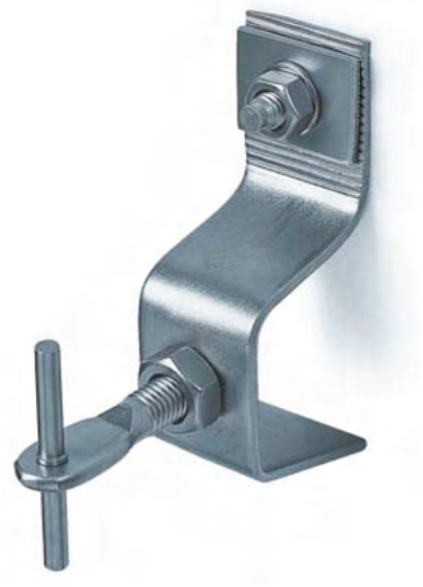
Shape C

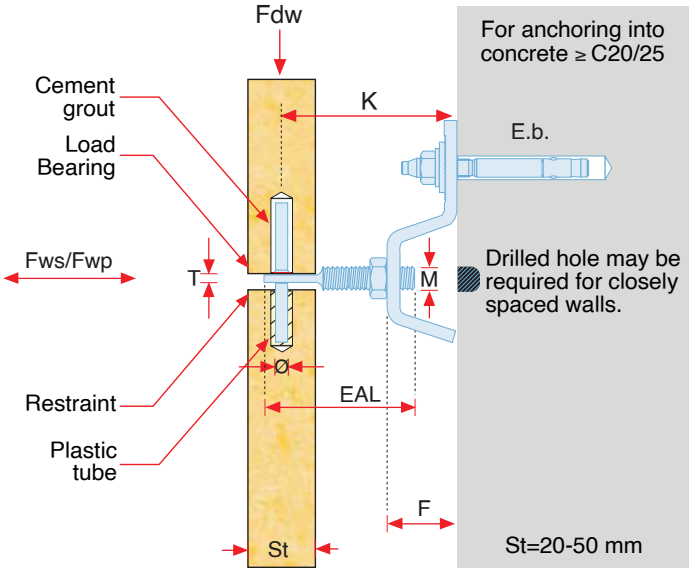


Shape D



HZ02 Z Anchors - Product Details





Product Code	Technical Details											
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ02-452	45	40	55	200	10	312	219	M8X80	5	M10	3.5	60
HZ02-552	55	45	70		20							60
HZ02-752	75	60	90		40							60
HZ02-952	95	80	110		60							60
HZ02-553	55	45	70	300	20	468	328	M8X80	5	M10	3.5	60
HZ02-753	75	60	90		40							60
HZ02-953	95	80	110		60							60
HZ02-1153	115	100	130		80							60
HZ02-554	55	45	65	400	10	624	437	M8X80	5	M12	4.5	70
HZ02-754	75	60	90		20							90
HZ02-954	95	80	110		40							90
HZ02-1154	115	100	130		60							90
HZ02-755	75	60	90	500	20	780	546	M8X80	5	M12	4.5	90
HZ02-955	95	80	110		40							90
HZ02-1155	115	100	130		60							90
HZ02-1355	135	120	150		80							90
HZ02-756	75	60	90	600	20	936	655	M10X90	6	M14	5.5	90
HZ02-956	95	80	110		40							90
HZ02-1156	115	100	130		60							90
HZ02-1356	135	120	150		80							90
HZ02-758	75	60	90	800	20	1235	865	M10X90	6	M14	5.5	90
HZ02-958	95	80	110		40							90
HZ02-1158	115	100	130		60							90
HZ02-1358	135	120	150		80							90

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

HZ02 Z Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 45 and 150 mm
- Suitable for horizontal & vertical joints

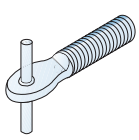
- Loads up to 800 N
- Stone thicknesses 20-50 mm

Product Code Description

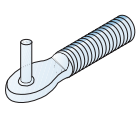
HZ02 - 45 2 A

- A — Shape
- 2 — Dead Load (x10 Kg)
- 45 — Projection (mm)
- HZ02 — Type

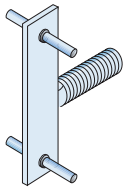
Shape A



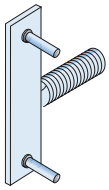
Shape B



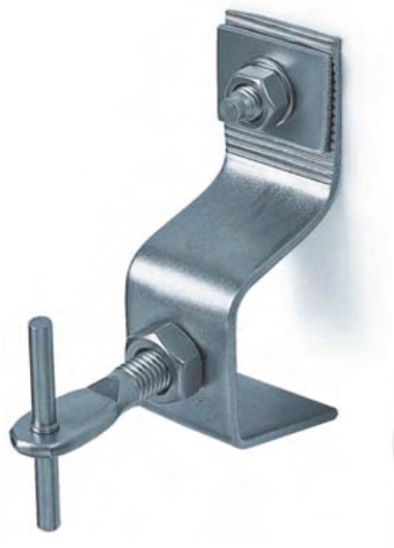
Shape C

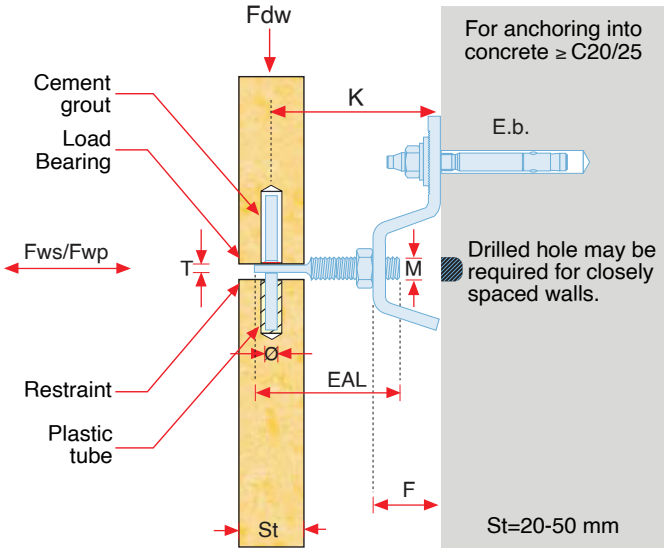


Shape D



HZ05 Z Anchor With Riveted Nut - Product Details





Product Code	Technical Details											
	Projection	Min. Projection	Max. Projection	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ05-452	45	40	55	200	10	312	219	M8X80	5	M10	3.5	60
HZ05-552	55	45	70		20							60
HZ05-752	75	60	90		40							60
HZ05-952	95	80	110		60							60
HZ05-553	55	50	70	300	20	468	328	M8X80	5	M10	3.5	70
HZ05-753	75	60	90		40							70
HZ05-953	95	80	110		60							70
HZ05-1153	115	100	130		80							70
HZ05-554	55	50	65	400	10	624	437	M8X80	5	M12	4.5	70
HZ05-754	75	60	90		20							90
HZ05-954	95	80	110		40							90
HZ05-1154	115	100	130		60							90
HZ05-755	75	60	90	500	20	780	546	M8X80	5	M12	4.5	90
HZ05-955	95	80	110		40							90
HZ05-1155	115	100	130		60							90
HZ05-1355	135	120	150		80							90

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

HZ05 Z Anchor

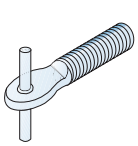
- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 45 and 150 mm
- Suitable for horizontal & vertical joints
- Loads up to 500 N
- Stone thickness 20-50 mm

Product Code Description

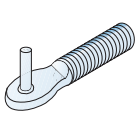
HZ05 - 45 2 A

- A — Shape
- 2 — Dead Load (x10 Kg)
- 45 — Projection (mm)
- HZ05 — Type

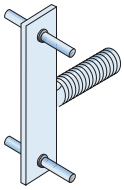
Shape A



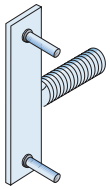
Shape B



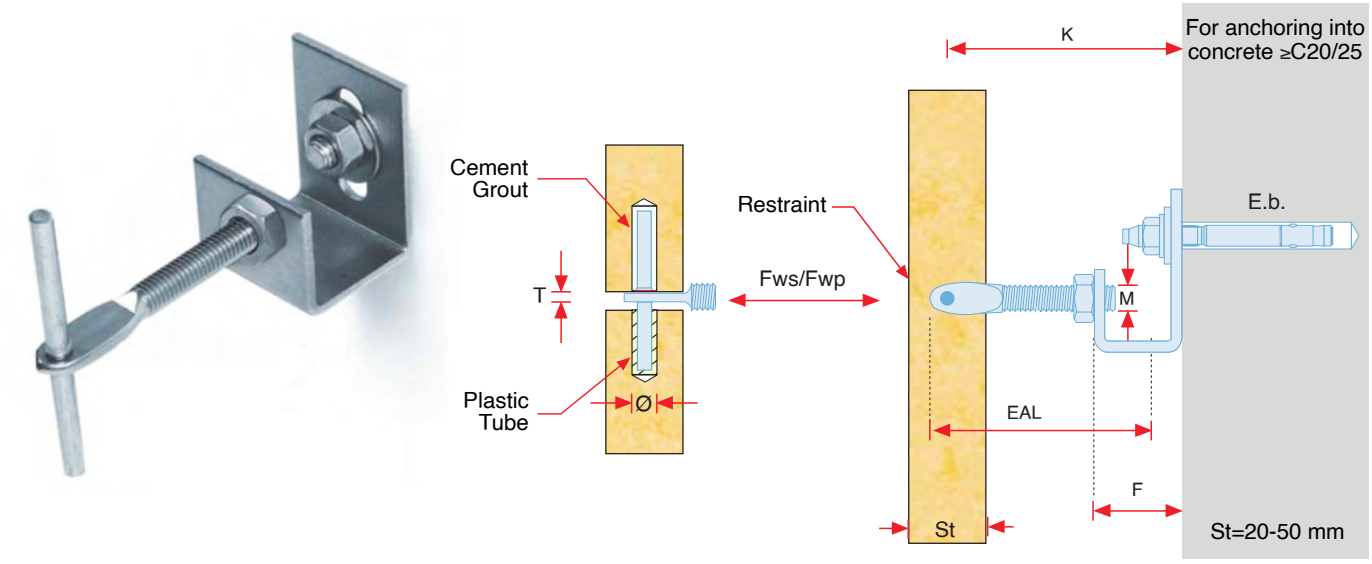
Shape C



Shape D



HRS01 Restraint Anchor - Product Details



Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HRS1-55 *	55	45	60	20	312	219	M8X80	5	M8	3	60
HRS1-75	75	60	90	40							60
HRS1-95	95	80	110	60							60
HRS1-115	115	100	130	60							80
HRS1-135	135	115	150	60							100
HRS1-155	155	135	170	60							120

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.
- Available in sizes to fit the projection range of all HZ anchors.
- (*) In case of back adjustment shorter adj. arms should be used.

HRS1 Restraint Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 45 and 150 mm
- Suitable for horizontal & vertical joints

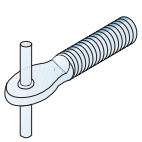
- Loads up to 312 N
- Stone thickness 20-50 mm

Product Code Description

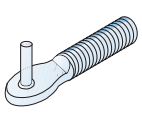
HRS1 - 45 A

- Shape
- Projection (K mm)
- Type

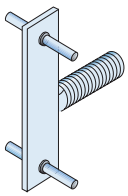
Shape A



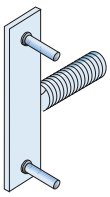
Shape B



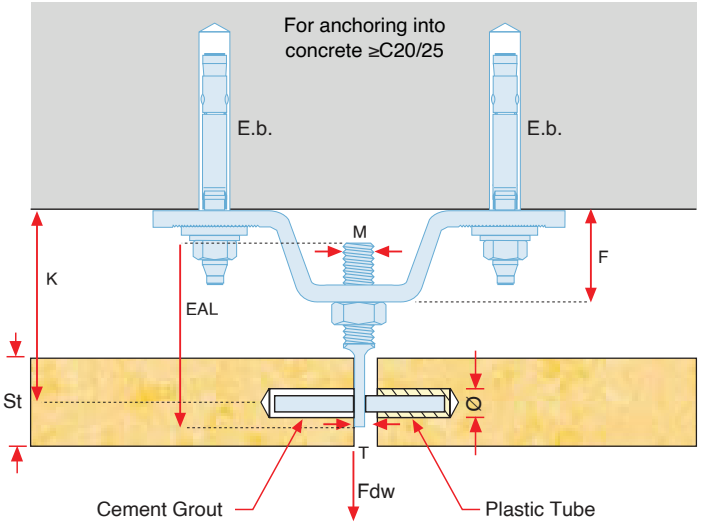
Shape C



Shape D



HZ07 Z Anchor For Soffits - Product Details



Product Code	Technical Details									
	Projection	Min. Projection	Max. Projection	Dead Load	Forming Size	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ07-452	45	40	55	200	10	M8X80	5	M10	3.5	60
HZ07-552	55	45	70		20					60
HZ07-752	75	60	90		40					60
HZ07-952	95	80	110		60					60
HZ07-553	55	50	70	300	20	M8X80	5	M10	3.5	60
HZ07-753	75	60	90		40					60
HZ07-953	95	80	110		60					60
HZ07-1153	115	100	130		80					60
HZ07-554	55	50	65	400	10	M8X80	5	M12	4.5	70
HZ07-754	75	60	90		20					80
HZ07-954	95	80	110		40					80
HZ07-1154	115	100	130		60					80

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

HZ07 Z Anchor - Soffit Anchor

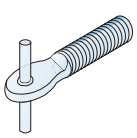
- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 45 and 130 mm
- Suitable for horizontal & vertical joints
- Loads up to 400 N
- Stone thickness 20-50 mm

Product Code Description

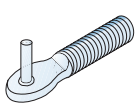
HZ07 - 45 2 A

- A — Shape
- 2 — Dead Load (x10 Kg)
- 45 — Projection (mm)
- HZ07 — Type

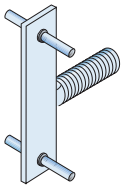
Shape A



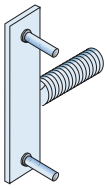
Shape B



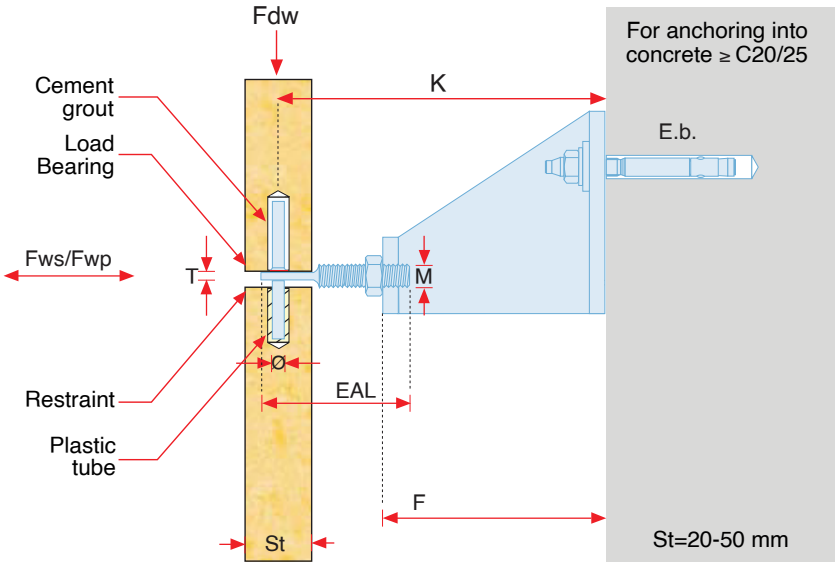
Shape C



Shape D



HZ08 Z Anchor - Product Details



Product Code	Technical Details											
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ08-1152	115	85	130	200	80	312	219	M8x80	5	M10	3.5	60
HZ08-1352	135	105	150		100							60
HZ08-1552	155	135	170		120							60
HZ08-1153	115	100	130	300	80	468	328	M8x80	5	M10	3.5	60
HZ08-1353	135	120	150		100							60
HZ08-1553	155	140	170		120							60
HZ08-1154	115	100	130	400	80	624	437	M8x80	5	M12	4.5	80
HZ08-1354	135	120	150		100							80
HZ08-1554	155	140	170		120							80
HZ08-1155	115	85	130	500	80	780	546	M8x80	5	M12	4.5	60
HZ08-1355	135	105	150		100							60
HZ08-1555	155	135	170		120							60
HZ08-1156	115	100	130	600	80	936	655	M10x90	6	M14	5.5	60
HZ08-1356	135	120	150		100							60
HZ08-1556	155	140	170		120							60
HZ08-1158	115	100	130	800	80	1235	865	M10x90	6	M14	5.5	80
HZ08-1358	135	120	150		100							80
HZ08-1558	155	140	170		120							80

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

HZ08 Z Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 115 and 170 mm
- Suitable for horizontal & vertical joints

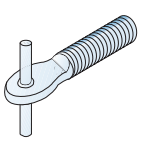
- Loads up to 400 N
- Stone thickness 20-50 mm

Product Code Description

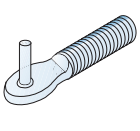
HZ08 - 115 2 A

- A — Shape
- 2 — Dead Load (x10 Kg)
- 115 — Projection (mm)
- HZ08 — Type

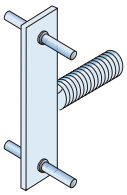
Shape A



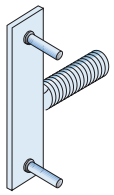
Shape B



Shape C

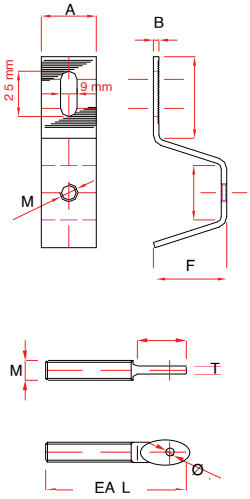


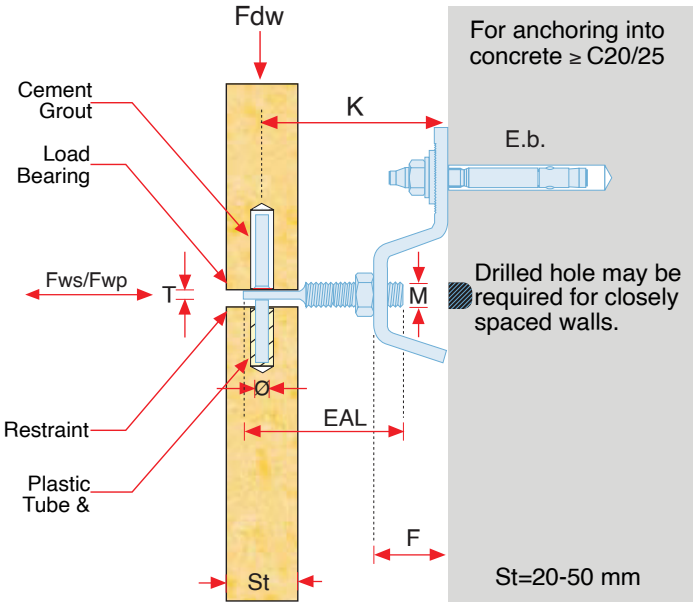
Shape D



HZ02-S Z Anchor - Product Details

LGA TEST REPORT
No : BBW 121 51 21
Date : 15.10.2006





Product Code	Technical Details											
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Offset	Wind-Pressure	Wind-Suction	Bolt Size	Pin Diameter	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)
HZ02-S-33010/10	40	40	50	500	10	350	220	M8x80	ø 5x70	M10	3.5	50
HZ02-S-33015/10	45	45	55	500	15							50
HZ02-S-33020/10	50	50	60	500	20							50
HZ02-S-33030/10	65	50	80	400	30							60
HZ02-S-33040/10	75	60	90	400	40							60
HZ02-S-33050/10	85	70	100	400	50							60
HZ02-S-33060/10	95	80	110	300	60							60
HZ02-S-33080/10	125	110	140	300	80							70
HZ02-S-330100/10	145	130	160	250	100							70
HZ02-S-330120/10	165	150	180	250	120							70
HZ02-S-43020/12	60	55	70	500	20					M12	4.5	70
HZ02-S-43040/12	90	75	105	500	40							80
HZ02-S-43060/12	110	95	125	400	60							80
HZ02-S-43080/12	130	115	145	400	80							80
HZ02-S-430100/12	150	135	165	300	100							80
HZ02-S-430120/12	170	155	185	300	120							80

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to LGA test results.
- Loads stated are characteristic resistance loads.
- Bolts are provided separately.
- Max Wind pressure: 350 N
- Test results are available upon order.

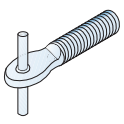
HZ02-S type Z anchors with standard sizes. Different types available according to desired method of fixation.

HZ02-2S Type without serration and with plain washer.

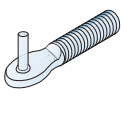
HZ05-S Type with riveted nut. Serrated with serrated washer.

HZ05-2S Type with riveted nut. Without serration and with plain washer.

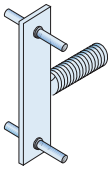
Shape A



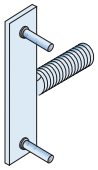
Shape B



Shape C



Shape D



Product Code Description

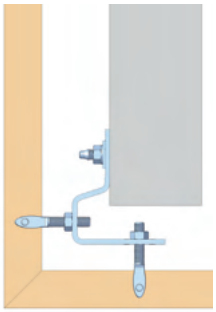
HZ02-S - 330 / 10 A

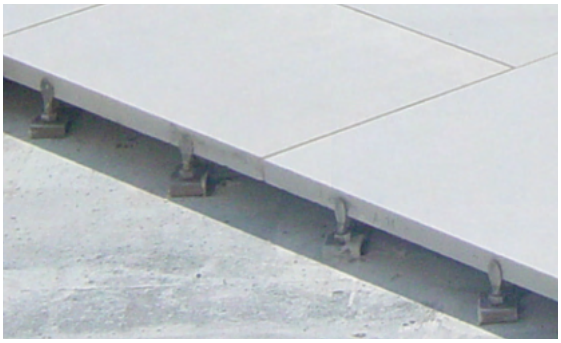
- A — Shape
- 10 — Adj. arm M size (mm)
- 330 — Anchor body size (mm)
- HZ02-S — Anchor type

HZ Z Anchor - Special Applications

HZ03 Special Z Anchor

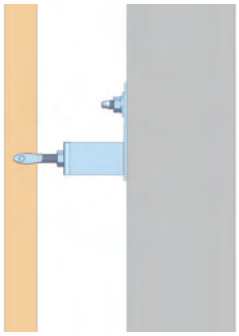
Used for installing soffit and facade panels with a single anchor

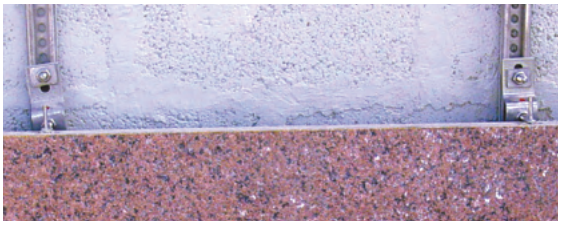




HZ06 Special Z Anchor - for large projection sizes

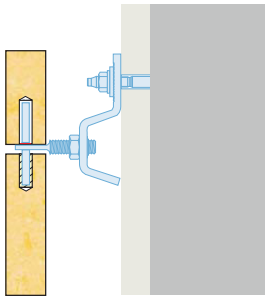
With optimal static performance
Can be used for projections over 150 mm





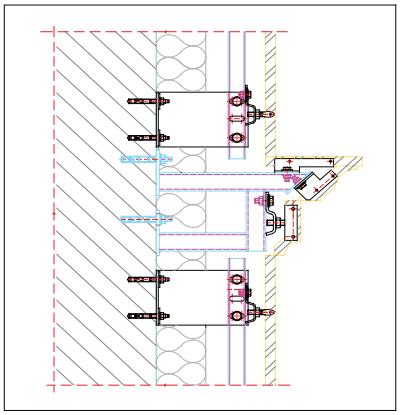
HZ09 Z Anchor - with wedge washer

Can be used for loads that are over 800 N when stronger vertical stabilization is required

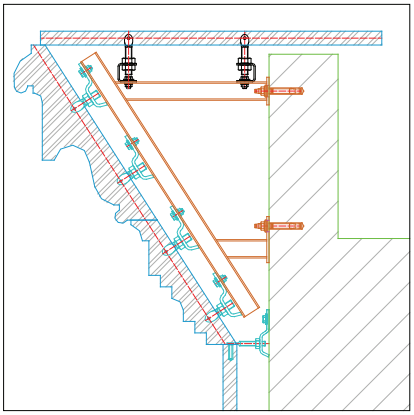


Special designs

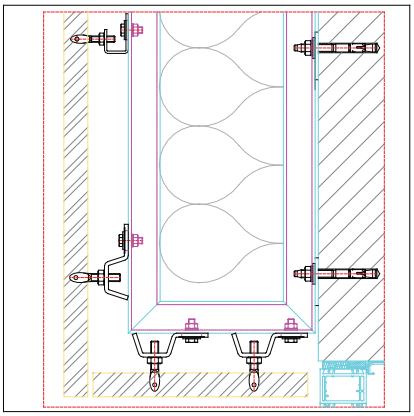
Z Anchors are fixed on sub frame to install cornice lining.



Z Anchors are fixed on to special steel structure for cornice parapet installation.



Z Anchors are fixed on to special steel structure for special area installation.



AXO Body Anchors - Introduction

- Direct fixing in to load bearing substrates with anchor bolts
- Indirect fixing on to sub channel systems with hex bolts or lock nuts
- Three dimensional adjustability - quick and easy fixing
- Installation at horizontal and vertical joints
- Optimum static performance for higher loads and larger projection sizes
- Recommended projection sizes up to 300 mm and loads up to 1300 N

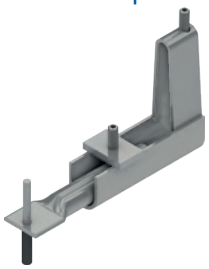
AXO1 Body Anchor

AXO2 Body Anchor

AXO3 Body Anchor

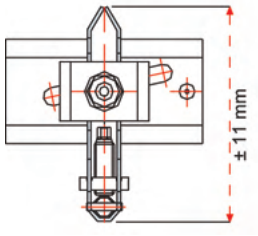
AXO4 Body Anchor

HZTA Telescope Anchor

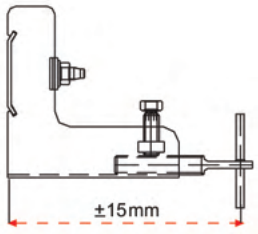


HRS3 Restraint Anchor

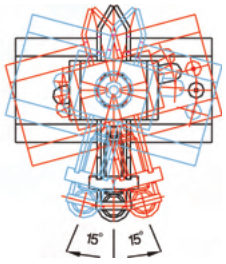
Three dimensional adjustability



1) Vertical adjustment is provided through the body space. The anchor is fixed onto the bolt through the wedge washer and the lock washer at the desired level.

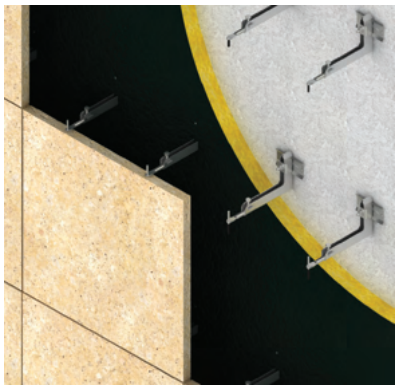


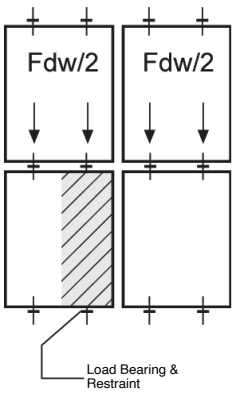
2) Adjusting the projection size by simply moving the adjustable arm without rotating. The adjustable arm is safely fixed to the anchor body with the lock nut and hex bolt.



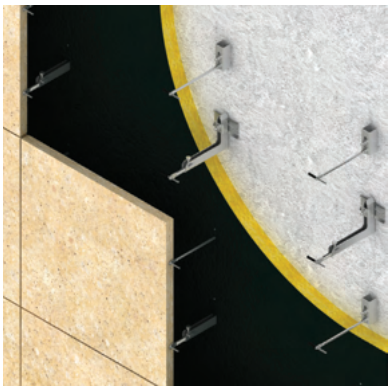
3) Adjusting the anchor left and right is provided by sliding the body up to 15 degrees left or right.

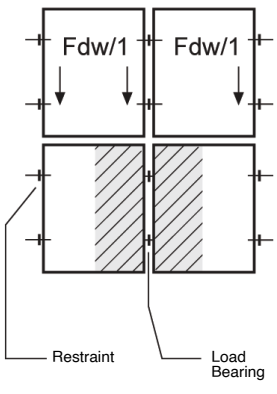
Installation at horizontal joints





Installation at vertical joints

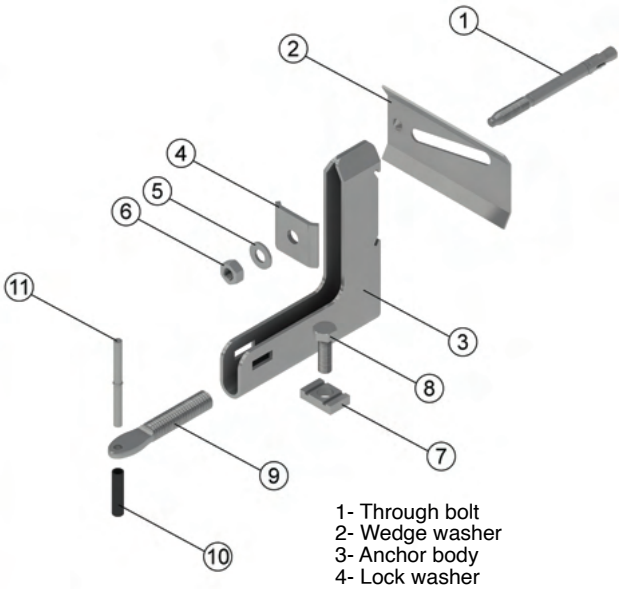




System features

- Suitable for concrete walls. Anchors are fixed on to concrete walls with expansion bolts.
- Projection sizes between 60 and 300 mm and loads up to 1300 N.
- In horizontal installation, slabs are pinned on the bottom and upper sides. The anchors act as load bearing, carrying half the weight of the slabs above. Anchors also act as restraint holding the slabs below and restraining against wind suction and pressure.
- In vertical installation, slabs are pinned at the left and right sides. The anchors on the bottom are load-bearing anchors carrying the whole weight of the slab. Half the weight of the slab on the left and half the weight of the slab on the right. The anchors on the top are restraint anchors holding the slabs and restraining against wind suction and pressure.
- Three dimensional adjustability allows quick and easy installation.
- The design and structural calculations of these anchors are made in our technical department. Special design and manufacturing can be made for the requirements of the project.

AXO Body Anchors - Installation Details



1- Through bolt
2- Wedge washer
3- Anchor body
4- Lock washer
5- Round washer for through bolt
6- Hex nut for through bolt
7- Locking plate
8- Hex bolt
9- Adjustable arm
10- Plastic tube
11- Flanged pin

Adjustable arm variations

Shape A

Shape B

Shape C

Shape D

Shape E

Shape F

Shape G

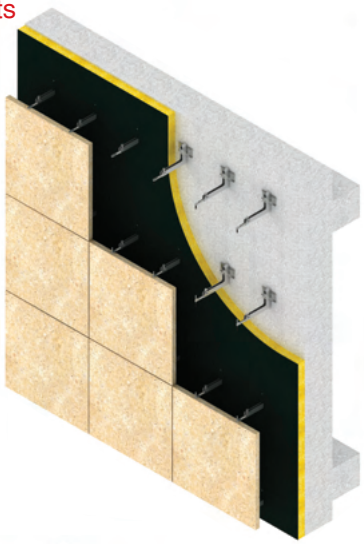
Shape H

Shape J

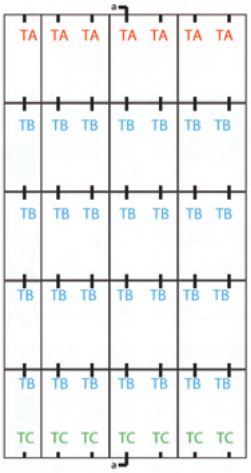
Shape K

Installation at horizontal joints

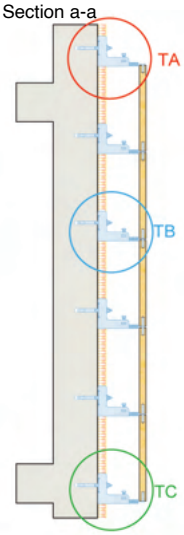
AXO4 Body Anchor



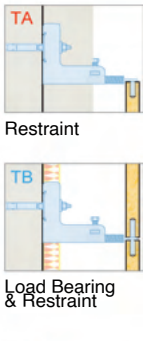
Elevation view



Section a-a



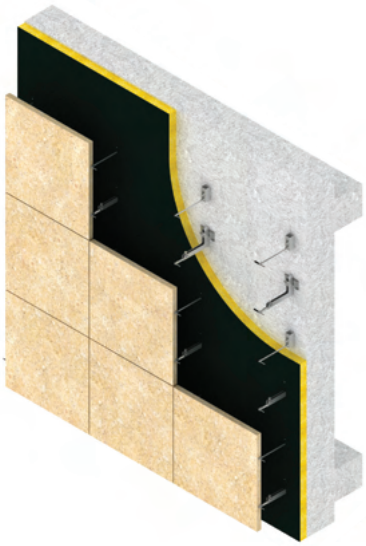
Installation details



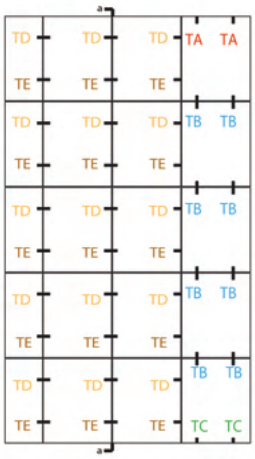
Installation at vertical joints

HRS3 Restraint Anchor

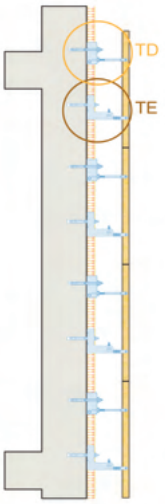
AXO4 Body Anchor



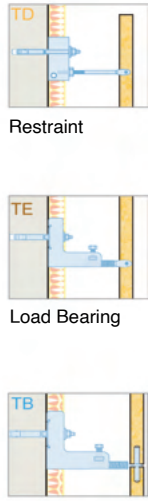
Elevation view



Section a-a

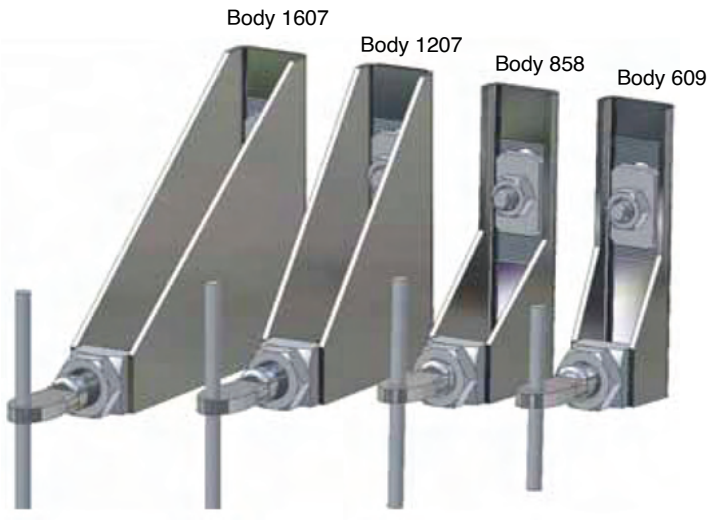


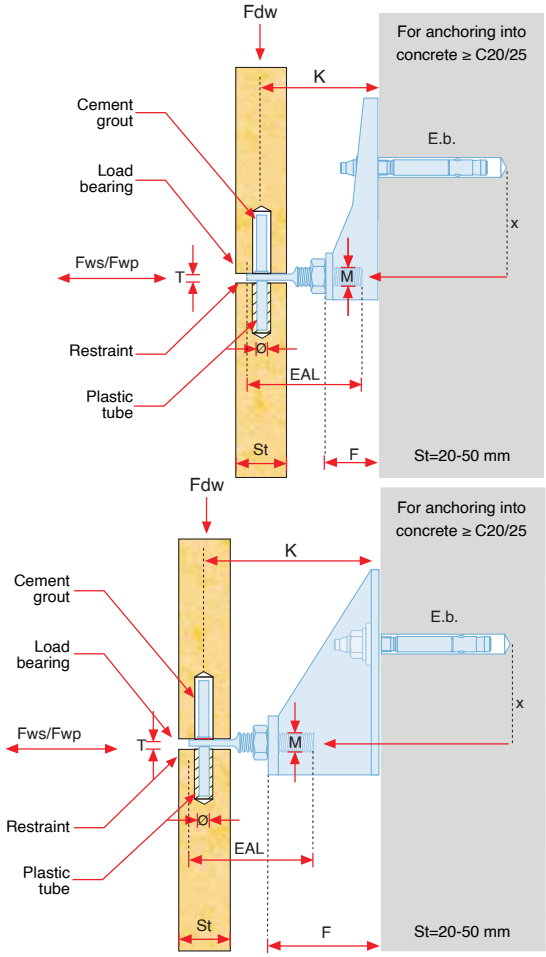
Installation details



BA Body Anchor - Product Details

LGA TEST REPORT
No : BBW 0541135-01
Date : 09.05.2005





Product Code	Technical Details												
	Projection	Min. Projection	Max. Projection	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
BA-609 BODY 1	60	50	75	900	28	1100	770	M8X80	5	M12	4.5	70	50
BA-858 BODY 2	85	70	100	800	46	700	700					70	
BA-1207 BODY 3	120	95	135	700	75	650	650					80	
BA-1607 BODY 4	160	145	175	700	115	600	600					80	

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to LGA test results.
- Loads stated are characteristic resistance loads.
- Bolts are provided separately.
- Test results are available upon order.

BA Body Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

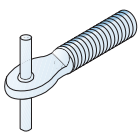
- Projection sizes between 60 and 160 mm
- Suitable for horizontal & vertical joints

- Loads up to 900 N
- Stone thicknesses 20-50 mm

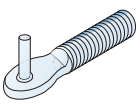
Product Code Description

BA - 60 9 A
- A — Type
- 60 — Projection (K mm)
- 9 — Dead Load (x10 Kg)
- A — Shape

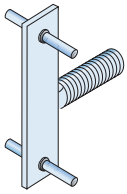
Shape A



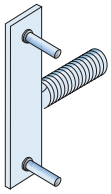
Shape B



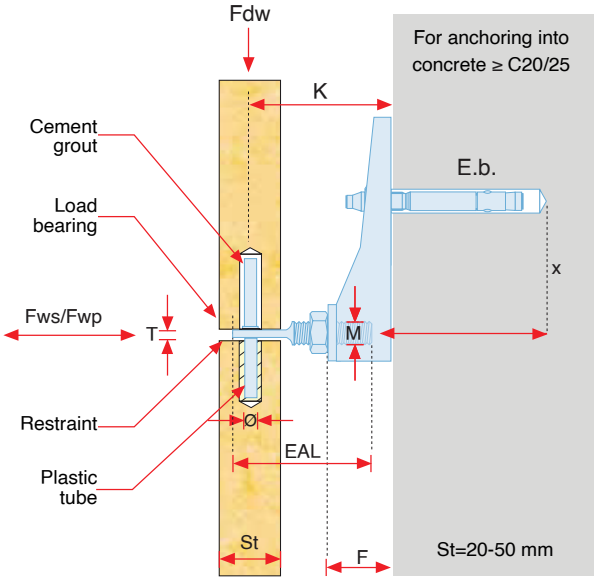
Shape C



Shape D



AXO1 Body Anchor - Product Details



Product Code	Technical Details												
	Projection	Min. Projection	Max. Projection	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
AXO1-705	70	55	85	500	20	780	546	M8X80	5	M12	4.5	80	50
AXO1-1105	110	95	125		60								
AXO1-7013	70	55	85	1300	20	2028	1419	M10X90	6	M16	6	80	50
AXO1-11013	110	95	125		60								

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculations are available upon order.

AXO1 Body Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 70 and 110 mm
- Suitable for horizontal & vertical joints

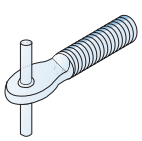
- Loads up to 1300 N
- Stone thickness 20-50 mm

Product Code Description

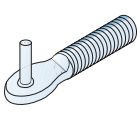
AXO1 - 60 9 A

- Shape
- Dead Load (x10 Kg)
- Projection (K mm)
- Type

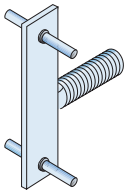
Shape A



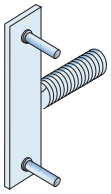
Shape B



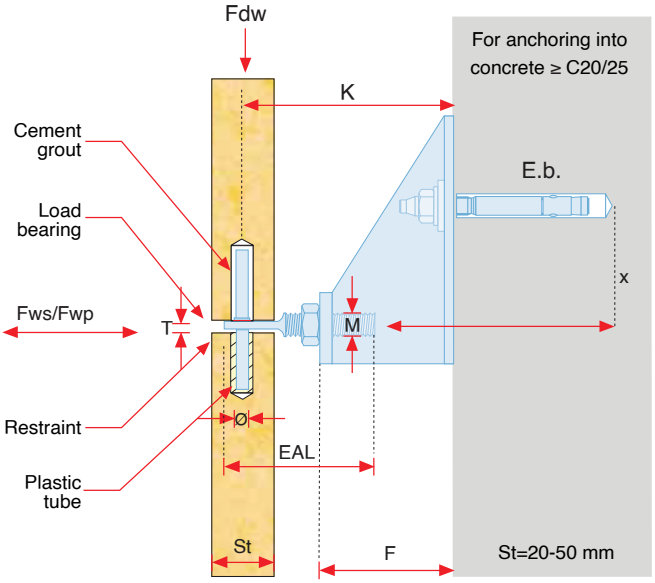
Shape C



Shape D



AXO2 Body Anchor - Product Details



Product Code	Technical Details												
	Projection	Min. Projection	Max. Projection	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
AXO2-1505	150	135	165	500	100	780	546	M8X80	5	M12	4.5	80	50
AXO2-15013	150	135	165	1300	100	2028	1419	M10X90	6	M16	6		

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculations are available upon order.

AXO2 Body Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection size 150 mm
- Suitable for horizontal & vertical joints

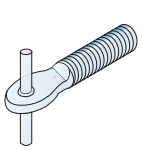
- Loads up to 1300 N
- Stone thickness 20-50 mm

Product Code Description

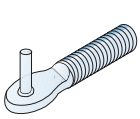
AXO2 -1505 A

- A — Shape
- 05 — Dead Load (x10 Kg)
- 15 — Projection (K mm)
- AXO2 — Type

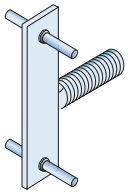
Shape A



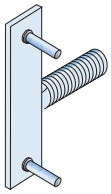
Shape B



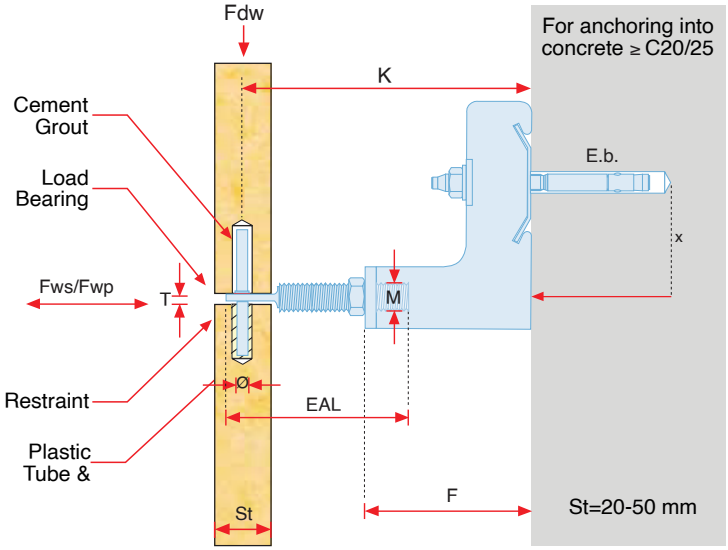
Shape C



Shape D



AXO3 Body Anchor - Product Details



Product Code	Technical Details												
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
AXO3-2005	200	180	220	500	155	780	546	M8X120	5	M12	4.5	80	75
AXO3-2205	220	200	240		175								
AXO3-2405	240	220	260		195								
AXO3-2605	260	240	280		215								
AXO3-2009	200	180	220	900	155	1430	1000	M10X130	6	M14	5.5	80	75
AXO3-2209	220	200	240		175								
AXO3-2409	240	220	260		195								
AXO3-2609	260	240	280		215								
AXO3-20013	200	180	220	1300	155	2028	1419	M12X145	6	M16	6	80	80
AXO3-22013	220	200	240		175								
AXO3-24013	240	220	260		195								
AXO3-26013	260	240	280		215								

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard
- Loads stated are working resistance loads.
- Bolts are provided separately.
- Structural calculations are available upon order.

AXO3 Body Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 200 and 260 mm
- Suitable for horizontal & vertical joints

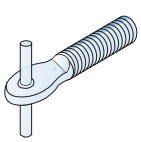
- Loads up to 1300 N
- Stone thicknesses 20-50 mm

Product Code Description

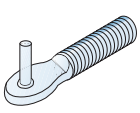
AXO3 - 200 5 A

- A — Shape
- 5 — Dead Load (x10 Kg)
- 200 — Projection (K mm)
- AXO3 — Type

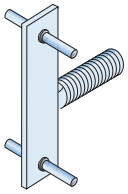
Shape A



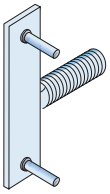
Shape B



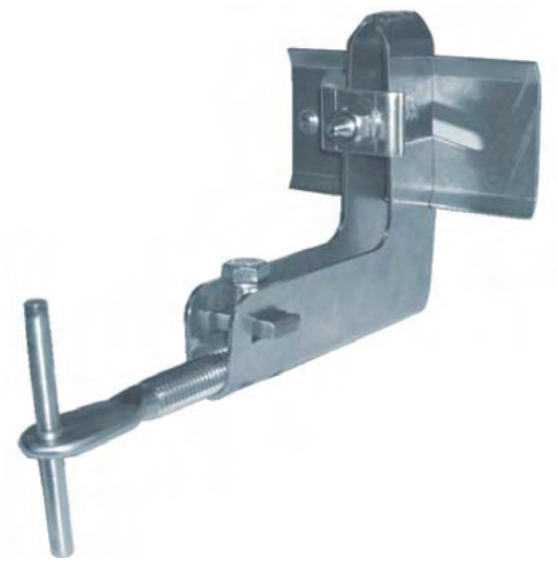
Shape C

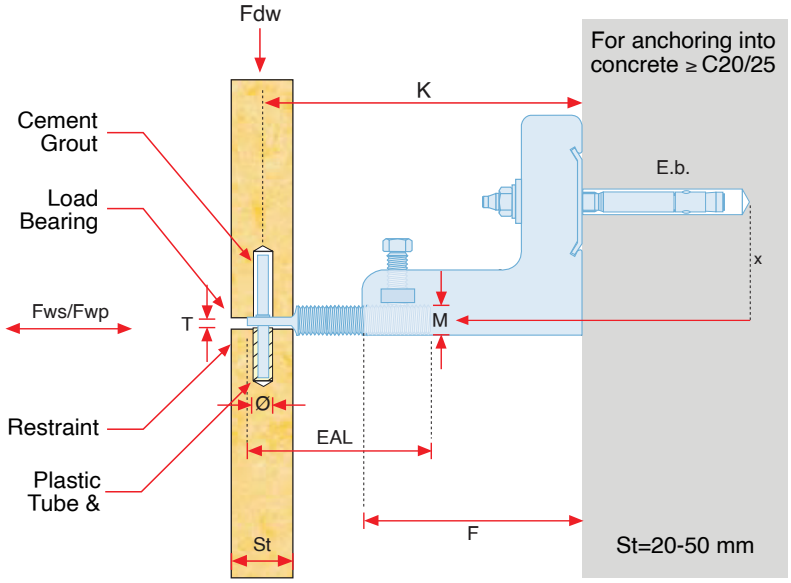


Shape D



AXO4 Body Anchor - Product Details





Product Code	Technical Details												
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
AXO4-1605	160	140	180	500	115	780	546	M8X120	5	M12	4.5	100	75
AXO4-1805	180	160	200		135								
AXO4-2005	200	180	220		155								
AXO4-2205	220	200	240		175								
AXO4-2405	240	220	260		195								
AXO4-2605	260	240	280		215								
AXO4-1609	160	140	180	900	115	1430	1000	M10X130	6	M14	5.5	100	75
AXO4-1809	180	160	200		135								
AXO4-2009	200	180	220		155								
AXO4-2209	220	200	240		175								
AXO4-2409	240	220	260		195								
AXO4-2609	260	240	280		215								
AXO4-16013	160	140	180	1300	115	2028	1419	M12X145	6	M16	6	100	80
AXO4-18013	180	160	200		135								
AXO4-20013	200	180	220		155								
AXO4-22013	220	200	240		175								
AXO4-24013	240	220	260		195								
AXO4-26013	260	240	280		215								

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculations are available upon order.

AXO4 Body Anchor

- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws

- Projection sizes between 160 and 260 mm
- Suitable for horizontal & vertical joints

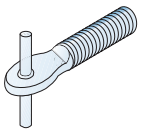
- Loads up to 1300 N
- Stone thickness 20-50 mm

Product Code Description

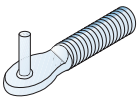
AXO4 - 160 5 A

- A — Shape
- 5 — Dead Load (x10 Kg)
- 160 — Projection (K mm)
- AXO4 — Type

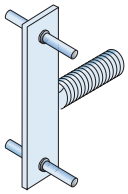
Shape A



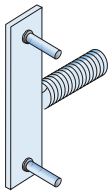
Shape B



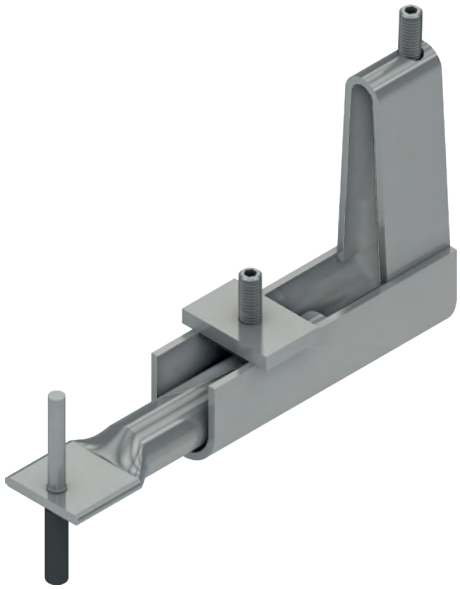
Shape C

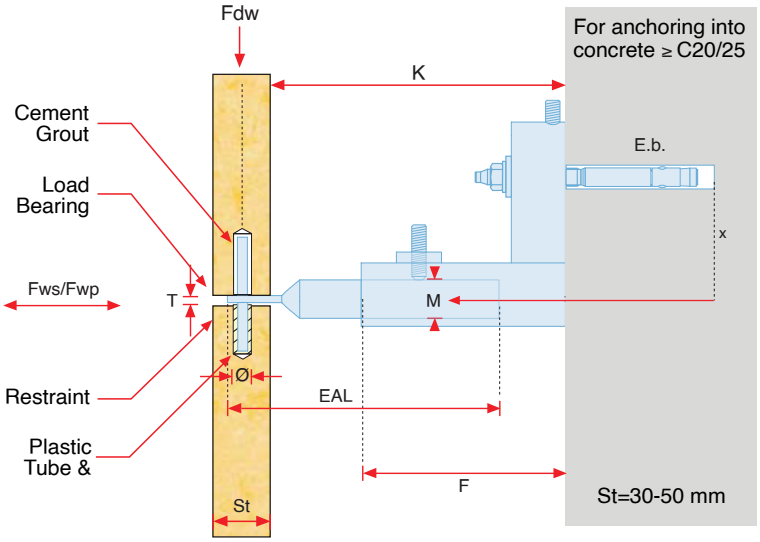


Shape D



HZTA Telescope Anchor - Product Details





Product Code	Technical Details												
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Dead Load	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Dia.	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
HZTA-15011	150	135	165	1100	90	1300	1300	M10x130	6	Ø21,3	4	132	75
HZTA-18011	180	165	195		120								
HZTA-21011	210	195	225		150								
HZTA-24011	240	225	255		180								
HZTA-27011	270	255	285		210								
HZTA-30011	300	285	315		240								

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculations are available upon order.

HZTA Telescope Anchor

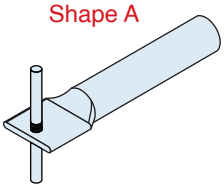
- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 150 and 300 mm
- Suitable for horizontal & vertical joints
- Loads up to 1100 N
- Stone thickness 30-50 mm

Product Code Description

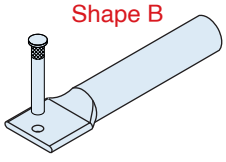
HZTA - 150 11

- Dead Load
- Projection (K mm)
- Type

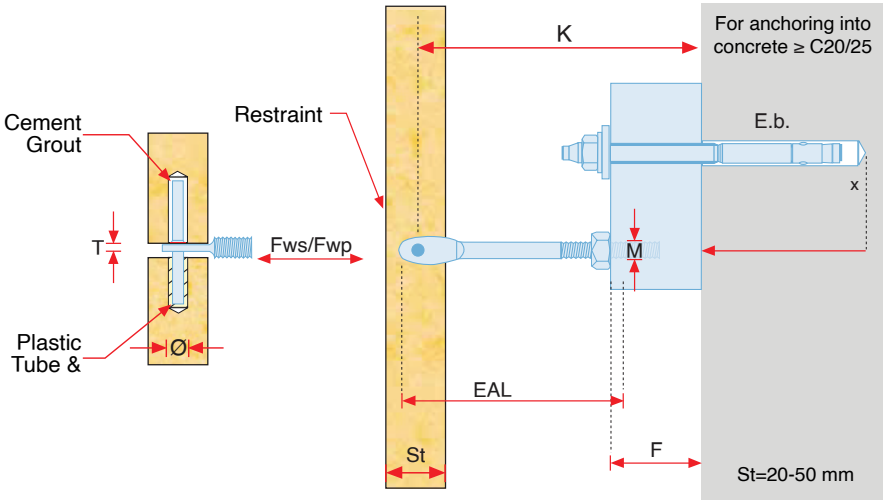
Shape A



Shape B



HRS3 Restraint Anchor - Product Details



Product Code	Technical Details											
	Projec-tion	Min. Projec-tion	Max. Projec-tion	Forming Size	Wind-Pressure	Wind-Suction	Expansion Bolt Size	Pin Size	Adj. Arm Metric Size	Adj. Arm Flat Thickness	Adj. Arm Length	X Size
	K (mm)	K - (mm)	K + (mm)	F (mm)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	M (mm)	T (mm)	EAL (mm)	x (mm)
HRS03-60	60	40	80	25	2028	1419	M8X120	5	M8	3	70	30
HRS03-80	80	60	100								90	
HRS03-100	100	80	120	32							100	
HRS03-120	120	100	140								120	
HRS03-140	140	120	160								140	
HRS03-160	160	140	180								160	
HRS03-180	180	160	200	40							170	
HRS03-200	200	180	220								190	
HRS03-220	220	200	240								210	
HRS03-240	240	220	260	50							220	
HRS03-260	260	240	280								240	
HRS03-280	280	260	300	60							260	
HRS03-300	300	280	320								270	

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4)
- Table above is prepared according to Eurocode standard
- Loads stated are working resistance loads
- Other sizes are available for production upon request
- Bolts are provided separately
- Structural calculation reports are available upon order
- Available in sizes to fit the projection range of all AXO anchors.

HRS3 Restraint Anchor

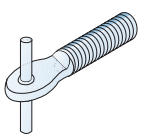
- Load bearing & restraint
- Three dimensional adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 60 and 300 mm
- Suitable for horizontal & vertical joints
- Loads up to 2028 N
- Stone thickness 20-50 mm

Product Code Description

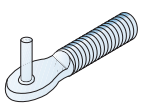
HRS03 - 60 A

- A — Shape
- 60 — Projection (K mm)
- HRS03 — Type

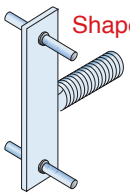
Shape A



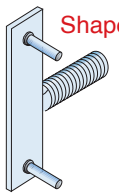
Shape B



Shape C



Shape D



AXO Body Anchor - Special Applications

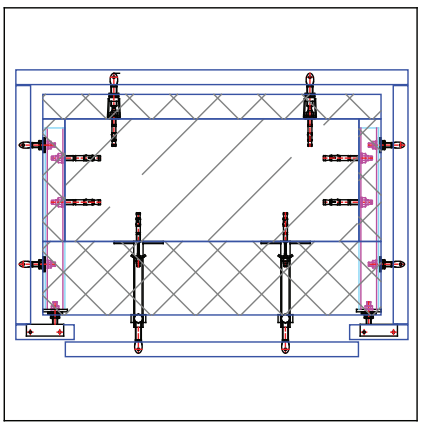
Body anchor with welded plate with two pins. Used for stone installation with single anchor. This type used for installation of reveals with maximum width of 25 cm.

Body anchor with welded shims and undercut bolt execution. With this type of anchor, stone panels are supported from the rear surface using undercut bolts instead of from the edges using pins.

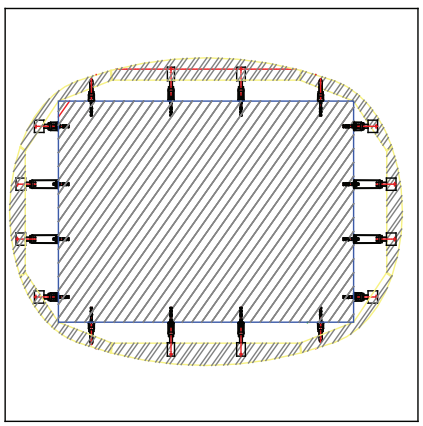
Body anchor with welded plate and riveted nut. A feature of HZ05 which is chosen for the fine adjustment of the projection by spinning or rotating the riveted nut while pins are set on the stone.

Special Designs

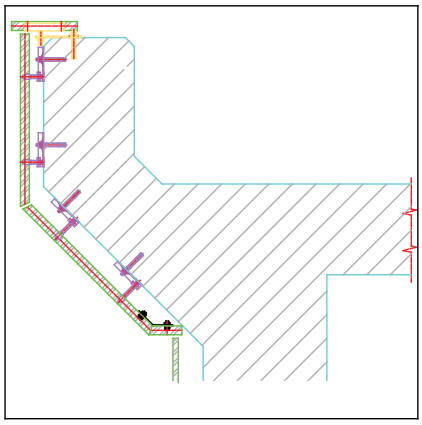
Body anchors are used for stone installation around columns.



Body anchors are used to form an oval shape around a column in natural stone.



Body anchors used for installation of parapet area.



HA L Anchors - Introduction

- Direct fixing into concrete walls with expansion bolts
- Indirect fixing onto sub channel system with hex bolts
- Economical & easy fixing
- Installation at horizontal joints only
- Adjustability provided through adjustable plates and slotted pin holes

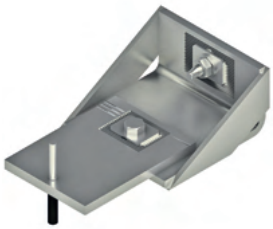
HA01 L Anchor

HA02 L Anchor Double Pin

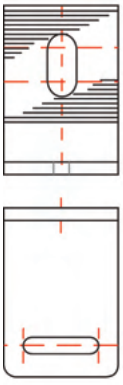
HA03 L Anchor With Kerf

HA04 L Anchor With Adjustable Plate

HA05 L Anchor With Adj. Plate & Welded Tie

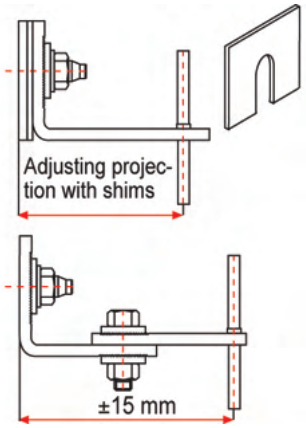


Adjustability



1. Vertical adjustment is made through the slot hole. The anchor is fixed on to the bolt with the serrated washer and nut.

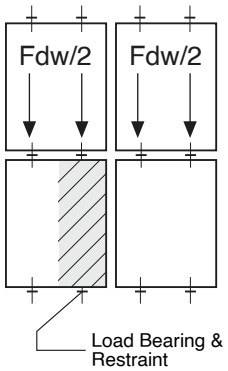
2. A slot pin hole can be provided to enable lateral adjustment of the pin.

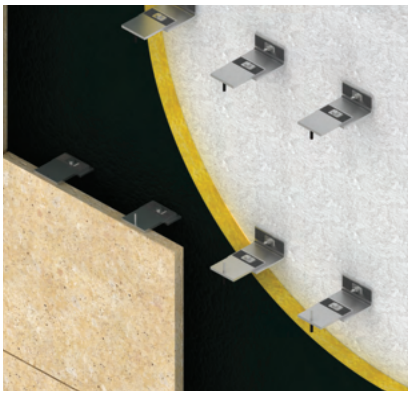


3. Greater projection sizes can be achieved by using shims. Shims are placed at the back of the anchor.

4. An adjustment plate is available in HA04 & HA05 type L anchors where adjustment of the projection size can be made.

Installation at horizontal joints





System features

HA01 L Anchors

- Suitable for concrete walls. Recommended projection sizes up to 55 mm.
- Slabs are pinned at the bottom and upper sides.
- Adjustability for projection size can be done by inserting shims between the anchor and the wall.
- Anchors act as load bearing and restraint, carrying the slabs above and restraining the slabs below.

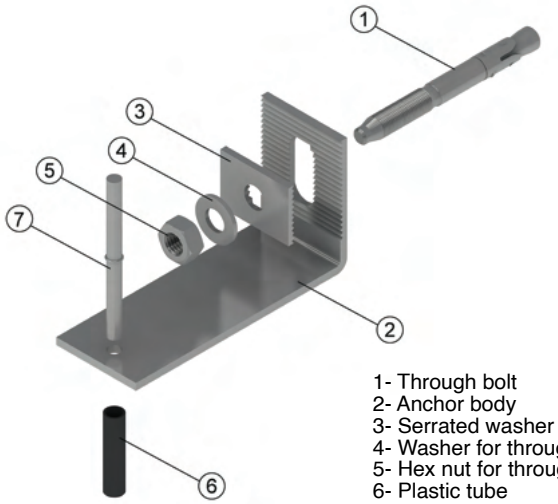
HA03 L Anchors

- Suitable for concrete walls. Recommended projection sizes up to 55 mm.
- Slabs have slits and the kerf parts of the anchors are inserted in to the slit edges of the slabs.
- Adjustability for projection size can be done by inserting shims between the anchor and the wall.
- Anchors act as load bearing and restraint, carrying the slabs above and restraining the slabs below.

HA04 L Anchors

- Suitable for concrete walls. Recommended projection sizes up to 180 mm.
- Slabs are pinned from the bottom and upper sides.
- Adjustability of the projection size is enabled with the adjustable plate, which is fixed to the body with hex bolts.
- Anchors act as load bearing and restraint, carrying the slabs above and restraining the slabs below.

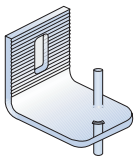
HA L Anchor - Installation Details



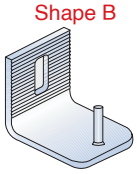
1- Through bolt
2- Anchor body
3- Serrated washer
4- Washer for through bolt
5- Hex nut for through bolt
6- Plastic tube
7- Flanged pin

Anchor Variations

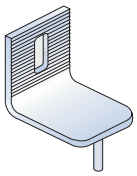
Shape A



Shape B



Shape C

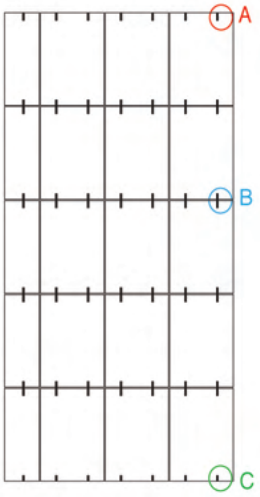


Shape D

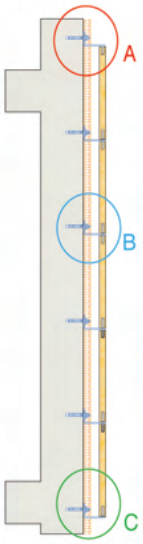
Installation at vertical joints

HA01 L Anchor

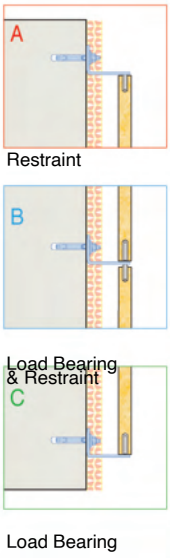
Elevation view



Section A-A

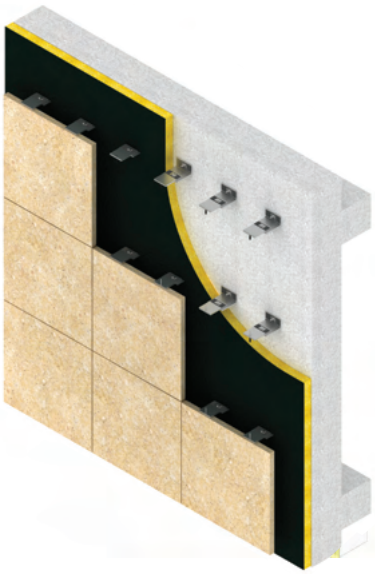


Installation details

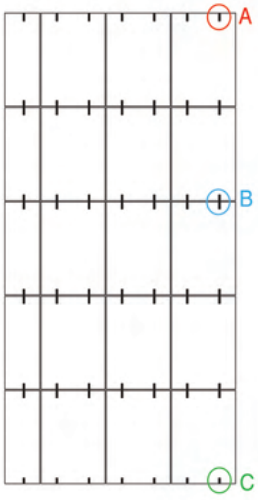


Installation at vertical joints

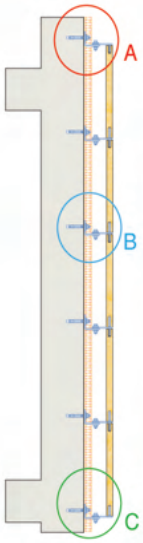
HA04 L Anchor



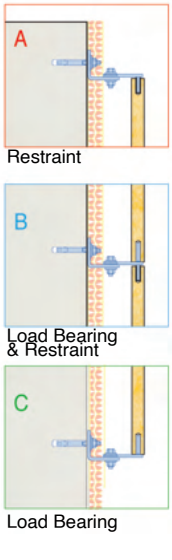
Elevation view



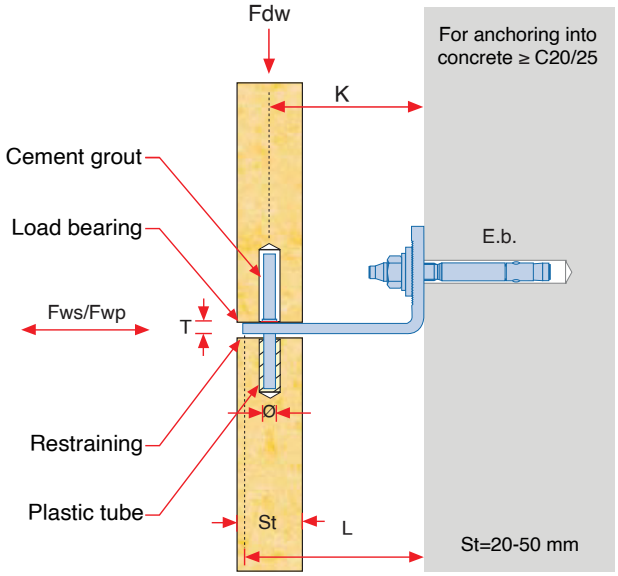
Section A-A



Installation details



HA01 L Anchor - Product Details



Product Code	Technical Details							
	Projection	Dead Load	Wind Pressure	Wind Suction	Bolt Size	Pin Diameter	Anchor Length	Anchor Thickness
	K (mm)	Fdw (N)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	L (mm)	T (mm)
HA01-301	30	100	156	110	M8X80	4	36	2
HA01-351	35						41	
HA01-401	40						46	
HA01-451	45						51	2.5
HA01-501	50						56	
HA01-551	55						61	
HA01-302	30	200	312	219	M8X80	4	38	3
HA01-352	35						43	
HA01-402	40						48	
HA01-452	45						53	
HA01-502	50						58	4
HA01-552	55						63	
HA01-303	30	300	468	328	M8X80	5	38	3
HA01-353	35						43	
HA01-403	40						48	4
HA01-453	45						53	
HA01-503	50						58	
HA01-553	55						63	
HA01-304	30	400	624	437	M8X80	5	38	3
HA01-354	35						43	4
HA01-404	40						48	
HA01-454	45						53	
HA01-504	50						58	
HA01-554	55						63	

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table above is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Bolts are provided separately.
- Structural calculation reports are available upon order.

HA01 L Anchor

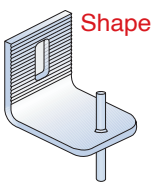
- Load bearing & restraint
- Limited adjustability
- Fastened on to load bearing walls with expansion bolts and on to channels with set screws
- Projection sizes between 30 and 35 mm
- Suitable for horizontal
- Loads up to 400 N
- Stone thickness above 20 mm

Product Code Description

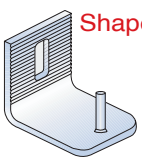
HA01 - 30 1 A

- A — Shape
- 1 — Dead Load (x10 Kg)
- 30 — Projection (K mm)
- HA01 — Type

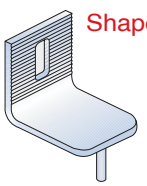
Shape A



Shape B



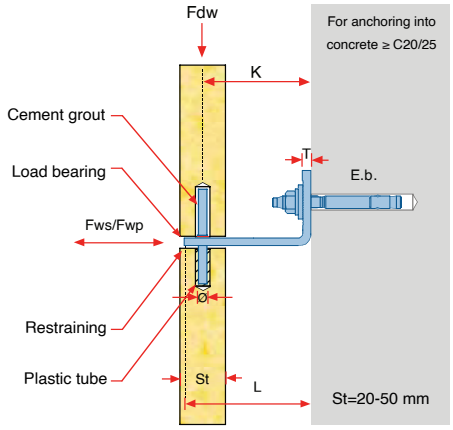
Shape C



HA02 L Anchor - Product Details

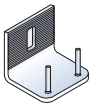
HA02 L Anchor

- Load bearing & restraint.
- Projection sizes between 30 and 55 mm.
- Loads up to 400 N.
- Suitable for horizontal joints.
- Stone thickness above 20mm.
- Fastened on walls with expansion bolts.
- Stone installation is made with a single anchor on each side.

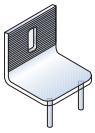


Shape A

Shape B



Shape C



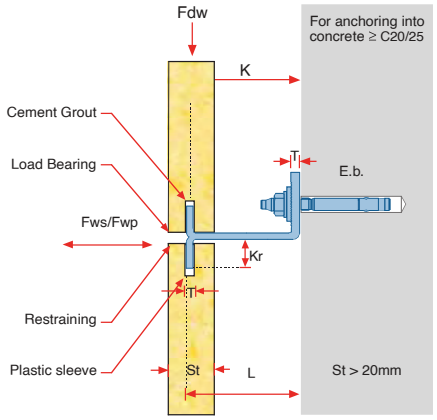
HA02 - 30 2 A
- A — Shape
- 2 — Dead Load (x10 Kg)
- 30 — Projection (K mm)
- HA02 — Type

Product Code	Technical Details							
	Projection	Dead Load	Wind Pressure	Wind Suction	Bolt Size	Pin Diameter	Anchor Length	Anchor Thickness
	K (mm)	Fdw (N)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	L (mm)	T (mm)
HA02-302	30	200	312	219	M8X80	4	38	3
HA02-352	35						43	
HA02-402	40						48	
HA02-452	45						53	
HA02-502	50						58	
HA02-552	55						63	
HA02-304	30	400	624	437	M8X80	6	38	4
HA02-354	35						43	
HA02-404	40						48	
HA02-454	45						53	
HA02-504	50						58	
HA02-554	55						63	

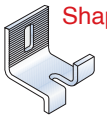
HA03 L Anchor - Product Details

HA03 L Anchor

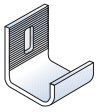
- Load bearing & restraint.
- Projection sizes between 30 and 55 mm.
- Loads up to 400 N.
- Suitable for horizontal joints.
- Stone thickness above 20mm.
- Fastened on walls with expansion bolts.
- Installation is made with kerf system where there are slit edges in the slabs.



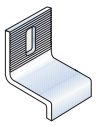
Shape A



Shape B



Shape C



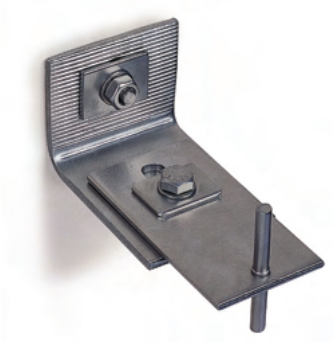
HA03 - 30 2 A
- A — Shape
- 2 — Dead Load (x10 Kg)
- 30 — Projection (K mm)
- HA03 — Type

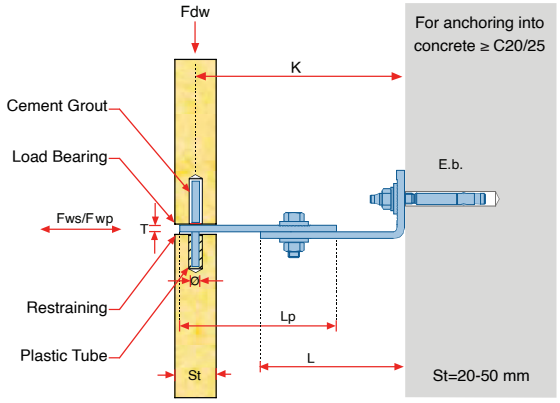
Product Code	Technical Details							
	Projection	Dead Load	Wind Pressure	Wind Suction	Bolt Size	Pin Diameter	Anchor Length	Anchor Thickness
	K (mm)	Fdw (N)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	L (mm)	T (mm)
HA03-302	30	200	312	219	M8X80	12	32	3
HA03-352	35						37	
HA03-402	40						42	
HA03-452	45						47	
HA03-502	50						52	4
HA03-552	55						57	
HA03-304	30	400	624	437	M8X80	15	32	3
HA03-354	35						37	4
HA03-404	40						42	
HA03-454	45						47	
HA03-504	50						52	
HA03-554	55						57	

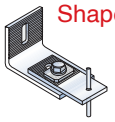
HA04 L Anchor - Product Details

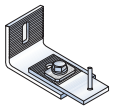
HA04 L Anchor

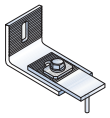
- Load bearing & restraint.
- Projection sizes between 100 and 180 mm.
- Loads up to 800 N.
- Suitable for horizontal joints.
- Stone thickness above 20mm.
- Fastened on walls with expansion bolts.
- Adjustability of the projection size is provided with the adjustable plate.






Shape A


Shape B


Shape C

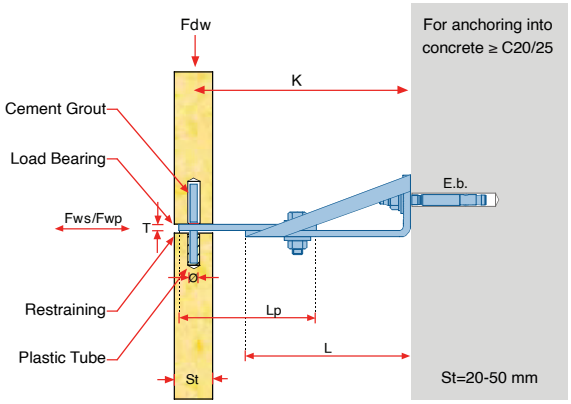
HA04 - 100 6 A
- A: Shape
- 6: Dead Load (x10 Kg)
- 100: Projection (K mm)
- HA04: Type

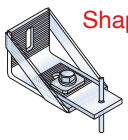
Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Bolt Size	Pin Diameter	Anchor Length	Adj. Plate Length	Adj. Plate Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	L (mm)	Lp (mm)	T (mm)
HA04-1006	100	85	115	600	936	655	M12X120	6	70	80	6
HA04-1206	120	105	135						90		
HA04-1406	140	125	155						110		
HA04-1606	160	145	175						130		
HA04-1806	180	165	195						150		
HA04-1008	100	85	115	800	1235	865	M12X120	6	70	80	6
HA04-1208	120	105	135						90		
HA04-1408	140	125	155						110		
HA04-1608	160	145	175						130		
HA04-1808	180	165	195						150		

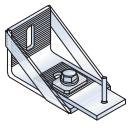
HA05 L Anchor - Product Details

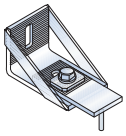
HA05 L Anchor

- Load bearing & restraint.
- Projection sizes between 200 and 280 mm.
- Loads up to 800 N.
- Suitable for horizontal joints.
- Stone thickness above 20mm.
- Fastened on walls with expansion bolts.
- Adjustability of the projection size is provided with the adjustable plate.




Shape A


Shape B

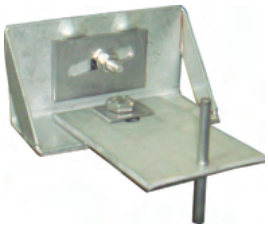

Shape C

HA05 - 200 6 A
- A: Shape
- 6: Dead Load (x10 Kg)
- 200: Projection (K mm)
- HA05: Type

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Bolt Size	Pin Diameter	Anchor Length	Adj. Plate Length	Adj. Plate Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	E.b. (mm)	Ø (mm)	L (mm)	Lp (mm)	T (mm)
HA05-2006	200	185	215	600	936	655	M12X120	6	170	80	6
HA05-2206	220	205	235						190		
HA05-2406	240	225	255						210		
HA05-2606	260	245	275						230		
HA05-2806	280	265	295						250		
HA05-2008	200	185	215	800	1235	865	M12X120	6	170	80	6
HA05-2208	220	205	235						190		
HA05-2408	240	225	255						210		
HA05-2608	260	245	275						230		
HA05-2808	280	265	295						250		

HA L Anchor - Special Applications

HA04-SP Support bracket with wedge washer



L anchor with adjustable plate combined with a wedge washer instead of serrated washer. This is chosen in cases where vertical loads are too high for the serrated washer to sustain the no slip feature.

HA04-K Support bracket with kerf

HA04-K L anchor with adjustable kerfed plates. This anchor is the same as HA04 L anchor with the difference of using kerf connection to stone instead of a pin connection.

HA-3H Restraint bracket

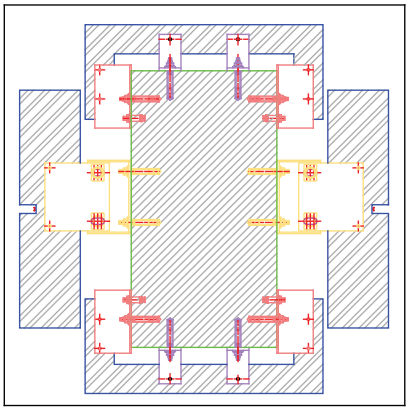
L anchor is produced with three holes in order to accommodate a special requirement. Customized production is made in any case to fulfil the special requirement of the stone application.

HAZ-21 Restraint bracket

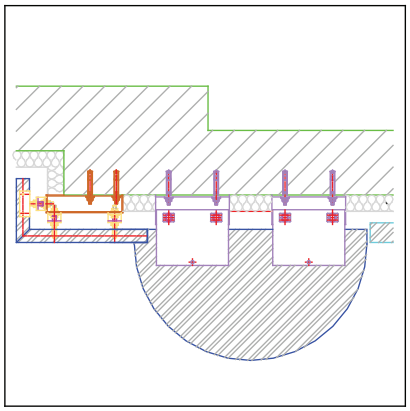
HAZ 21 restraint anchor, designed for the purpose of installing into insulated walls more quickly. Insulation is drilled instead of cut. HAZ 21 anchors are generally used as restraints and are used for corbel facade installations.

Special Designs

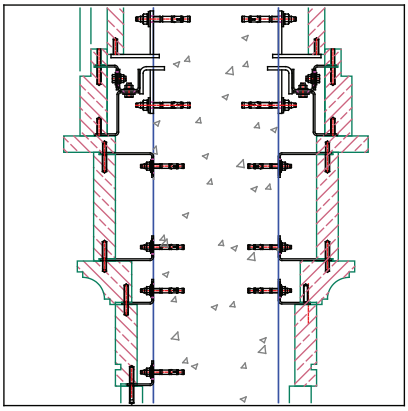
L anchors are used to install thick stone slabs around corners.



L anchors are used to support large semi circular stones to forming a massive column block.



L anchors used for stone installation around column with variations in stone and projection.

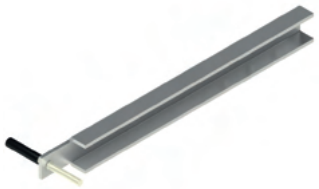


HDM Heavy Duty Mortar Anchors - Introduction

- Direct fixing to concrete and masonry walls with mortar
- Economical & easy fixing
- Installation at vertical and horizontal joints
- Special design for installing heavy loads at large projection sizes

Load Bearing Anchors

BUN



BUG

BTN

BTG

MTN

MTG

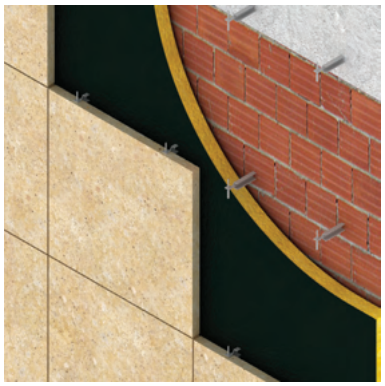
Restraint Anchors

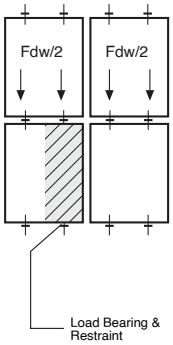
HN

HG

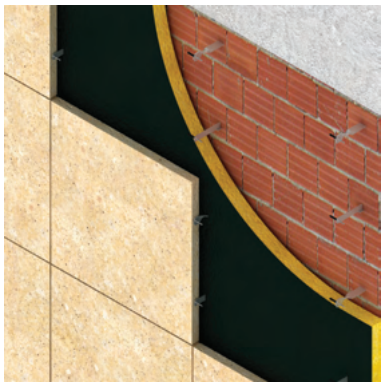
HR

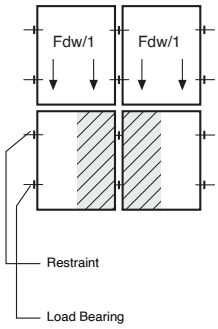
Installation at horizontal joints



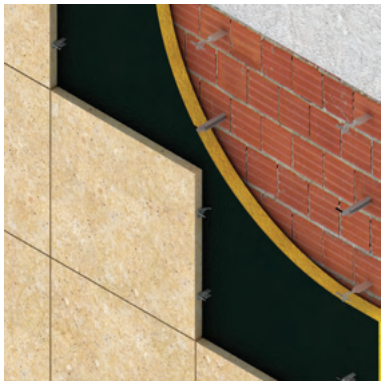


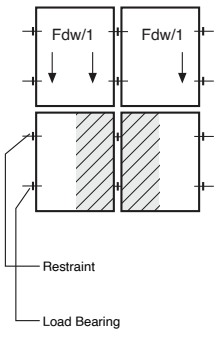
Installation at vertical joints





Installation at vertical joints





System features

- Suitable for installing high load natural stone slabs at large projection sizes on to concrete and masonry walls.

- Holes 6mm larger than the anchor width are drilled in the walls.

- The holes are filled with mortar and anchors are set into mortar bed.

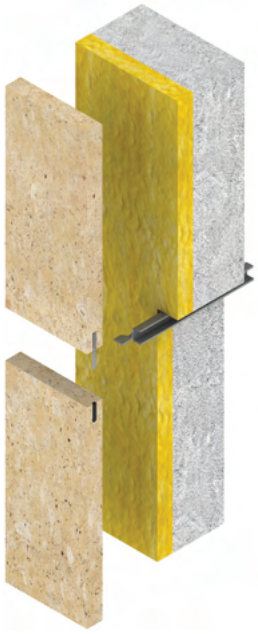
- In horizontal joint installation, slabs are pinned on the bottom and upper sides. Anchors act as load bearing carrying half the weight of the slabs above.

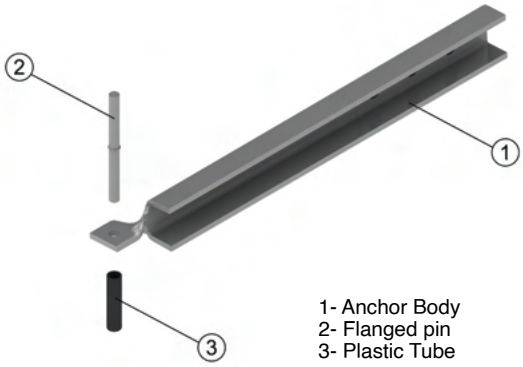
Anchors also act as restraint holding the slabs below and restraining against wind suction and pressure.

- In vertical joint installation, slabs are pinned at the left and right sides. Anchors on the bottom are load bearing anchors carrying the whole weight of the slab.

- Half the weight of the slab on the left and half the weight of the slab on the right. Anchors on the top are restraint anchors holding the slabs and restraining against wind suction and pressure.

HDM Mortar Anchors - Installation Details

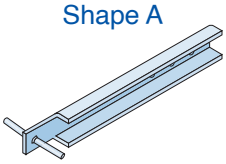




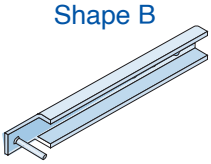
1- Anchor Body
2- Flanged pin
3- Plastic Tube

Anchor variations

Shape A



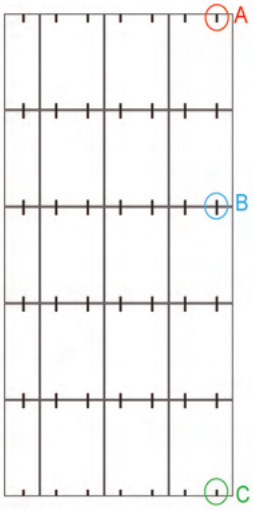
Shape B



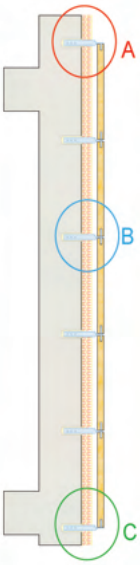
Installation at horizontal joints

BUG
Mortar Anchor

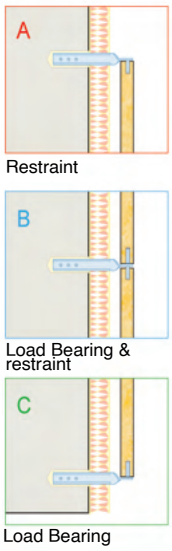
Elevation view



Section A-A



Installation details

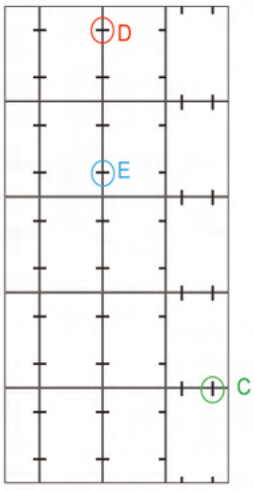


Installation at vertical joints

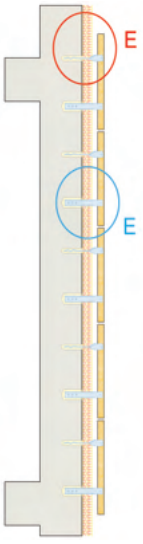
HG
Restraint Anchor

BUN
Mortar Anchor

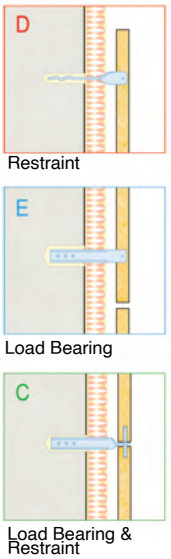
Elevation view



Section A-A



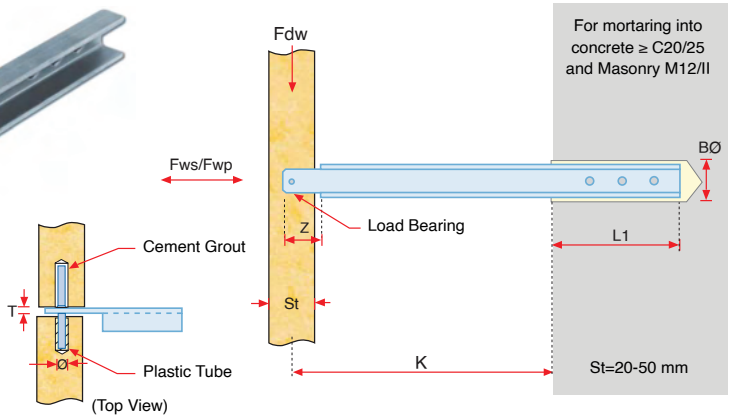
Installation details



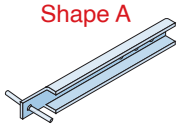
BUN Mortar Anchor - Product Details

BUN Mortar Anchor

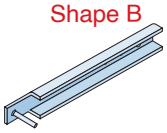
- Load bearing & restraint.
- Projection sizes between 160 and 240 mm.
- Loads up to 1200 N
- Three dimensional adjust ability.
- Suitable for vertical joints.
- Stone thickness 20-50mm.
- Fastened into concrete ≥ C20/25 and Masonry M12/II.



Shape A



Shape B



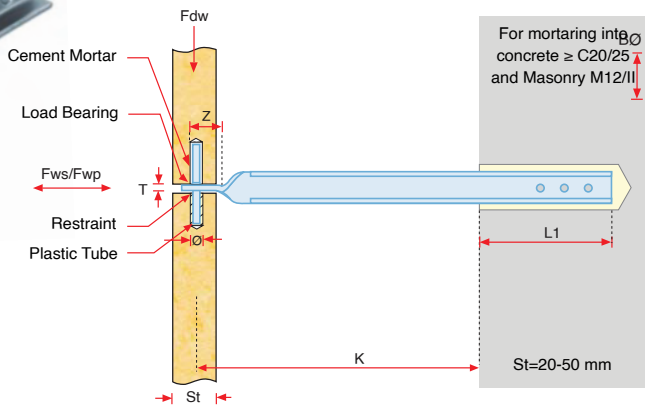
BUN - 6 22 A
- A — Shape
- 22 — Projection (x10mm)
- 6 — Dead Load (x10 Kg)
- BUN — Type

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Z Size	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	Z (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
BUN-622	220	210	230	600	393	786	22	80	5	34	3
BUN-624	240	230	250							38	
BUN-816	160	150	170	800	524	1048	22	80	5	32	4
BUN-818	180	170	190								
BUN-820	200	190	210								
BUN-822	220	210	230							36	
BUN-824	240	230	250								
BUN-1016	160	150	170	1000	655	1310	22	80	6	32	4
BUN-1018	180	170	190								
BUN-1020	200	190	210								
BUN-1022	220	210	230								
BUN-1024	240	230	250								
BUN-1216	160	150	170	1200	818	1636	22	80	6	36	4
BUN-1218	180	170	190								
BUN-1220	200	190	210								
BUN-1222	220	210	230								
BUN-1224	240	230	250							38	

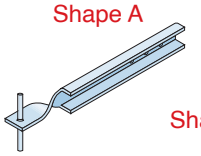
BUG Mortar Anchor - Product Details

BUG Mortar Anchor

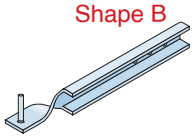
- Load bearing & restraint.
- Projection sizes between 160 and 240 mm.
- Loads up to 600 N.
- Three dimensional adjustability.
- Suitable for horizontal joints.
- Stone thickness 20-50mm.
- Fastened into concrete ≥ C20/25 and Masonry M12/II.



Shape A



Shape B



BUG - 6 22 A
- A — Shape
- 22 — Projection (x10mm)
- 6 — Dead Load (x10 Kg)
- BUG — Type

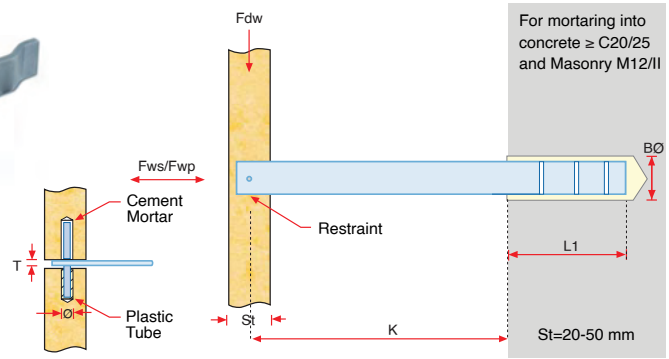
Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Z Size	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	Z (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
BUG-616	160	150	170	600	571	1142	17	80	5	32	4
BUG-618	180	180	190								
BUG-620	200	200	210							34	
BUG-622	220	220	230								
BUG-624	240	240	250							36	

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Structural calculations are available upon order.

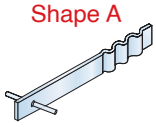
BTN Mortar Anchor- Product Details

BTN Mortar Anchor

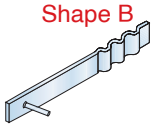
- Load bearing & restraint.
- Projection sizes between 160 and 240 mm.
- Loads up to 600 N.
- Three dimensional adjustability.
- Suitable for vertical joints.
- Stone thickness 20-50 mm.
- Fastened into concrete ≥ C20/25 and Masonry M12/II.



Shape A



Shape B



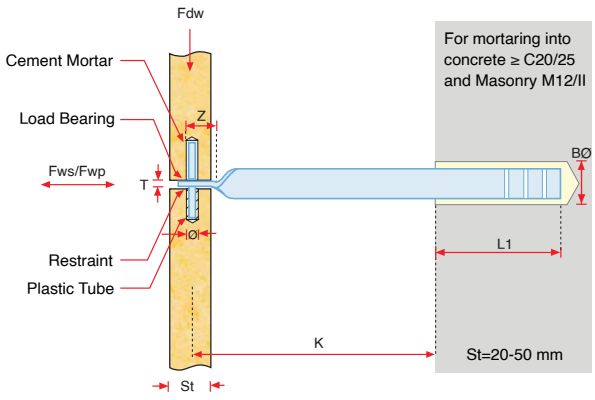
Product Code	Technical Details									
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
BTN-416	160	150	170	400	260	520	80	5	36	5
BTN-418	180	170	190						38	5
BTN-420	200	190	210						40	5
BTN-422	220	210	230						36	6
BTN-424	240	230	250							6
BTN-616	160	150	170	600	393	786	80	5	39	6
BTN-618	180	170	190						41	
BTN-620	200	190	210						42	

BTN - 4 16 A
- A — Shape
- 16 — Projection (x10mm)
- 4 — Dead Load (x10 Kg)
- BTN — Type

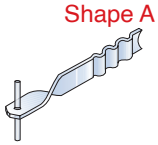
BTG Mortar Anchor - Product Details

BTG Mortar Anchor

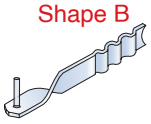
- Load bearing & restraint.
- Projection sizes between 160 and 240 mm.
- Loads up to 500 N.
- Three dimensional adjustability.
- Suitable for horizontal joints.
- Stone thickness 20-50 mm.
- Fastened into concrete ≥ C20/25 and Masonry M12/II.



Shape A



Shape B



Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Z Size	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	Z (mm)	L1 (mm)	ø (mm)	BØ (mm)	T (mm)
BTG-316	160	150	170	300	393	786	22	80	5	30	5
BTG-318	180	170	190							32	
BTG-320	200	190	210								
BTG-322	220	210	230							34	6
BTG-324	240	230	250								
BTG-516	160	150	170	500	655	1309	22	80	5	36	
BTG-518	180	170	190								
BTG-520	200	190	210							38	

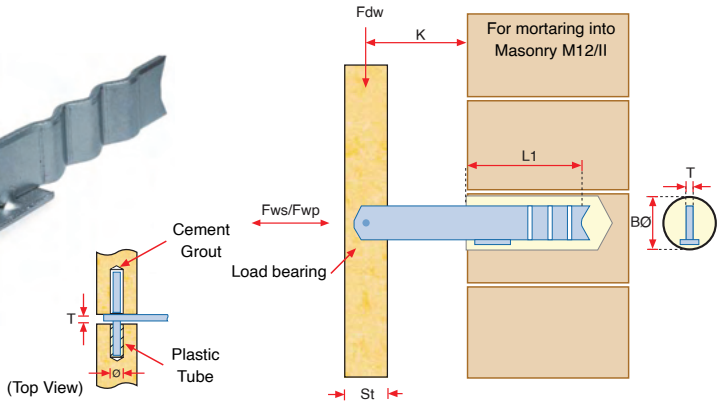
BTG - 3 16 A
- A — Shape
- 16 — Projection (x10mm)
- 3 — Dead Load (x10 Kg)
- BTG — Type

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Structural calculations are available upon order.

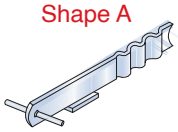
MTN Mortar Anchor - Product Details

MTN Mortar Anchor

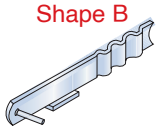
- Load bearing & restraint
- Projection sizes between 80 and 180 mm.
- Loads up to 1000 N.
- Three dimensional adjustability.
- Suitable for vertical joints.
- Stone thickness 20-50 mm.
- Fastened into Masonry M12/II walls with mortar.



Shape A



Shape B



MTN - 4 8 A
- Shape
- Projection (x10mm)
- Dead Load (x10 Kg)
- Type

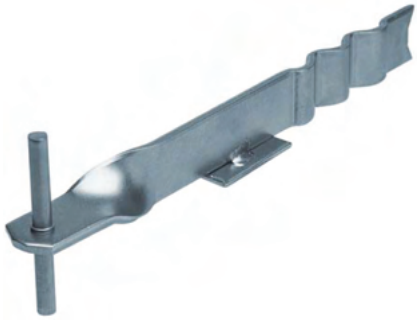
Product Code	Technical Details									
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
MTN-4 8	80	70	90	400	295	589	90	5	30	5
MTN-414	140	130	140						34	5
MTN-418	180	170	180						36	6
MTN-6 6	60	50	70	600	442	884	90	5	34	6
MTN-612	120	110	130							6
MTN-620	200	190	210						38	6
MTN-10 8	80	70	80	100	737	1473	90	5	38	6
MTN-1024	140	130	140						40	6
MTN-1018	180	170	190						42	6

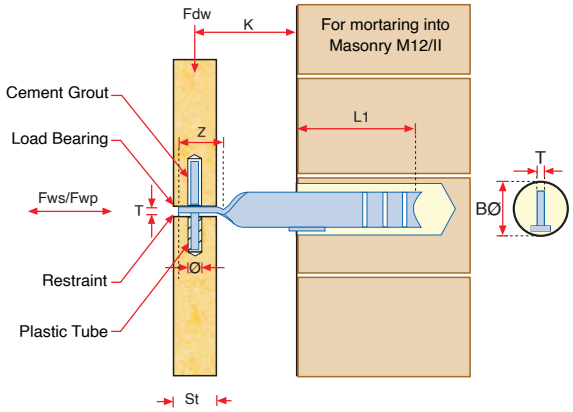
- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Structural calculations are available upon order.

MTG Mortar Anchor - Product Details

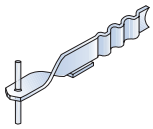
MTG Mortar Anchor

- Load bearing & restraint.
- Projection sizes between 100 and 200 mm.
- Loads up to 800 N.
- Three dimensional adjustability.
- Suitable for horizontal joints.
- Stone thickness 20-50 mm.
- Fastened into Masonry M12/II walls with mortar.

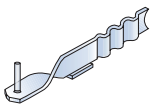




Shape A



Shape B



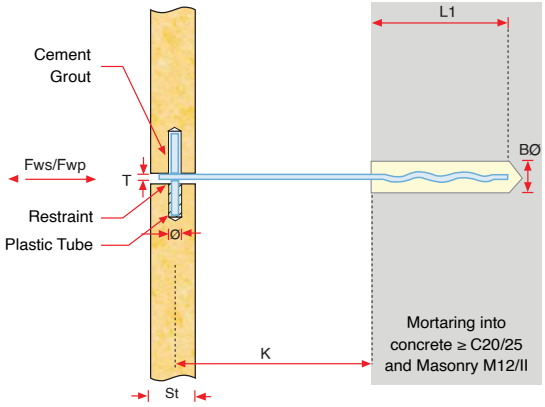
MTG - 3 16 A
- Shape
- Projection (x10mm)
- Dead Load (x10 Kg)
- Type

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Z Size	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	Z (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
MTG-310	100	90	110	300	442	884	22	90	5	34	3
MTG-314	140	130	150								4
MTG-316	160	150	170								5
MTG-4 8	80	70	90	400	589	1179	22	90	5	34	4
MTG-412	120	110	130							36	4
MTG-420	200	190	210							40	6
MTG-6 6	60	50	70	600	884	1768	22	90	5	38	4
MTG-610	100	90	110							38	5
MTG-616	160	150	170							40	6
MTG-8 8	80	70	90	800	1179	2357	22	90	5	40	5
MTG-816	160	150	170							44	8
MTG-820	200	190	210							46	8

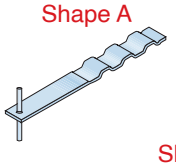
HN Mortar Anchor Restraint - Product Details

HN Mortar Anchor & Restraint

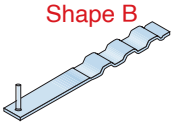
- Restraint only.
- Projection sizes between 160 and 240 mm.
- Wind loads up to 1000 N.
- Three dimensional adjustability.
- Suitable for horizontal joints.
- Stone thickness 20-50 mm.
- Fastened into concrete ≥ C20/25 Masonry M12/II walls with mortar.



Shape A



Shape B



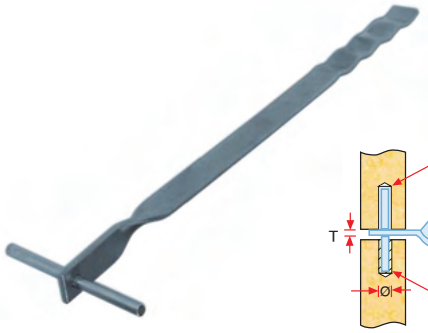
Product Code	Technical Details								
	Projection	Min. Projection	Max. Projection	Wind Pressure	Wind Suction	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fwp (N)	Fws (N)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HN-1016	160	150	170	1000	500	80	5	21	3
HN-1018	180	170	190						
HN-1020	200	190	210						
HN-1022	220	210	230					24	
HN-1024	240	230	250					26	

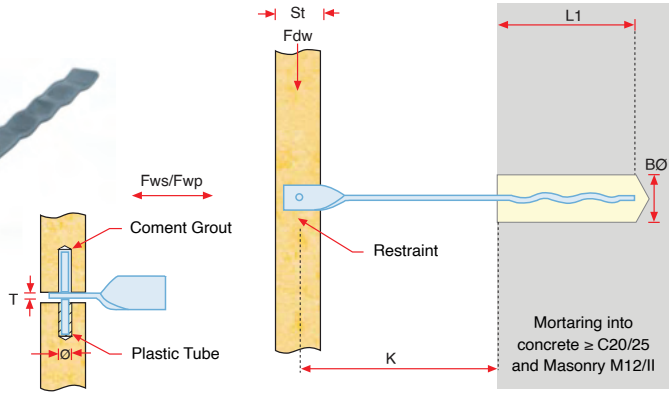
HN - 10 16 A
- A — Shape
- 16 — Projection (x10mm)
- 10 — Dead Load (x10 Kg)
- HN — Type

HG Mortar Anchor Restraint - Product Details

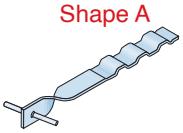
HG Mortar Anchor

- Restraint only.
- Projection sizes between 100 and 240 mm.
- Wind loads up to 1000 N.
- Three dimensional adjustability.
- Suitable for vertical joints.
- Stone thickness 20-50 mm.
- Fastened into concrete ≥ C20/25 Masonry M12/II walls with mortar.

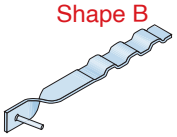




Shape A



Shape B



Product Code	Technical Details								
	Projection	Min. Projection	Max. Projection	Wind Pressure	Wind Suction	Embedded Length	Pin Diameter	Bore Diameter	Anchor Thickness
	K (mm)	K - (mm)	K + (mm)	Fwp (N)	Fws (N)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HG-1016	160	150	170	1000	500	80	5	21	3
HG-1018	180	170	190						
HG-1020	200	190	210						
HG-1022	220	210	230					24	
HG-1024	240	230	250					26	

HG - 10 16 A
- A — Shape
- 16 — Projection (x10mm)
- 10 — Dead Load (x10 Kg)
- HG — Type

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Structural calculations are available upon request.

HSD Mortar Anchor - Introduction

- Direct fixing to concrete and masonry walls with mortar
- Economical & easy fixing
- Installation at vertical and horizontal joints

HSD01 Mortar Anchor

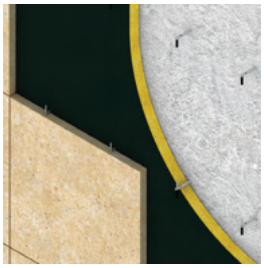
HSD02 Mortar Anchor W. Plate

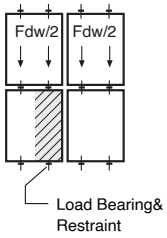
HSD03 Mortar Anchor Twisted Head

HSD04 Mortar Anchor W. Plate & Twisted

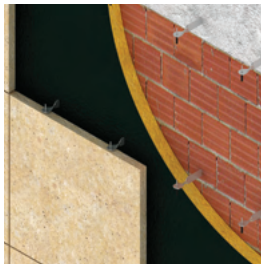
HRD01 Mortar Anchor

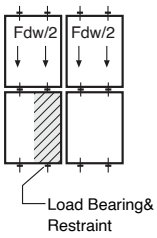
Installation at Horizontal joints with HRD01 Anchor



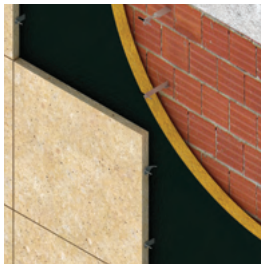


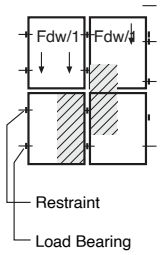
Installation at Horizontal joints with HSD04





Installation at Vertical joints with HSD02&03

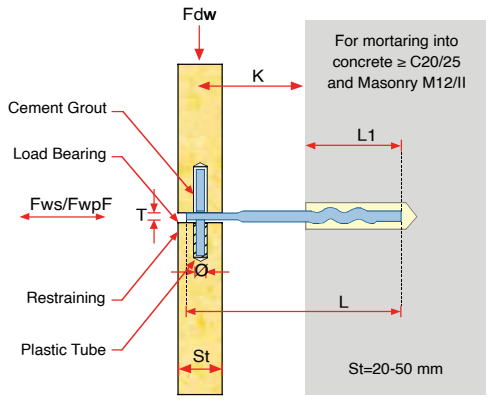




HRD Mortar Anchor Fixing Systems - Product Details

HRD01 Mortar Anchor

- Load bearing & restraint.
- Projection sizes between 35 and 75 mm.
- Loads up to 400 N
- Three dimensional adjustability. Suitable for horizontal joints.
- Stone thickness 20-50 mm.
- Fastened into concrete ≥ C20/25 and Masonry M12/II.



Shape A

Shape B

HRD01 - 35 1 A
- A: Shape
- 1: Dead Load (x10 kg)
- 35: Projection (x10 mm)
- HRD01: Type

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Anchor Length	Dowel Embedded Length	Pin Diameter	Bore Diameter	Flat Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HRD01-351	35	20	50	100	156	110	135	80	4	12	2.5
HRD01-451	45	30	60				145			14	3
HRD01-551	55	40	70				155				
HRD01-651	65	50	80				165				
HRD01-751	75	60	90				175				
HRD01-352	35	20	50	200	312	219	135	80	4	14	3
HRD01-452	45	30	60				145				
HRD01-552	55	40	70				155			16	3.5
HRD01-652	65	50	80				165				
HRD01-752	75	60	90				175				
HRD01-354	35	20	50	400	624	437	135	80	5	18	4
HRD01-454	45	30	60				145				
HRD01-554	55	40	70				155				
HRD01-654	65	50	80				165				
HRD01-754	75	60	90				175				

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).• Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads. • Other sizes are available for production upon request.
- Structural calculations are available upon order.

HSD Mortar Anchor - Product Details

HSD01 Mortar Anchor

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Anchor Length	Dowel Embedded Length	Pin Diameter	Bore Diameter	Flat Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HSD01-352	35	20	50	200	312	219	135	90	4	21	2.5
HSD01-452	45	30	60				145				
HSD01-552	55	40	70				155			24	
HSD01-652	65	50	80				165				
HSD01-752	75	60	90				175				
HSD01-354	35	20	50	400	624	437	135	90	5	26	2.5
HSD01-454	45	30	60				145			28	
HSD01-554	55	40	70				155				
HSD01-654	65	50	80				165			30	
HSD01-754	75	60	90				175			32	
HSD01-356	35	20	50	600	936	655	135	90	6	26	4
HSD01-456	45	30	60				145				
HSD01-556	55	40	70				155			28	
HSD01-656	65	50	80				165			30	
HSD01-756	75	60	90				175			32	

HSD02 Mortar Anchor

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Anchor Length	Dowel Embedded Length	Pin Diameter	Bore Diameter	Flat Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HSD02-352	35	20	50	200	312	219	135	90	4	24	2.5
HSD02-452	45	30	60				145				
HSD02-552	55	40	70				155			28	
HSD02-652	65	50	80				165				
HSD02-752	75	60	90				175				
HSD02-354	35	20	50	400	624	437	135	90	5	30	2.5
HSD02-454	45	30	60				145			32	
HSD02-554	55	40	70				155				
HSD02-654	65	50	80				165			34	
HSD02-754	75	60	90				175			36	
HSD02-356	35	20	50	600	936	655	135	90	6	30	4
HSD02-456	45	30	60				145				
HSD02-556	55	40	70				155			32	
HSD02-656	65	50	80				165			34	
HSD02-756	75	60	90				175			36	

HSD03 Mortar Anchor

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Anchor Length	Dowel Embedded Length	Pin Diameter	Bore Diameter	Flat Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HSD03-352	35	20	50	200	312	219	135	90	4	26	3
HSD03-452	45	30	60				145				
HSD03-552	55	40	70				155				
HSD03-652	65	50	80				165				
HSD03-752	75	60	90				175				
HSD03-354	35	20	50	400	624	437	135	90	5	24	4
HSD03-454	45	30	60				145				
HSD03-554	55	40	70				155				
HSD03-654	65	50	80				165			26	
HSD03-754	75	60	90				175				
HSD03-356	35	20	50	600	936	655	135	90	6	34	4
HSD03-456	45	30	60				145				
HSD03-556	55	40	70				155				
HSD03-656	65	50	80				165				
HSD03-756	75	60	90				175				

HSD04 Mortar Anchor

Product Code	Technical Details										
	Projection	Min. Projection	Max. Projection	Dead Load	Wind Pressure	Wind Suction	Anchor Length	Dowel Embedded Length	Pin Diameter	Bore Diameter	Flat Thickness
	K (mm)	K - (mm)	K + (mm)	Fdw (N)	Fwp (N)	Fws (N)	L (mm)	L1 (mm)	Ø (mm)	BØ (mm)	T (mm)
HSD04-352	35	20	50	200	312	219	135	90	4	30	3
HSD04-452	45	30	60				145				
HSD04-552	55	40	70				155				
HSD04-652	65	50	80				165				
HSD04-752	75	60	90				175				
HSD04-354	35	20	50	400	624	437	135	90	5	28	4
HSD04-454	45	30	60				145				
HSD04-554	55	40	70				155				
HSD04-654	65	50	80				165			30	
HSD04-754	75	60	90				175				
HSD04-356	35	20	50	600	936	655	135	90	6	38	4
HSD04-456	45	30	60				145				
HSD04-556	55	40	70				155				
HSD04-656	65	50	80				165				
HSD04-756	75	60	90				175				

- Material: Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Table below is prepared according to Eurocode standard.
- Loads stated are working resistance loads.
- Other sizes are available for production upon request.
- Structural calculations are available upon request.

HMP Sub Channel Systems - Introduction

HMP Sub channel systems are used for stone cladding on to non-load bearing walls or on to wall structures with high projection sizes. By using specially designed channel supports and restraints, channels are spanned between floor levels, creating a secondary structure on to which cladding installation is enabled by bolting brackets on to the channels.

• Channels are fixed on to channel supports that are fastened to load bearing beams, spanning between floor levels overlaying in the thermal insulation.

• Stone fixing is done with anchors that are fixed on to channels either with set screws or lock nut sets.

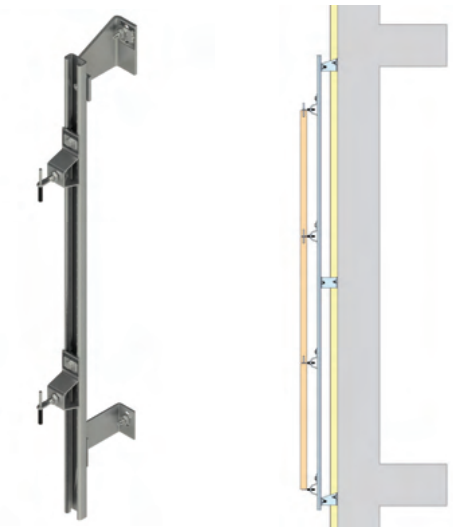
• High load bearing capacity to fit projection sizes up to 360 mm. Higher projections can be custom designed.

• Greater projection sizes and load capacities are achieved with special design.

• Fully adjustable and allows quick and easy installation.

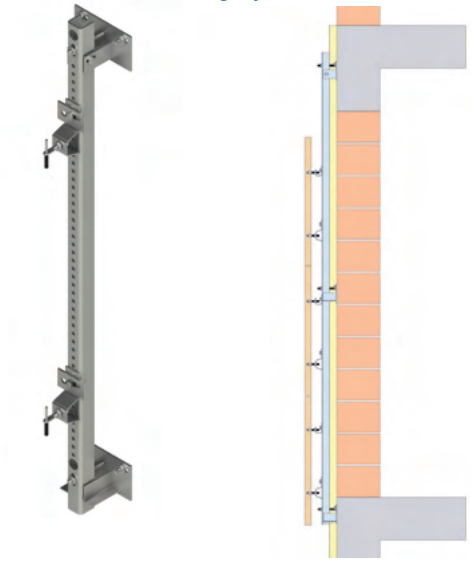
• Lower drilling points increases production rate and reduces cold bridging as well noise during construction.

HMPC-HC1
Sub Channel Fixing System

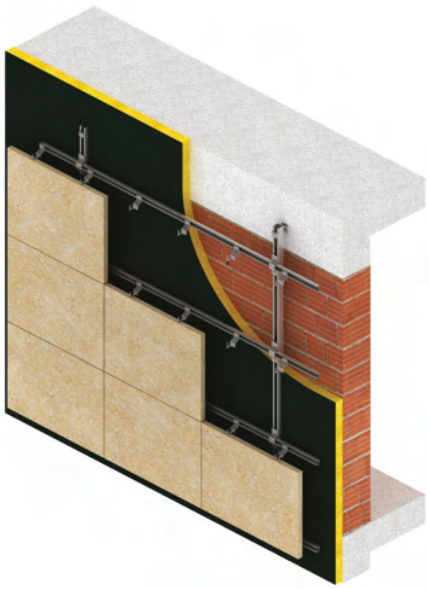


Sub channel Fixing system with vertically spanned channels

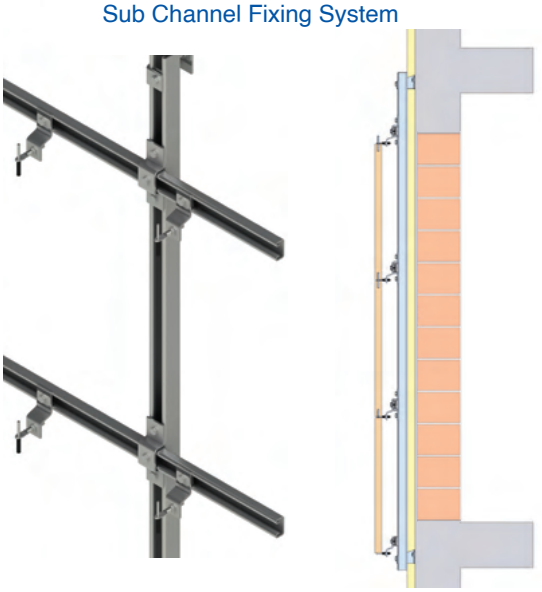
HMPA-HC2
Sub Channel Fixing System



Sub channel Fixing system with vertically & horizontally spanned channels

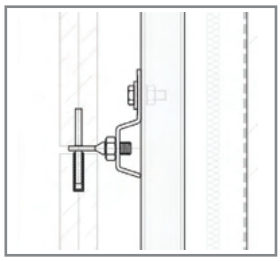


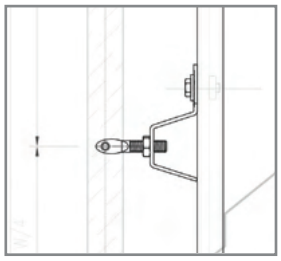
HMPC-HC1/H
Sub Channel Fixing System



HMP Sub Channel Fixing Systems - Introduction

Steel channels are available in cold rolled hot dip galvanized ST37 -ST52 mild steel and stainless steel grade AISI 304-1.4301 & AISI 316-1.4401. Channels have drilled holes for easy assembly using set screws. Various types of sub channel systems can be formulated with the availability of different channel supports and restraints. Steel channel systems are preferred for high load stone facade installations. Available in Stainless steel and hot dip galvanized mild steel with zinc coating of minimum 50 microns.





Sub Channel System

HMPA-HC2 HMPA-HC3 HMPA-HC5 HMPC-HC1 HMPC-HC1/H HMPA-HC1/H

Steel Channels

HMPA U Channel HMPL L Channel HMPB C Channel HMPC C Channel HMPS Toothed channel

Channel Supports

HCSP1 HCSP2 HCSP3 HCSP4 HCSP5 ATS-S

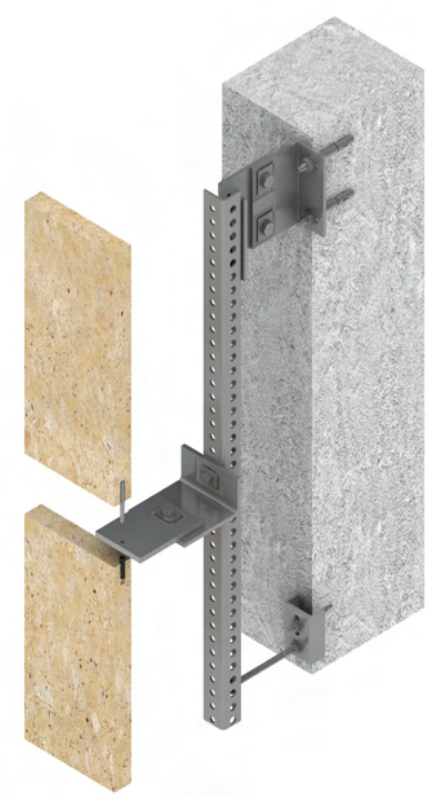
Channel Restraints

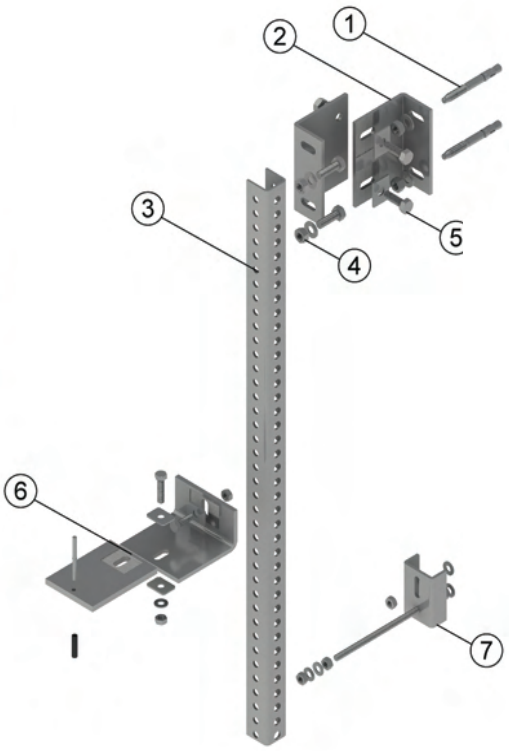
HCRS1 HCRS2 HCRS3 HCRS4 HCRS5 ATS-R

HMP Sub Channel Fixing Systems - Installation Details

HMPA-HC5 Sub Channel System

Sub channel system with HMPA U channel assembled on HCSP05 channel supports and HCRS5 channel restraints. Stone installation can be made with either Z Anchors or HA L anchors. Fully adjustable with high load capacity.

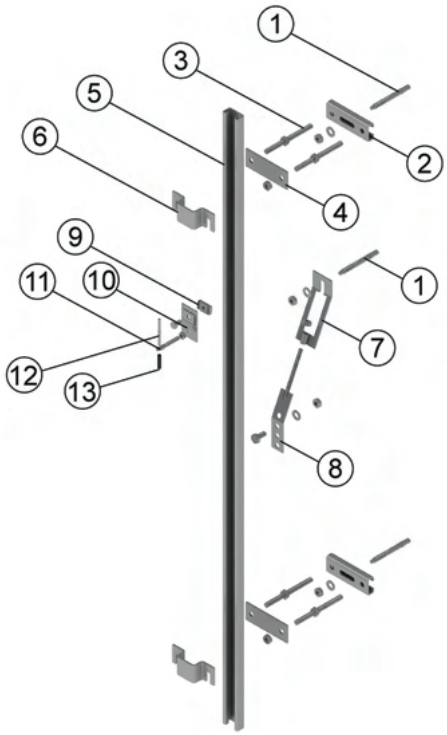




1- Through bolt
2- Channel support
3- U Channel
4- Hex nut
5- Hex bolt
6- L anchor
7- Channel restraint
8- Plastic tube

ATS Sub channel fixing system

Sub channel system with HMPS toothed channel assembled on ATS-S channel supports and ATS-R channel restraints. Stone installation can be made with either Z Anchors or HA L anchors. Easy adjustability on the vertical axis allow quick installation of the brackets on to channels using lock nuts.

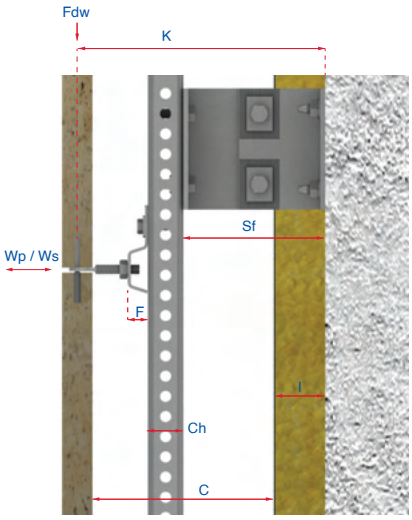


1- Through bolt
2- Restraint channel
3- Threaded rod
4- Restraint plate
5- C channel
6- Omega anchor
7- Channel support upper part
8- Channel support lower part
9- Lock nut
10- Z anchor
11- Adjustable arm
12- Flanged pin
13- Plastic tube

HMP Sub Channel Fixing Systems - Installation Details

HMPA-HC5 Sub Channel System

- Indirect fixing on to non-load bearing walls
- Projection sizes of up to 380 mm
- 2.2 kN load capacity on vertically spanned channel
- Lower drilling points enable fast installation
- Installation at vertical and horizontal joints
- Easy to use & adjustability in three directions
- Ability to accommodate building movements.



K: projection size
Fdw: dead Load
Ws: wind pressure
C: wall cavity
I: insulation thickness
CH: channel height

F: anchor forming size
Sf: support forming size
Lc: channel length
Sc: vertical channel spacing
Lk: end channel spacing
Ls: connection spacing

HMPA U Channel

HCSP2 Channel Support

HCRS Channel Restraint

HZ02 Z Anchor

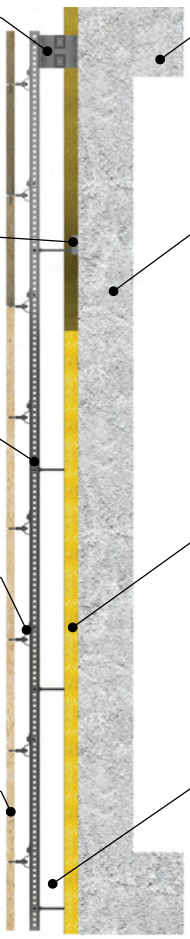
Channel support
Channel supports are load bearing brackets that bear the full weight of the cladding fixed on the sub channel systems. The load is transferred to the concrete beam and the attachment is made with anchor bolts.

Channel restraint
Channel restraints are brackets that restrain the sub channel system against wind pressure and suction. The brackets are tied to the wall with suitable anchor bolts, strengthening the channels against buckling and deflection.

Channel
Channels are spanned between floor levels and can be supplied in the same length as the floor height.

Z Anchors
Z Anchors are brackets that are used to install stone slabs on to the channels. The brackets are fixed to the channels with hex bolts. Each bracket is designed to carry the load of the individual stone panel.

Stone panel
Stone panels are fixed on to sub channel system. Proper study and calculation is made to check the suitability of stone and dimensions for facade installation purposes.



Load bearing beams
Load bearing beams are usually constructed out of high strength concrete. Sometimes steel is used. The Sub Channel system is loaded on this part of the substrate.

Building wall
The walls can be constructed out of concrete, brick, concrete block or y tong. Different attachment types are used for different type of walls, therefore careful analysis must be made to use the most secure type of connections to the wall for restraining the sub channel system.

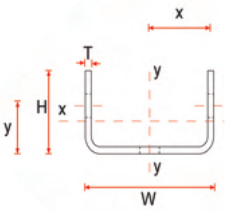
Insulation
A layer of thermal insulation is covered on the wall, with suitable dowels. Sound insulation, fire proof barriers and EPDM may also be laid behind and or in front of the thermal insulation, providing full protection to the building.

Wall cavity
This is the empty space between the cladding and the insulation. Adequate space is required to accommodate the sub channel fixing system, allowing room for the channel and brackets to fit into.

HMP Sub Channel Systems - Product Details

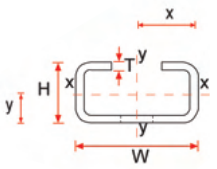
HMPA U Profil

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMPA-3-35/35	3	35/35	2.83	1.24	17.50	4.27	2.44	12.14
HMPA-3-40/40	3	40/40	4.55	1.74	20.00	6.92	3.46	13.93
HMPA-4-40/40	4	40/40	5.67	2.19	20.00	8.60	4.30	14.10
HMPA-4-50/50	4	50/50	12.33	3.81	25.00	18.97	7.60	17.65
HMPA-5-50/50	5	50/40	14.68	4.57	25.00	22.40	8.97	17.87



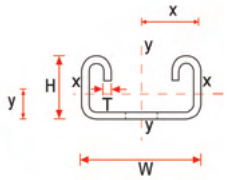
HMPB C Profil

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMPB-2.5-41/21	2.5	41/21	1.32	1.19	20.50	5.71	2.79	9.85
HMPB-3-41/21	3	41/21	1.48	1.33	20.50	6.55	3.19	9.86



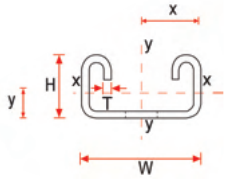
HMPC C Profil

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMPC-2.5-41/22	2.5	41/21	2.83	1.24	17.50	4.27	2.44	12.14
HMPC-2.5-41/41	2.5	41/41	4.55	1.74	20.00	6.92	3.46	13.93
HMPC-3-41/22	3	41/21	5.67	2.19	20.00	8.60	4.30	14.10
HMPC-3-41/41	3	41/41	12.33	3.81	25.00	18.97	7.60	17.65



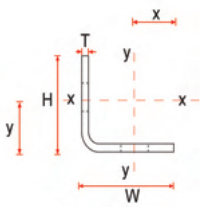
HMPS Toothed C Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMPS-2.5-41/22	2.5	41/21	2.83	1.24	17.50	4.27	2.44	12.14
HMPS-2.5-41/41	2.5	41/41	4.55	1.74	20.00	6.92	3.46	13.93
HMPS-3-41/22	3	41/21	5.67	2.19	20.00	8.60	4.30	14.10
HMPS-3-41/41	3	41/41	12.33	3.81	25.00	18.97	7.60	17.65



HMPL L Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMPL-3-40/40	3.00	40/40	2.88	1.02	28.16	2.88	1.02	11.84
HMPL-3-50/50	3.00	50/50	6.04	1.69	35.72	6.04	1.69	14.28
HMPL-4-40/40	4.00	40/40	3.72	1.34	27.79	3.72	1.34	12.21
HMPL-4-50/50	4.00	50/50	7.85	2.22	35.40	7.85	2.22	14.60
HMPL-5-50/50	5.00	50/50	9.57	2.73	35.03	9.57	2.73	14.97

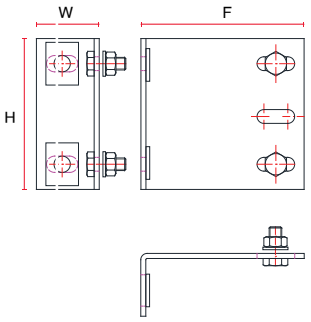


- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4) & Hot Dip Galvanized Steel
- Table above is prepared according to Eurocode standards
- Loads stated are working resistance loads
- Channels can be provided up to 6 metres length.

HMP Sub Channel Systems - Product Details

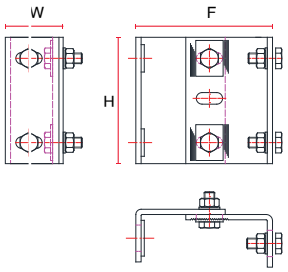
HCSP3 Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Hex screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
HCSP3-50	50	120	50	M10x25	M10x90	2520	2940
HCSP3-70	50	120	70				
HCSP3-90	50	120	90				
HCSP3-110	50	120	110				
HCSP3-130	50	120	130				
HCSP3-150	50	120	150			1820	1800
HCSP3-170	50	120	170				
HCSP3-190	50	120	190				
HCSP3-210	60	120	210				
HCSP3-230	60	120	230				



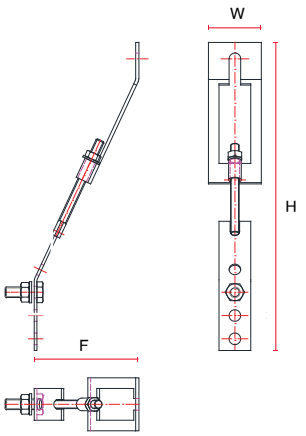
HCSP5 Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Hex screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
HCSP5-130	50	120	130	M10x25	M10x90	2200	5250
HCSP5-150	50	120	150				
HCSP5-170	50	120	170				
HCSP6-190	50	120	190				
HCSP5-210	60	120	210				
HCSP5-230	60	120	230			1610	5000
HCSP5-250	60	120	250				
HCSP5-270	60	120	270				
HCSP5-290	60	120	290				
HCSP3-310	60	120	310				



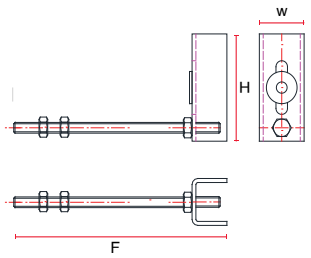
ATS-S Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Hex screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
ATS-100	50	290	100	M12x40	M12x110	5000	4550
ATS-140	50	375	140				
ATS-180	50	460	180				
ATS-220	50	550	220				
ATS-260	50	635	260				
ATS-300	50	710	300				



HCRS-ST Channel Restraint

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Thread Metric (mm)	Exp. Bolt	Max wind load (kN)
HCRS-80	50	80	80	M8	M8x100	4550
HCRS-100	50	80	100			
HCRS-120	50	80	120			
HCRS-140	50	80	140			
HCRS-160	50	80	160			
HCRS-180	50	80	180			
HCRS-210	50	80	210			
HCRS-240	50	80	240			
HCRS-270	50	80	270			
HCRS-310	50	120	300			



- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4) & Hot Dip Galvanized Steel
- Table above is prepared according to Eurocode standards
- Loads stated are working resistance loads
- Expansion bolts are provided separately
- More types and sizes available upon request

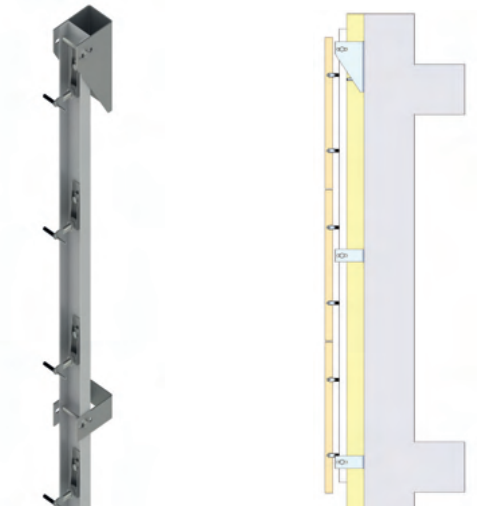
HMP-ALU Sub Channel Systems - Introduction

HMP-ALU Sub Channel Systems with aluminium channels are preferred due to its light weight and easiness of cutting and drilling. These systems are used for the installation of cladding panels such as, natural stone panels ,ceramic panels and fibre cement panels.

There are three methods of connection to the panel. The first one is with the pin system where pins are inserted to the pre-drilled pin holes on the edge of the stone panels. The second is the kerf system where slot openings on edge of stone accommodate the kerf anchors. The third system is the undercut system where undercut bolts are attached on the back of the stone. Three dimensional adjustability is enabled and fast installation is possible due to the light weight of aluminium and the ease of cutting and drilling on site.

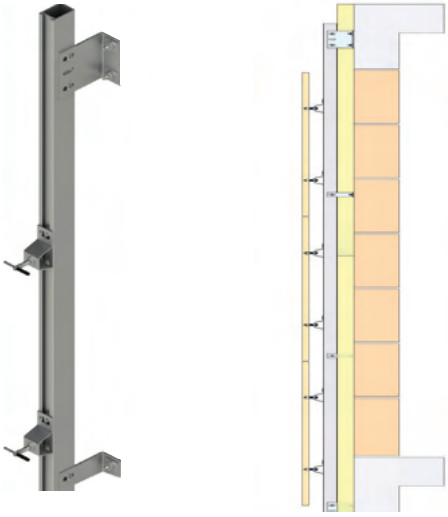
- Fixing to sub channel structure which is attached to load bearing beams
- Light weight and easy to install
- Possibility of cutting and drilling aluminium channels provides flexibility
- Fully adjustable and allows fast installation with the use of self drilling screws

HMP-ALU-U
Sub Alu. Channel Fixing System

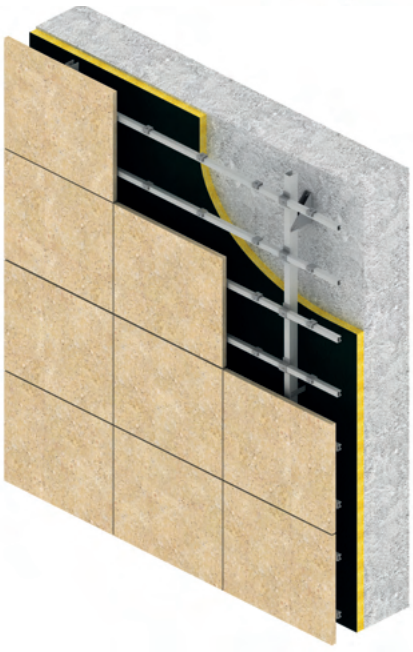


Sub Channel Fixing System with Vertically spanned channels

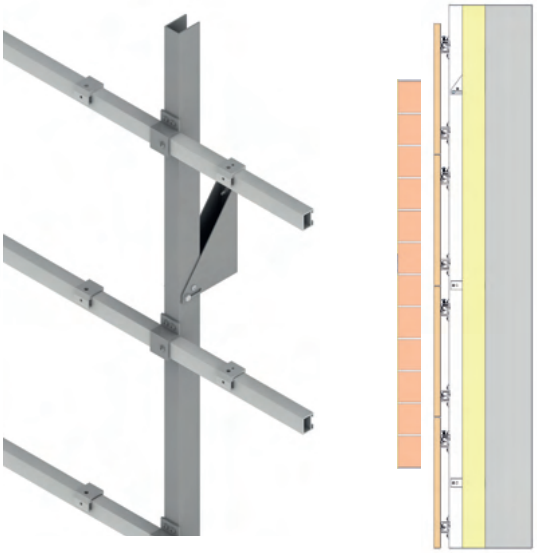
HMP-ALU-SP
Sub Alu. Channel Fixing System



Sub Channel Fixing System with Vertically & Horizontally spanned channels

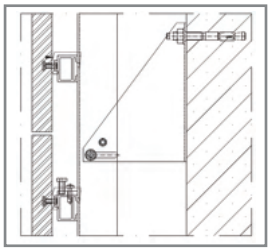


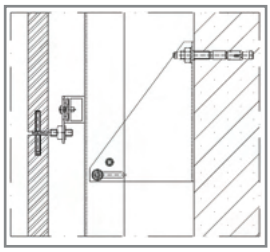
HMP-ALU-AG
Sub Alu. Channel Fixing System



HMP-ALU Sub Channel Fixing Systems - Introduction

Channels are available in extruded aluminium. Various type of sub channel systems can be formulated to accommodate the requirements of the cladding project. Aluminium channels are used for installing natural stone, fibre cement, ceramic panels and other light weight cladding materials. Available in extruded aluminium grade EN AW 6063 and 6066 both in mill finish and anodised finish.





Channel Systems

HMP-ALU-U

HMP-ALU-SP

HMP-ALU-P

HMP-ALU-AG

HMP-ALU-P/K

Aluminium Channels

HMP-ALU-U

HMP-ALU-BV

HMP-ALU-RV

HMP-ALU-T

HMP-ALU-L

HMP-ALU-P

Channel Supports

HCSP3-AL

HCSP4-AL

HCSP5-AL

Channel Restraints

HCRS3-AL

HCR4-AL

Aluminium brackets

HM-AG Agraf bracket

HM-P Agraf bracket

HM-AG-K Agraf bracket

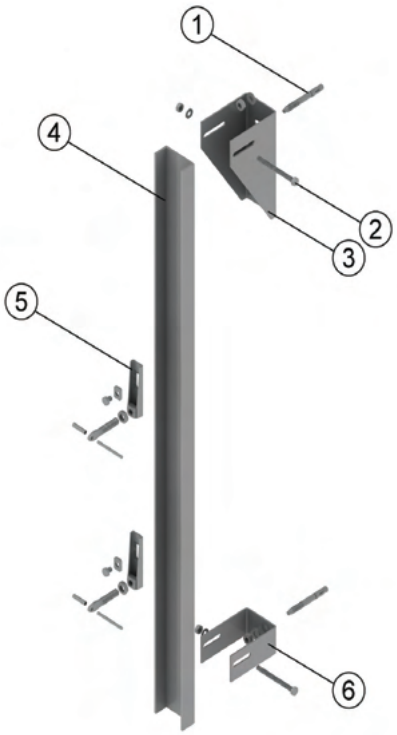
HZ-SPX Bracket

HCC-ALU Connector

HMP-ALU Sub Channel System - Installation Details

HMP-ALU-U Sub channel fixing system

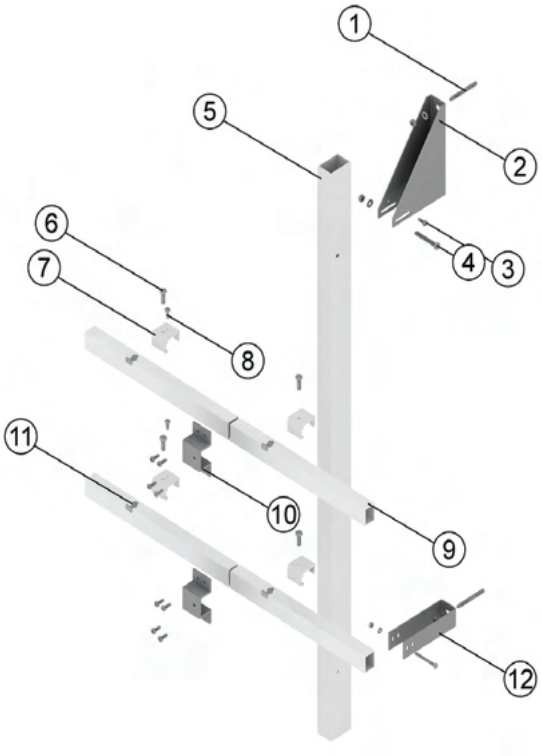
Sub channel system with HMP-ALU-U aluminium channel assembled on HCSP4-ALU channel supports and HCRS4-ALU channel restraints. Stone installation can be made with either Z Anchors or Body anchors. Brackets are fixed on the channel with self tabbing screws, allowing quick and easy installation.



1- Through bolt
2- Hex bolt
3- Channel support
4- Channel
5- Body anchor
6- Channel restraint

HMP-ALU-AG Sub channel system

Sub channel system with Aluminium box channels forming a vertical and horizontal grid. Vertical channels are fixed on HCSP4-ALU Channel supports and the horizontal channels are set on the vertical channels with channel connection elements. Stone fixing is made on to horizontal channels using the hang on method through the agraffe brackets that are fixed on the stone with undercut bolts.

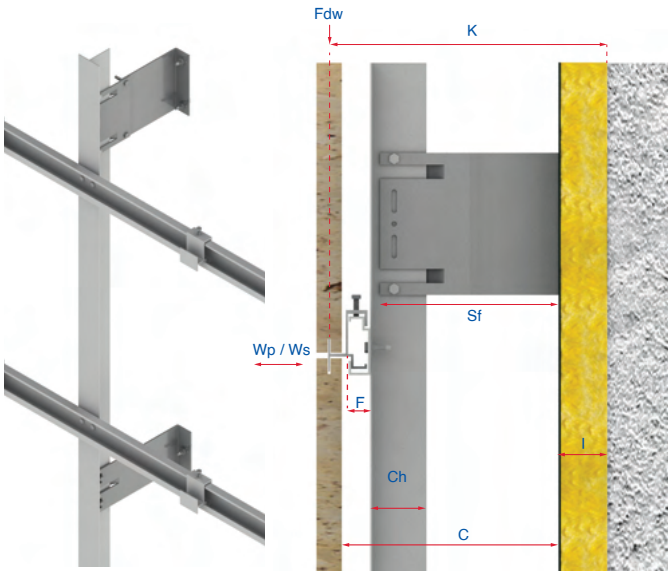


1- Through bolt
2- Channel support
3- Self drilling screw
4- Hex bolt
5- Vertical box channel
6- Levelling screw
7- Agraffe bracket
8- Self drilling screw
9- Horizontal box channel
10- Channel connection
11- Undercut bolt
12- Channel restraint

HMP-ALU Sub Channel System - Installation Details

HMP-ALU-P Sub Channel System

- Indirect fixing on to non-load bearing walls
- Projection sizes of up to 365 mm with load capacity of 1.8 kN
- Lower drilling points enable fast installation
- Installation at vertical and horizontal joints
- Easy to use & adjustability in three directions
- Ability to accommodate building movements



K: projection size
Fdw: dead Load
Ws: wind pressure
C: wall cavity
I: insulation thickness
CH: channel height

F: anchor forming size
Sf: support forming size
Lc: channel length
Sc: vertical channel spacing
Lk: end channel spacing
Ls: connection spacing

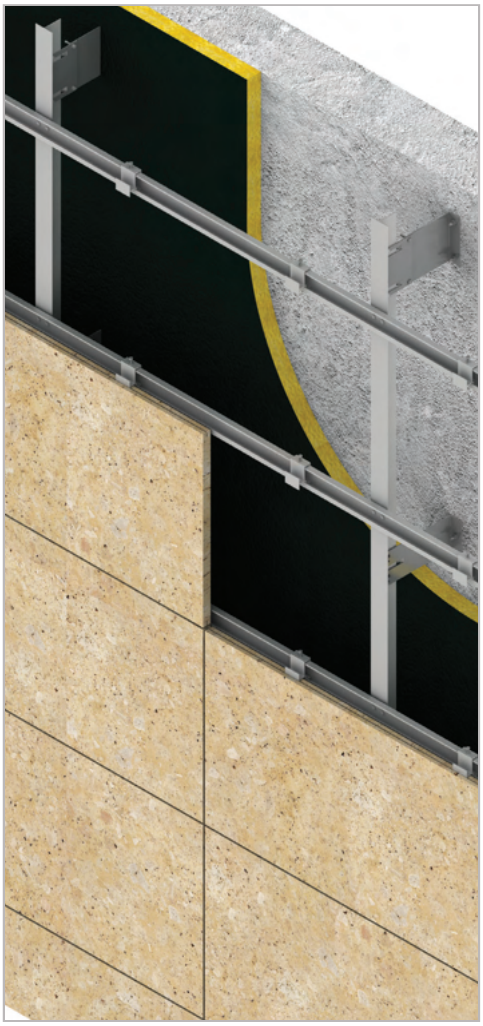
HMP-ALU-T T Channel

HMP-ALU-P Agraffe channel

HCRS3-ALU Channel Restraint

HCSP3-ALU Channel Support

HM-AG-K Agraffe bracket



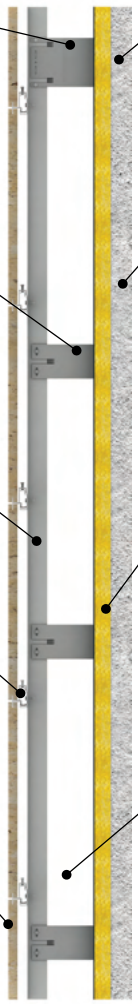
Channel support
Channel supports are load bearing brackets that bear the full weight of the cladding fixed on the sub channel systems. The load is transferred to the concrete beam and the attachment is made with anchor bolts.

Channel restraint
Channel restraints are brackets that restrain the sub channel system against wind pressure and suction. The brackets are tied to the wall with suitable anchor bolts, strengthening the channels against deflection and buckling.

Channel
Channels are spanned between floor slabs and can be supplied in the same length as the floor height.

Agraffe Kerf Brackets
Agraffe kerf brackets that are used to install stone slabs on to the channels. The brackets are fixed to the channels with hex self drilling screws. Each bracket is designed to carry the load of the individual stone panel.

Stone panel
Stone panels are fixed on to sub channel system. Proper study and calculation is made to check the suitability of stone and dimensions for facade installation purposes.



Load bearing beams
Load bearing beams are usually constructed out of high strength concrete. Sometimes steel is used. The Sub Channel system is loaded on this part of the substrate.

Building wall
The walls can be constructed out of concrete, brick, concrete block or ytong. Different attachment types are used for different type of walls, therefore careful analysis must be made to use the most secure type of connections to the wall for restraining the sub channel system.

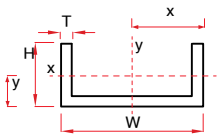
Insulation
A layer of thermal insulation is covered on the wall, with suitable dowels. Sound insulation, fire proof barriers and EPDM may also be laid behind and or in front of the thermal insulation, providing full protection to the building.

Wall cavity
This is the empty space between the cladding and the insulation. Adequate space is required to accommodate the sub channel fixing system, allowing room for the channel and brackets to fit into.

HMP-ALU Sub Channel Systems - Product Details

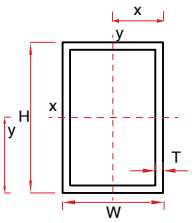
HMP-ALU-U
U Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMP-ALU-U-45/32	3	45/32	4.08	3.46	22.50	10.76	4.78	11.78
HMP-ALU-U-50/37	4	50/37	7.86	5.69	25.00	19.44	7.77	13.80
HMP-ALU-U-60/42	5	60/42	14.07	9.16	30.00	39.33	13.11	15.36



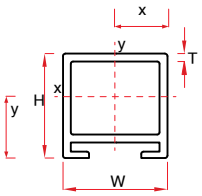
HMP-ALU-BV
Box Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HML-ALU-BV-60/50	3	60/50	32.26	10.75	25.00	24.17	9.66	30.00
HML-ALU-BV-80/50	4	80/50	82.70	20.67	25.00	38.88	15.55	40.00
HML-ALU-BV-100/50	4	100/50	144.13	28.83	25.00	47.37	18.95	50.00
HML-ALU-BV-120/50	5	120/50	276.33	46.05	25.00	66.33	26.53	60.00



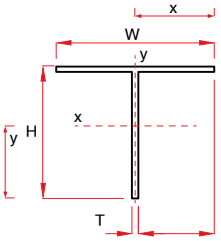
HMP-ALU-RL
Slot Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMP-ALU-RL-30	3	40/30	4.44	2.89	20.00	8.78	4.39	15.33
HMP-ALU-RL-40	3	40/40	9.50	4.76	20.00	10.84	5.42	19.92
HMP-ALU-RL-80	3	40/80	27.08	9.22	20.00	14.95	7.47	29.36



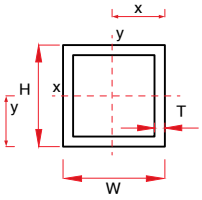
HMP-ALU-T
T Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMP-ALU-T-50/80	2.5	50/80	21.86	4.01	25.00	2.61	1.04	54.44
HMP-ALU-T-60/100	2.5	60/100	42.53	6.27	30.00	4.51	1.50	67.79
HMP-ALU-U-60/120	3	60/120	82.88	10.51	30.00	5.43	1.81	78.84



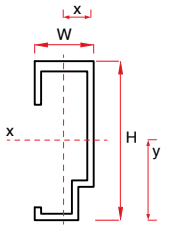
HMP-ALU-BH
Box Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMP-ALU-BH-40/30	3.00	40/30	5.08	3.38	20.00	8.14	4.07	15.00
HMP-ALU-BH-40/40	3.00	40/40	10.20	5.10	20.00	10.20	5.10	20.00
HMP-ALU-BH-40/60	4.00	40/60	34.50	11.50	20.00	17.80	8.90	30.00



HMP-ALU-P
Aggrafe Channel

Product code	Thickness T (mm)	Section W/H (mm)	IXX (cm4)	ZX (cm3)	X (mm)	YY (cm4)	ZY (cm3)	Y (mm)
HMP-ALU-P-45/32	2.2	45/32	16.66	4.66	14.03	2.03	1.45	35.72

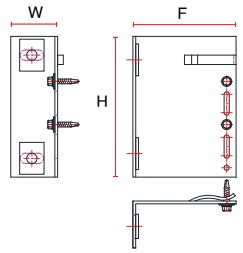


- Material: Extruded Aluminium Grade EN AW 6063 T66 mill finish and black anodised
- Table above is prepared according to Eurocode standards
- Loads stated are working resistance loads
- Channels can be provided up to 6 metres length.

HMP-ALU Sub Channel Systems - Product Details

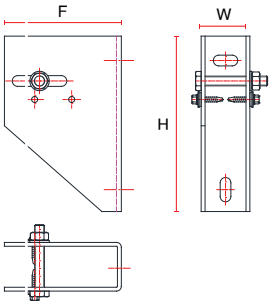
HCSP3-AL Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Self tabbing screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
HCSP3-AL-50	50	120	50	6.6 x 30	M10x90	1800	2000
HCSP3-AL-70	50	120	70				
HCSP3-AL-90	50	120	90				
HCSP3-AL-110	50	120	110				
HCSP3-AL-130	50	120	130				
HCSP3-AL-150	50	120	150			1600	2000
HCSP3-AL-170	50	120	170				
HCSP3-AL-190	50	120	190				
HCSP3-AL-210	60	120	210				
HCSP3-AL-230	60	120	230				



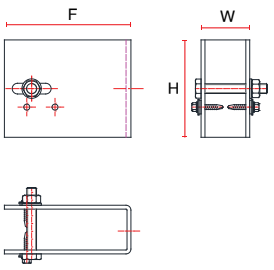
HCSP4-AL Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Hex screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
HCSP4-AL-100	50	175	100	M10x80	M10x90	5650	5250
HCSP4-AL-120	50	175	120				
HCSP4-AL-140	50	175	140				
HCSP4-AL-160	50	195	160				
HCSP4-AL-180	50	195	180				
HCSP4-AL-210	50	195	210				
HCSP4-AL-240	50	195	240				
HCSP4-AL-270	50	215	270				
HCSP4-AL-300	50	215	300				



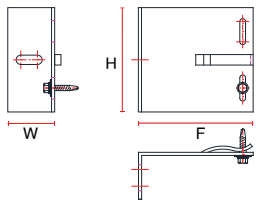
HCSP5-AL Channel Support

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Self tabbing screw	Exp. Bolt	Max Load (kN)	Max wind load (kN)
HCSP4-AL-100	50	120	100	M10x70	M10x90	2500	2000
HCSP4-AL-120	50	120	120				
HCSP4-AL-140	50	120	140				
HCSP4-AL-160	50	120	160				
HCSP4-AL-180	50	120	180				
HCSP4-AL-210	50	120	210				
HCSP4-AL-240	50	120	240				
HCSP4-AL-270	50	120	270				
HCSP4-AL-300	50	120	300				

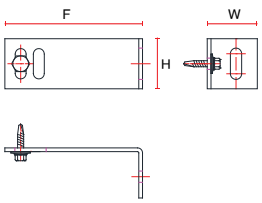


HCRS3-AL Channel Restraint

Product code	Width W (mm)	Height H (mm)	Form size F (mm)	Self tabbing screw	Exp. Bolt	Max wind load (kN)
HCRS3-AL-70	40	80	70	6.6 x 30	M8x80	2000
HCRS3-AL-70	40	80	90			
HCRS3-AL-90	40	80	110			
HCRS3-AL-110	40	80	130			
HCRS3-AL-130	40	80	150			
HCRS3-AL-150	40	80	170			
HCRS3-AL-170	40	80	190			
HCRS3-AL-190	40	80	210			
HCRS3-AL-210	40	80	230			
HCRS3-AL-230	50	120	300			



HCRS5-AL Channel Restraint



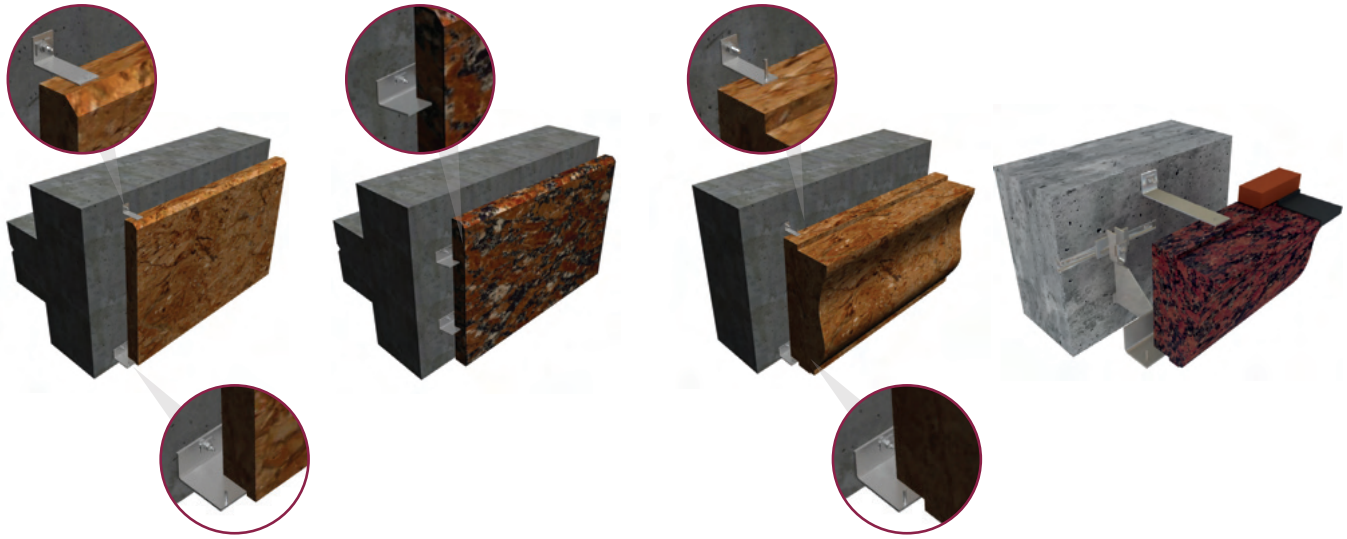
- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4) & Hot Dip Galvanized Steel
- Table above is prepared according to Eurocode standards
- Loads stated are working resistance loads
- Expansion bolts are provided separately
- More sizes available upon request

HMCS Heavy Duty Corbel Fixing Systems - Introduction

Load Bearing Anchors

Fixing systems for the installation of heavy corbel stone walls are available in a variety of types and size ranges as shown below. The actual system proposal will be made according to the technical requirements of the project. The use of these fixing systems is for high load stone cladding walls, coping and cornice stones that are made with thicker panels that can be as much as 120 mm. Load bearing and restraint anchors are used to install the slabs on to different wall backings using a variety of attachment methods like cast in channels or anchor bolts.

Application Examples



Load Bearing Support Brackets

HMS-UP

HMCS-SB/P

HMCS-DB

HAMF

Restraint Brackets

HA-RST

HA-RH

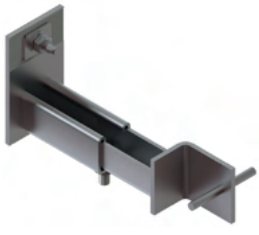
HA-RST/K B

HAZ21

Periscope Brackets

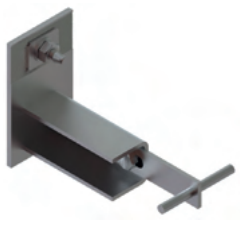
HPC1

HPC2



HPC3

HPC4

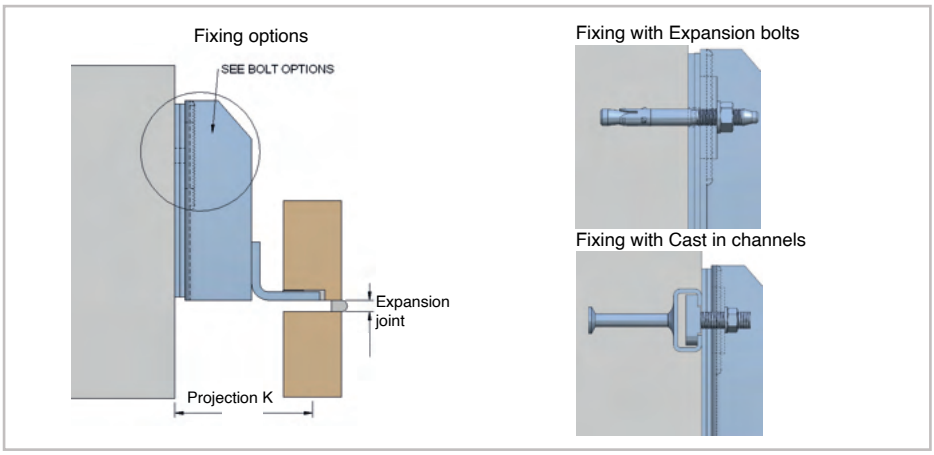


Heavy Duty Corbel Fixing Systems - Introduction

Load Bearing Anchors

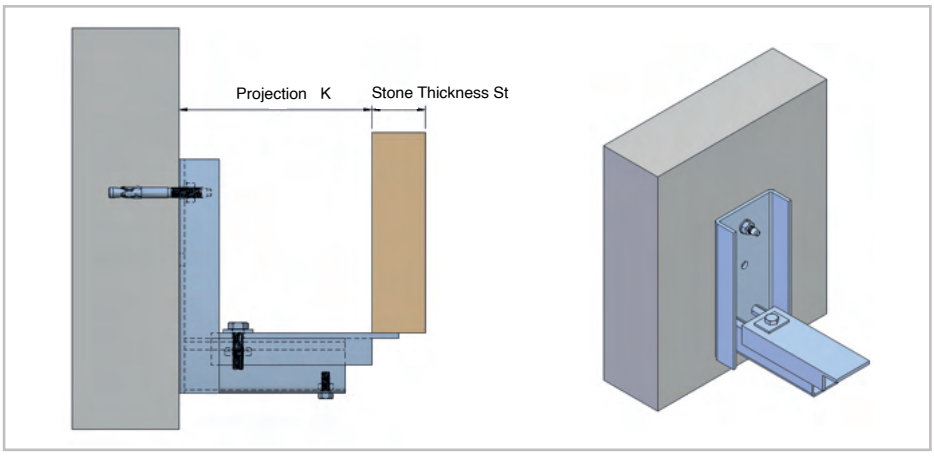
Heavy Duty brackets used for load bearing are fixed on to load bearing concrete walls. The two main methods that are usually used for attachments are either by anchor bolts or anchor channels.

Both anchor channels and anchors bolts specified according to the load requirements of the project and must be structurally verified according to the loads concerned on the project.



Heavy Duty brackets have limited adjustability to take the irregularities of the walls. An accepted method is the use of shims to adjust the projection sized by up to 10 mm.

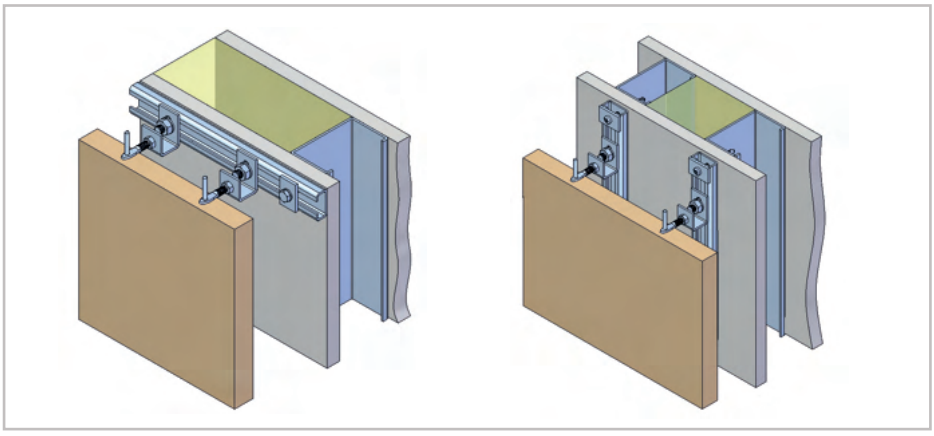
Greater adjustability can be achieved by special design as illustrated on the diagram on the right. An adjustable plate can be adapted to adjust in and out the distance of the projection size.



Restraining Brackets

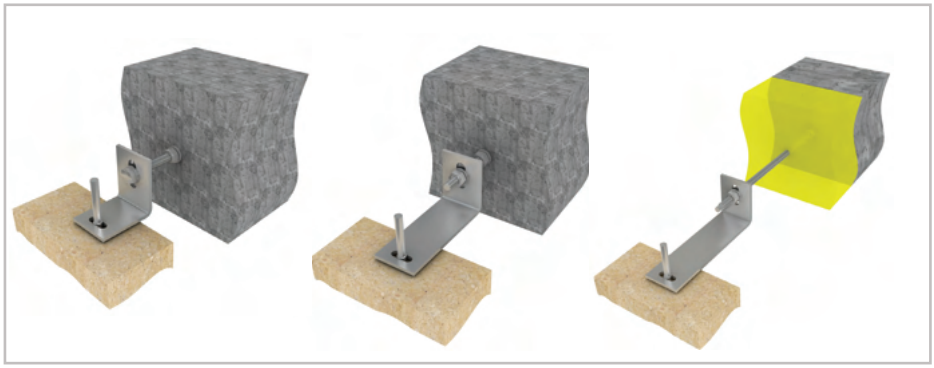
There are many systems to be used for restraining the stone slabs that are supported on a corbel system. Channel systems can be used as they are suitable to be fixed on commonly used steel sections.

Restraint anchors or wall ties can be easily fixed on to the channel at desired position which enables greater flexibility and easiness in installing the slabs.

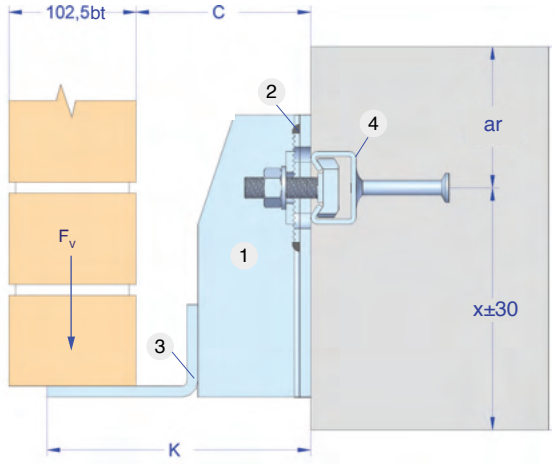


Restraint brackets are used for restraining stone slabs directly on to wall backings. There are various types of brackets that can be used for quick and easy installation.

Depending on the cavity and the existence of insulation on the wall, different type of restraint brackets are preferred for installation.



HMCS-SB Support Bracket - Product Details



Support set elements:

1 - U Shaped bracket with vertical slot hole

2 - Welded serrated washer

3 - Welded support angle plate

4 - Anchor channel for attachments.

Product Code	Technical Details						
	Projection	Dead Load	Cavity	Bolt Height	Bolt Size	Bolt Spacing	Anchor Channel
	K (mm)	Fdw (kN)	C (mm)	X (mm)	E.b. (mm)	SC	Cl (mm)
HMCS-SB-130/3.5	130	3.50	60	115	M10x90	460	28/15
HMCS-SB-150/3.5	150		80				
HMCS-SB-170/3.5	170		100				38/17
HMCS-SB-190/3.5	190		120				
HMCS-SB-210/3.5	210		140				
HMCS-SB-230/3.5	230		160				
HMCS-SB-130/7	130	7.00	60	115	M12x110	370	38/17
HMCS-SB-150/7	150		80				
HMCS-SB-170/7	170		100				
HMCS-SB-190/7	190		120				40/25
HMCS-SB-210/7	210		140				
HMCS-SB-230/7	230		160				
HMCS-SB-130/10.5	130	10.50	60	135	M12x110	400	40/25
HMCS-SB-150/10.5	150		80				
HMCS-SB-170/10.5	170		100				49/30
HMCS-SB-190/10.5	190		120				
HMCS-SB-210/10.5	210		140				
HMCS-SB-230/10.5	230		160				
HMCS-SB-130/14	130	14.00	60	150	M16x130	350	49/30
HMCS-SB-150/14	150		80				
HMCS-SB-170/14	170		100				
HMCS-SB-190/14	190		120				
HMCS-SB-210/14	210		140				
HMCS-SB-230/14	230		160				
HMCS-SB-130/18	130	18.00	60	150	M16x130	300	49/30
HMCS-SB-150/18	150		80				
HMCS-SB-170/18	170		100				
HMCS-SB-190/18	190		120				
HMCS-SB-210/18	210		140				
HMCS-SB-230/18	230		160				

- Material : Stainless Steel 1.4301 (AISI 304-A2) & 1.4401 (AISI 316-A4)
- Load capacities refer to fixings in concrete ≥ C20/25
- Loads stated are allowable loads
- Other sizes are available for production upon request
- Bolts and cast in channels are provided separately
- Structural calculation reports are available upon order

HMCS-SB Support Bracket

The load bearing support bracket is an angle with a welded single bracket that is used for the installation of high load stone corbel walls on to straight and curves walls. This support bracket can be supplied with or without welded pins or with a cranked angle. This bracket is fixed on to concrete walls either with anchor bolts or cast-in channels.

Product Code Description

HMCS-SB - 130 / 3.5

- 3.5 — Dead Load (kN)
- 130 — Projection (mm)
- HMCS-SB — Type

HAZ Restraint Brackets - Product Details

HAZ 21 Restraint Bracket

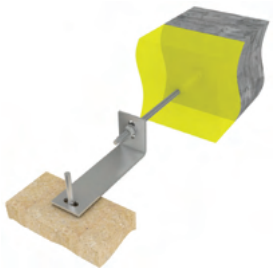
HAZ 21 bracket is used for restraining hand set stone on to concrete or solid block work.

The design enables to fixing through the insulation without the need for excessive cutting and damage to the insulation.

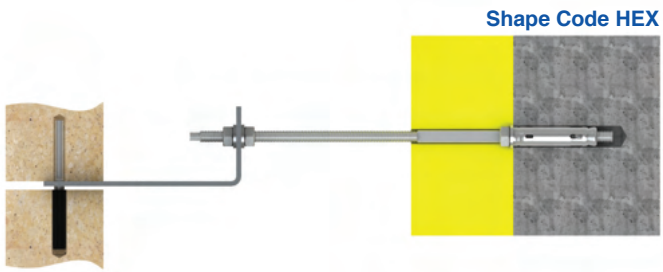
The wall is drilled with a diameter 10 mm hole where the HAZ 21 is fitted in to the hole and then tightened to achieve a secure connection.

The use of the correct type is decided whether the walls are insulated and the size of the cavity.

The brackets come pre-assembled and are available in three types, all in stainless steel.



Shape Code HEX



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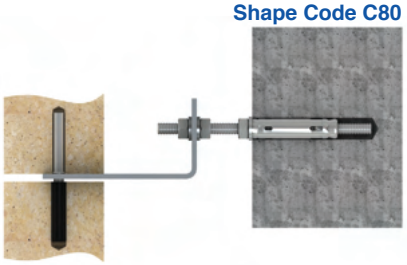

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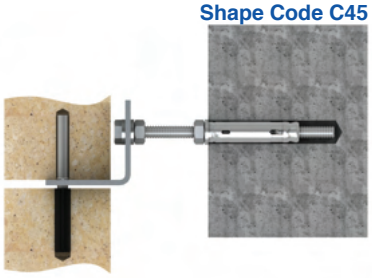

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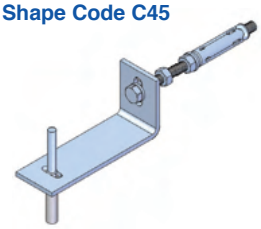

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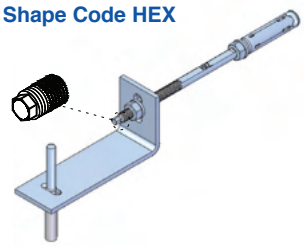

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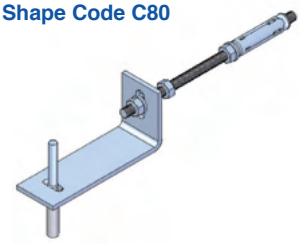


HAZanchor21 RANGE - ADJUSTABLE RESTRAINT FOR STONE CLADDING
SUPPLIED FULLY ASSEMBLED READY FOR USE

SHAPE CODE	ORDER CODE				ADJUSTMENT		CAVITY RANGE	
					+	-	Max	Min
C45	S40/C45/i0	S50/C45/i0	S75/C45/i0	S100/C45/i0	16	20	61	25
C80	S40/C80/i0	S50/C80/i0	S75/C80/i0	S100/C80/i0	19	19	99	61
HEX	S40/C107/i60	S50/C107/i60	S75/C107/i60	S100/C107/i60	8	8	115	99
HEX	S40/C131/i60	S50/C131/i60	S75/C131/i60	S100/C131/i60	16	16	147	115
HEX	S40/C179/i60	S50/C179/i60	S75/C179/i60	S100/C179/i60	32	32	211	147
HEX	S40/C110/i80	S50/C110/i80	S75/C110/i80	S100/C110/i80	5	0	112	107
HEX	S40/C118/i80	S50/C118/i80	S75/C118/i80	S100/C118/i80	5	5	123	113
HEX	S40/C134/i80	S50/C134/i80	S75/C134/i80	S100/C179/i80	10	10	144	124
HEX	S40/C166/i80	S50/C166/i80	S75/C166/i80	S100/C166/i80	21	21	187	145
HEX	S40/C200/i80	S50/C200/i80	S75/C200/i80	S100/C200/i80	32	32	232	168

Other sizes available to order

Simply specify **S C** and **¡** order code required.See below.

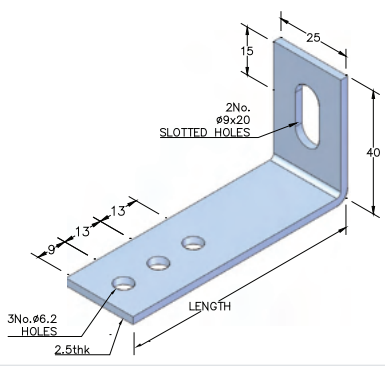
KEY TO ORDER CODE:-

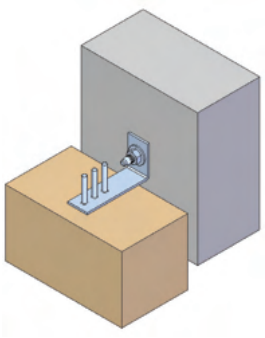
S — Stone thickness

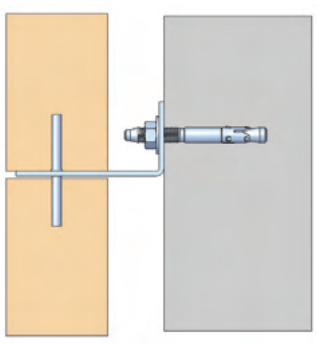
C — Cavity width Average

¡ — Insulation thickness Max

HAZ 3H Restraint Bracket







3 Hole Restraint Cramp

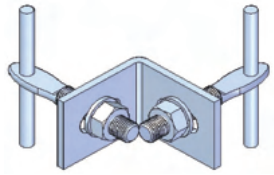
Product Code	Length
3H/60	60
3H/75	75
3H/100	100
3H/125	125
3H/150	150
3H/175	175
3H/200	200
3H/225	225
3H/250	250

Other Lengths Available to Order

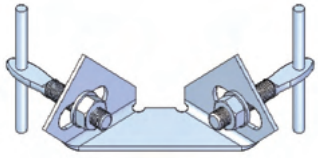
HCA Corner Anchors - Introductions & Details

- For fixing small slabs on to supported facade slabs.
- Used for reveal, column, soffit and sill slabs.
- Slabs can be assembled in the work shop for faster installation on site.
- Special drilling is required on the slabs, details of which are shown at the bottom of the page.

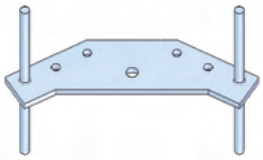
HCA01 Corner Anchor



HCA02 Corner Anchor



HCA03 Corner Anchor



HCA01 Application

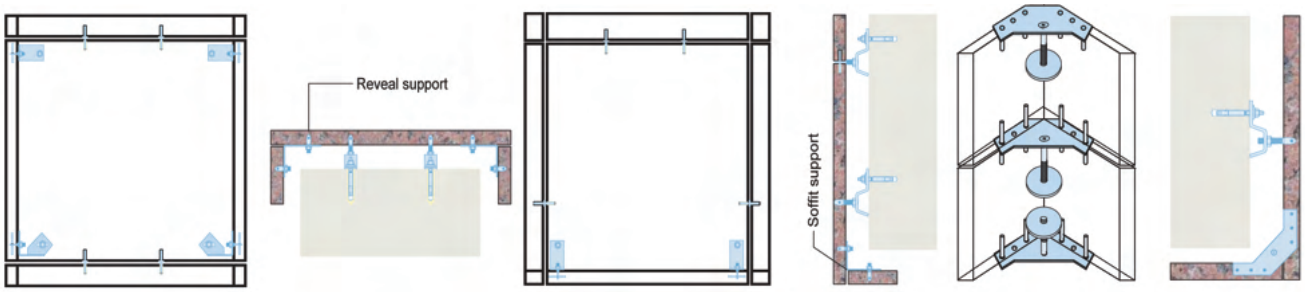
Reveal slabs can be connected to the supported slabs at columns. In this instance HCA01 corner anchors are used as load bearing and HCA02 are used as restraint.

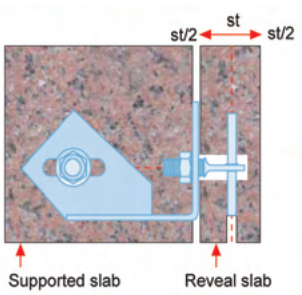
HCA02 Application

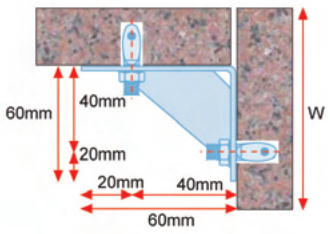
Soffit slabs can be connected to the supported slabs at parapets. In this instance only HCA02 corner anchors are used as restraint.

HCA03 Application

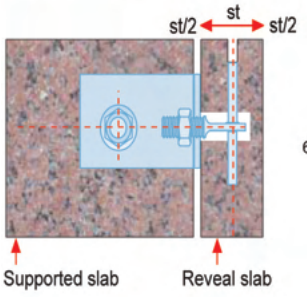
This anchor is used to fasten two slabs together at corners. The disk is inserted at a split edge on the slab. A special bolt is fixed between the anchor and the disk which firmly connects the slabs together.

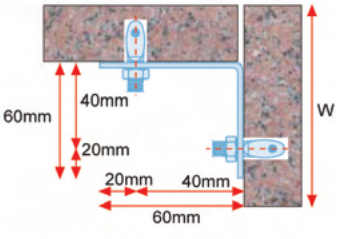






Product Code	Technical Details				
	Reveal Size	Vertical Load	Wind Load	Adjustable Arm	Straight Pin
	StxWxL cm	(N)	(N)	(mm)	(mm)
HCA02	3(4)x10x45	38(50)	40	M8x45	ø5x80
	3(4)x15x60	76(100)	50		
	3(4)x20x75	130(170)	60		

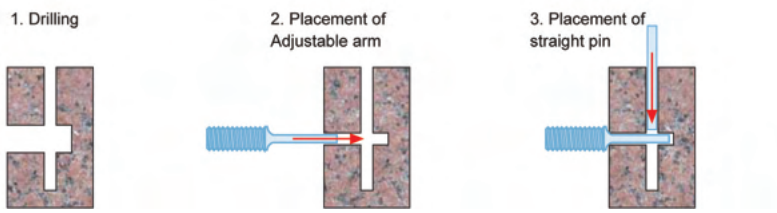


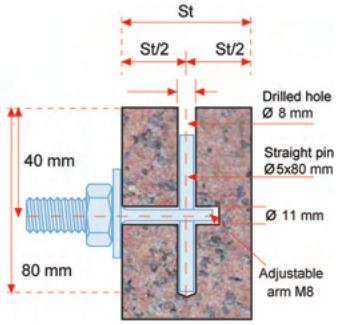


Product Code	Technical Details				
	Reveal Size	Vertical Load	Wind Load	Adjustable Arm	Straight Pin
	StxWxL cm	(N)	(N)	(mm)	(mm)
HCA01	3(4)x10x45	38(50)	40	M8x45	ø5x80
	3(4)x15x60	76(100)	50		
	3(4)x20x75	130(170)	60		

Special Drilling for HCA01 & HCA02 Corner Anchors

Special drilling is done to the slabs at the upper face and at the back. The drilling must be done precisely as shown on the illustration. The adjustable arm inserted from the back of the stone meets the pin which is inserted from the edge surface of the stone.

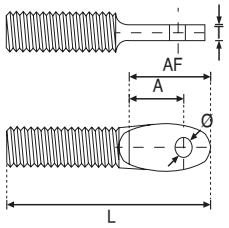




HAZ Accessories Product Details

HAA Adjustable Arm

Product Code	Technical Detail						
	Metric Size	Length	Flat length Size	Flattening Thickness	Pin Diameter	Stone Thickness	Distance Between Edge & Hole
	M (mm)	L (mm)	AF (mm)	T (mm)	Ø (mm)	St (mm)	A (mm)
HAA-8/50	8	50	A+6	3	4	20	12-13
HAA-8/60	8	60	A+6	3	4	25	14-16
HAA-8/70	8	70	A+6	3	4	30	16-17
HAA-10/50	10	50	A+8	3.5	5	40	22-24
HAA-10/60	10	60	A+8	3.5	5	50	26-29
HAA-10/70	10	70	A+8	3.5	5		
HAA-10/80	10	80	A+8	3.5	5		
HAA-12/50	12	50	A+8	4.5	5		
HAA-12/60	12	60	A+8	4.5	5		
HAA-12/70	12	70	A+8	4.5	5		
HAA-12/80	12	80	A+8	4.5	5		
HAA-14/50	14	50	A+8	5.5	6		
HAA-14/60	14	60	A+8	5.5	6		
HAA-14/70	14	70	A+8	5.5	6		
HAA-14/80	14	80	A+8	5.5	6		
HAA-16/50	16	50	A+8	6	6		
HAA-16/60	16	60	A+8	6	6		
HAA-16/70	16	70	A+8	6	6		
HAA-16/80	16	80	A+8	6	6		



Type B : With Welded Pin

Type C : With Welded Plate

Type D : With Welded Plate & Pins

Type E : With Welded Shim

HFP Flanged Pin

Product Code	Technical Details		
	Diameter	Length	Flange Diameter
	Ø (mm)	L (mm)	FØ (mm)
HFP-4/50	4	50	5
HFP-5/60	5	60	6
HFP-5/70	5	70	6
HFP-6/70	6	70	7

HSW Serrated Washer

Product Code	Technical Details			
	Thick-ness	Height	Width	Length
	T (mm)	H (mm)	W (mm)	L (mm)
HSW-22307	2.5	22	30	Ø7
HSW-22309	2.5	22	30	Ø9
HSW-263411	3	26	34	ø11
HSW-263413	3	26	34	ø13

HTP Traced Pin

Product Code	Technical Details		
	Diameter	Length	Trace Height
	Ø (mm)	L (mm)	TH (mm)
HTP-5/70	5	70	5.2
HTP-6/75	6	75	6.2

HPW Plain Washer

Product Code	Technical Details			
	Thick-ness	Height	Width	Length
	T (mm)	H (mm)	W (mm)	L (mm)
HPW-22307	2.5	22	30	Ø7
HPW-22309	2.5	22	30	Ø9
HPW-263411	3	26	34	ø11
HPW-263413	3	26	34	ø13

HSP Straight Pin

Product Code	Technical Details	
	Diameter	Length
	Ø (mm)	L (mm)
HSP-4/60	4	60
HSP-5/60	5	60
HSP-5/70	5	70
HSP-6/70	6	70

HMLN Lock Nut

Product Code	Technical Details			
	Thick-ness	Height	Width	Metric Hole
	T (mm)	H (mm)	W (mm)	M (mm)
HMLN-6	6	20	34	M6
HMLN-8	8	20	34	M8
HMLN-10	9	20	34	M10
HMLN-12	10	20	34	M12

HUP U Shaped Pin

Product Code	Technical Details		
	Diameter	Height	Width
	Ø (mm)	L (mm)	W (mm)
HUP-4/50	4	20	50
HUP-5/50	5	25	50
HUP-6/50	6	30	50

HSM Shim Plate

Product Code	Technical Details			
	Thick-ness	Height	Width	Slot Hole
	T (mm)	H (mm)	W (mm)	Ø x SL
HSM-4030-7	2	40	30	7x20
HSM-4030-9	2	40	30	9x25
HSM-4050-11	3	40	50	11x25
HSM-4050-13	4	40	50	13x30

HCP Capped Pin

Product Code	Technical Details		
	Diameter	Cap Diameter	Length
	Ø (mm)	ØC (mm)	L (mm)
HCP-4/35	4	6	35
HCP-5/40	5	7	40
HCP-6/45	6	8	45

HPT Plastic Tube

Product Code	Technical Details		
	Inner Diameter	Outer Diameter	Length
	In. Ø (mm)	Ou. Ø (mm)	L (mm)
HPT-4	4.5	6	30
HPT-5	5.5	7	40
HPT-6	6.5	8	40

- Material : Stainless Steel 1.4301 (A2) & 1.4401 (A4).
- Material for Plastic Tube: Polyacetal.

HAZ Undercut Bolts For Stone Attachments - Introduction

The HB11 and T31 Undercut bolts are designed for attachments on the rear surfaces of stone panels. This method of attachment becomes necessary when the use of conventional pin system is not suitable. The undercut stone attachment method has advantages which can result in various benefits in material cost and installation time. HAZ Metal provides service in the design and technical support for using these systems.

CE European Technical Approval

CE marking & (DoP)
Declaration of Performance

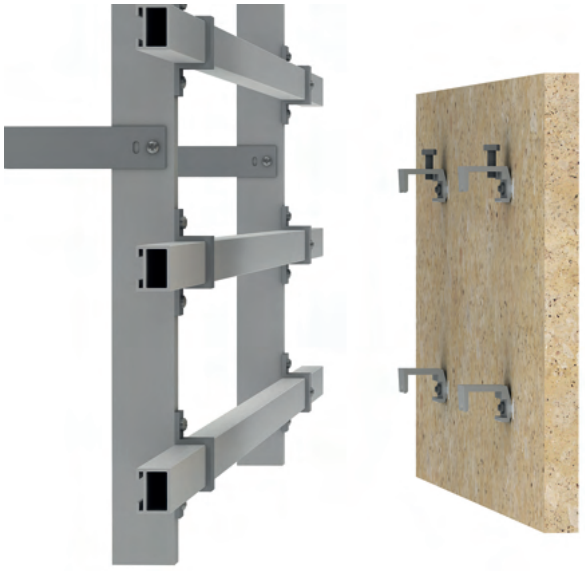
ETA European Organisation for Technical Assessment

ETA European Technical
Assessment ETA-17/0402

HB11 Attachment to Stone

T31 Attachment to Stone

Indirect fixing of panels on to sub channel system using undercut anchors



Advantages:

* Free positioning of the undercut bolt anywhere on the rear side of the panel
* Higher pull out values can be achieved using undercut bolts
* Optimization of bending moments of the stone panels which result in thinner panels and larger panel dimensions.
* No appearance of fixing elements at joints.

In order to achieve easy and secure fixing of the undercut anchors, special drilling needs to be made on the rear surface of the panels. This must be done with great care as any incorrect drilled holes will prevent the firm attachment of the undercut bolts on to the panels. Drilling is done using special drill bits with wet machining system. Machines and drill bits can be supplied by HAZ.

Drilling for HB11 Undercut Bolts

Drilling is made with no core drill bits using wet system drilling machines. No tolerance drilled hole is essential for proper fixing.

Drilling for T31 Undercut Bolts

Drilling is made with a customized designed machine using electro plated special made bits to drill the hole required.

HAZ Undercut Bolts - Product Details

HB Anchor Bolts - Product Details

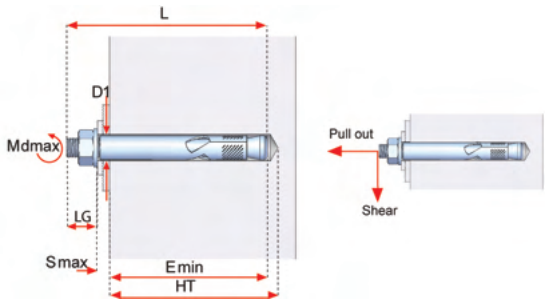
HB01 Sleeve Bolt

Application:
For fastening fixtures to concrete strength class C20/25 & solid concrete block walls.

Available in:
Stainless Steel EN 1.4301 & 1.4401 (AISI 304 & AISI 316) and E.galvanized Mild Steel.

Product Code Example

HB01 - 6 / 80
- Length
- Diameter
- Type



Product Code	Technical Details									Working Resistance (kN)			
	Bolt Size	Sleeve Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Bolt Length	Concrete Blockwork Wall		C 20/25 Concrete Wall	
	(mm)	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	L (mm)	Pullout	S hear	Pullout	Shear
HB01-6/80	M6X80	Ø8x60	8	55	45	10	9	7	80	2.50	0.84	4.29	5.43
HB01-8/80	M8X80	Ø10x60	10	55	45	10	11	15	80	2.89	1.04	6.85	9.89
HB01-10/80	M10X80	Ø12x60	12	55	45	10	13	30	80	3.00	1.24	7.72	15.60
HB01-12/100	M12X100	Ø16x78	16	75	65	10	17	45	100	3.20	1.40	8.00	16.10

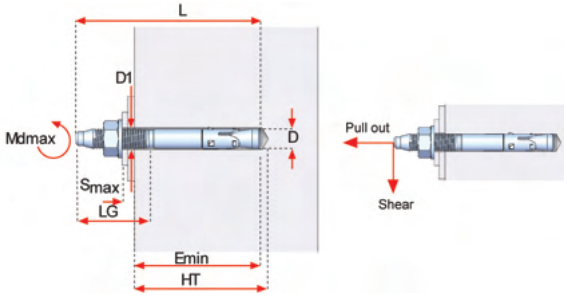
HB03 Through Bolt

Application:
For fastening fixtures to concrete strength class C20/25 & solid concrete block walls.

Available in:
Stainless Steel EN 1.4301 & 1.4401 (AISI 304 & AISI 316) and E.galvanized mild steel.

Product Code Example

HB03 - 8 / 80
- Length
- Diameter
- Type



Product Code	Technical Details								Working Resistance (kN)	
	Bolt Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Bolt Length	Thread Length	C 20/25 Concrete Wall	
	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	L (mm)	LG (mm)	Pullout	Shear
HB03-8/80	M8X80	8	65	47	23	9	13	80	30	4.11	6.50
HB03-8/100	M8X100	8	65	47	43	9	13	100	45		
HB03-8/120	M8X120	8	65	47	63	9	13	120	65		
HB03-10/90	M10X90	10	70	65	17	11	25	90	35	6.47	9.70
HB03-10/110	M10X110	10	70	65	37	11	25	110	45		
HB03-10/130	M10X130	10	70	65	57	11	25	130	65		
HB03-12/110	M12X110	12	95	80	15	13	40	110	35	9.64	12.40
HB03-12/135	M12X135	12	95	80	40	13	40	135	40		
HB03-12/145	M12X145	12	95	80	50	13	40	145	40		

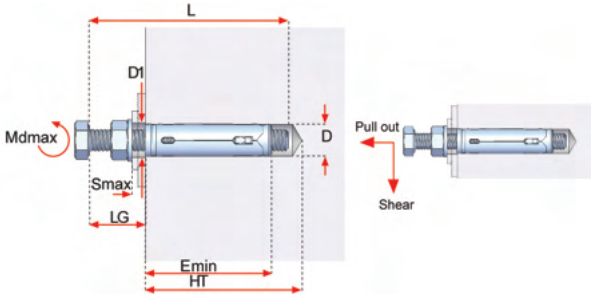
HB05 Shell Bolt

Application:
For fastening fixtures to concrete strength class C20/25 & solid concrete block walls.

Available in:
Stainless steel EN 1.4301 & 1.4401 (AISI 304 & AISI 316)

Product Code Example

HB05 - 6 / 80
- Length
- Diameter
- Type



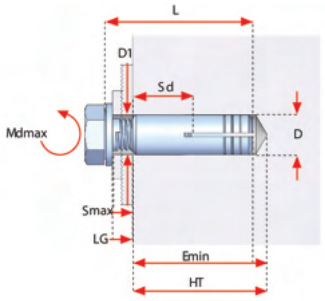
Product Code	Technical Details									Working Resistance (kN)			
	Bolt Size	Shell Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Bolt Length	Concrete Blockwork Wall		C 20/25 Concrete Wall	
	(mm)	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	L (mm)	Pullout	S hear	Pullout	Shear
HB05-6/80	M6X80	Ø10X59	10	65	40	15	7	10	80	3.50	3.30	4.20	3.30
HB05-8/80	M8X80	Ø12X44	12	80	45	20	9	20	80	4.10	6.70	6.15	6.70
HB05-10/100	M10X100	Ø15X50	15	90	55	30	11	40	100	5.20	11.00	9.50	11.00
HB05-12/120	M12X120	Ø18X65	18	105	65	30	13	75	120	6.05	12.15	11.95	17.50

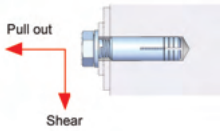
HB Anchor Bolts - Product Details

HB06 Drop in Bolt

Application:
For fastening fixtures to concrete walls.

Available in:
Stainless Steel EN 1.4301 & 1.4401 (AISI 304 & AISI 316) and E.galvanized mild steel.





Setting tool:

Product Code Example

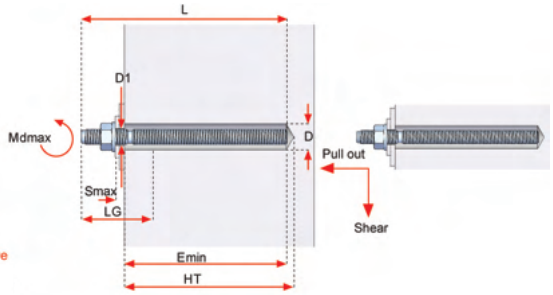
HB06 - 6
- 6 — M. Size
- HB06 — Type

Product Code	Technical Details									Working Resistance (kN)	
	Bolt Size	Shell Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Screw in Depth Min/Max	C 20/25 Concrete Wall	
	(mm)	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	Sd (mm)	Pullout	Shear
HB06-6	M6X20	Ø8x25	8	28	25	11	7	4	6/10	2.00	1.78
HB06-8	M8X25	Ø10x30	10	33	30	13	9	8	11/17	3.20	3.30
HB06-10	M10X30	Ø12x40	12	43	40	17	11	15	13/19	4.35	3.90
HB06-12	M12X35	Ø14x50	14	53	50	18	13	35	15/21	6.00	6.80

HB07 Chemical Bolt

Application:
For fastening fixtures to concrete walls.

Available in:
Stainless Steel EN 1.4301 & 1.4401 (AISI 304 & AISI 316) and E.galvanized Mild Steel.



Injection gun

Epoxy Acralite Adhesive

Perforated sleeve

Product Code Example

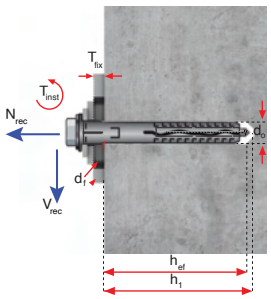
HB07- 8 / 110
- 110 — Length
- 8 — Diameter
- HB07 — Type

Product Code	Technical Details								Working Resistance (kN)			
	Bolt Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Bolt Length	Concrete Blockwork Wall		C 20/25 Concrete Wall	
	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	L (mm)	Pullout	Shear	Pullout	Shear
HB07-8/110	M8X110	10	82	80	14	9	7	110	1.20	2.20	8.80	10.20
HB07-10/130	M10X130	12	92	90	21	11	15	130	1.80	3.00	12.30	15.60
HB07-12/160	M12X160	14	115	110	28	13	25	160	2.70	3.20	18.30	22.00

HB13 Wall Plug

Application:
For Facade Applications

Available in:
Stainless Steel EN 1.4401 (AISI 316)



Product Code Example

HBWP- 8 / 80
- 80 — Length
- 8 — Diameter
- HBWP — Type

Product Code	Technical Details									Working Resistance (kN)			
	Bolt Size	Sleeve Size	Drill Hole Dia.	Drill Length	Min. Embed-ment	Max. Fixture Thickness	Fixture Hole Dia.	Max Torque	Bolt Length	Concrete Blockwork Wall		C 20/25 Concrete Wall	
	(mm)	(mm)	D (mm)	HT (mm)	E min. (mm)	Smax (mm)	D1 (mm)	Mdmax(Nm)	L (mm)	Pullout	S hear	Pullout	Shear
HBWP-8/80	M8X80	Ø10x51	8	54	51	20	9	15	80	0.80	1.30	1.60	2.00
HBWP-8/100	M8X100	Ø10x51	8	54	51	40	9	15	100	0.80	1.30	1.60	2.00
HBWP-10/80	M10X80	Ø12x55	10	58	55	15	11	25	80	1.50	1.90	2.70	2.90
HBWP-10/100	M10X100	Ø12x55	10	58	55	35	11	25	100	1.50	1.90	2.70	2.90

Stone Fixing Systems Design Principles

Technical Design & Engineering

HAZ Metal provides services in the design of fixing systems and the preparation of structural calculations. This service is done in the company technical department using CAD software and RFEM stress analysis programs.

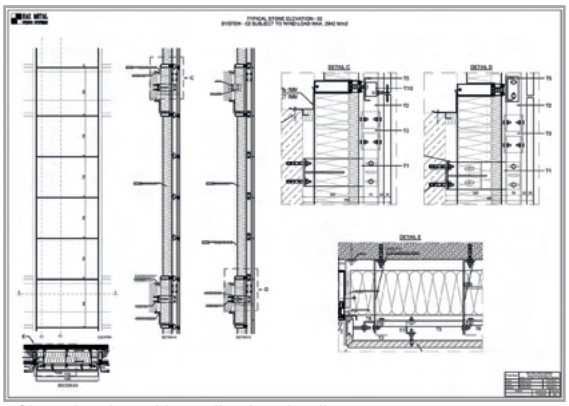
Our technical department receives the necessary technical information of the project in order to propose the most suitable, secure, easy to use and economical fixing systems in accordance with the project criteria. Custom design is also made in accordance with the architectural drawings of the project.

HAZ Metal provides the necessary technical documentation for submittal to the projects structural consultants in order to receive approval for the fixing system and its components. The design principles mentioned herein are used in the design and structural calculations for natural stone fixing systems.

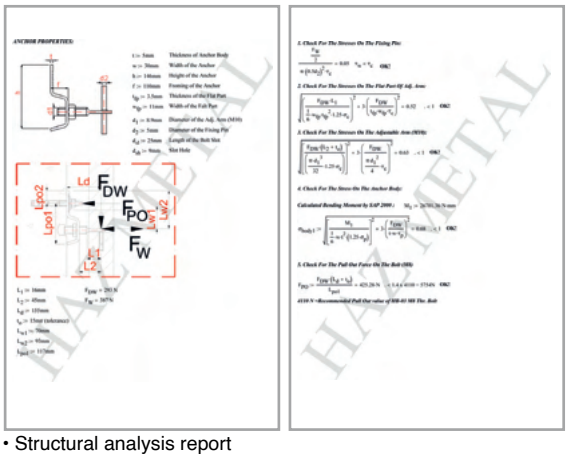
Finite element stress analysis is implemented for complex structures where the structural integrity of the fixing systems needs to be maintained. This procedure is especially made for sub channel systems, steel structures and unitised panel facade units.

HAZ Metal can offer the design and engineering services by referring to any international standards. The engineering department will relate to the specifications of the project and conduct its design and dimensioning according to the requested criteria.

Reference is made to the following standards:



• Shop drawing with application details



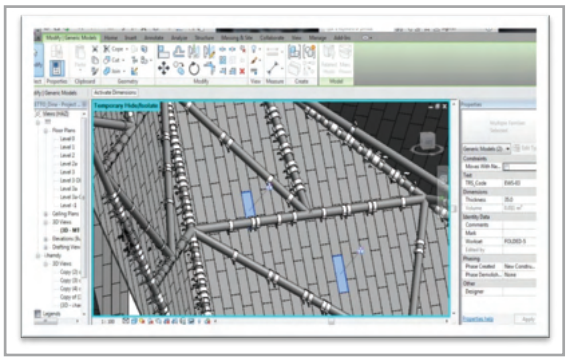
• Structural analysis report

British Standards

BS 8298	• Design and installation of natural stone cladding
BS EN 10088-2	• Steel plates, sheets and strips stainless and heat resisting
BS 6105	• Corrosion resistant stainless steel fasteners
BS 5950	• Structural use of steel work in building
BS 6399 Part 2	• Code of practice for wind loads
BS 970 Part 3	• Mechanical properties for stainless steel

German Standards

DIN 18516	• Cladding for ventilated walls
DIN 18800	• Steel structures, design and dimensioning
DIN 18801	• Steel framed structures
DIN 1045	• Concrete and reinforced concrete, design and dimensioning
DIN 1053	• Masonry, design and dimensioning
DIN 1055	• Wind loads design code
DIN 4114	• Steel construction, stability cases



• Parametric modelling

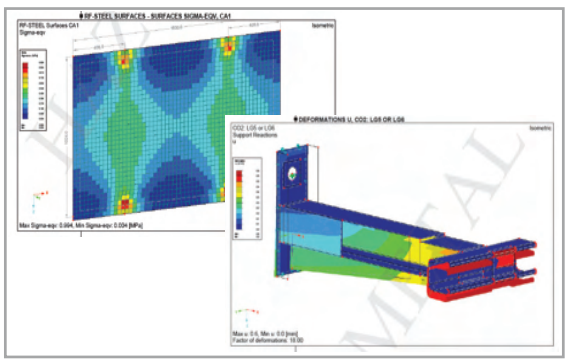
American Standards

ASTM C1242 - 12	• Standard guide for stone attachment systems
ASTM A 276	• Specification for stainless steel bars and shapes
ASTM 666	• Specification for annealed or cold worked austenitic stainless steel sheets
ASCE	• Minimum design loads for buildings

Uniform Building Code & International Building Code

Euro codes

EN 1990	Basis of Structural Design. Structural Analysis and Design by Testing
EN 1090	Execution of steel & aluminium structures
EN 1991	General Actions - Wind
EN 1998	General Rules, seismic actions and rules for buildings



• Finite element method stress analysis

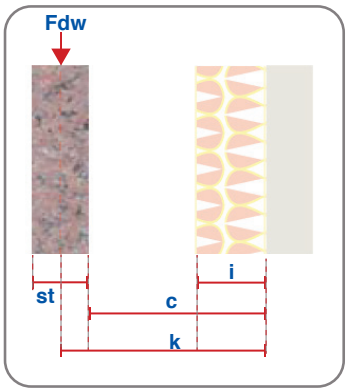
Stone Fixing Systems Design Principles

Design Factors

The following design factors are considered:

Wall Structure

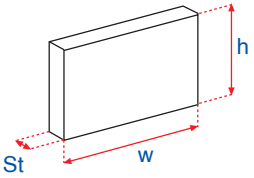
(i) : Insulation
(c) : Cavity
(st) : Thickness of stone
(k) : Projection
(Fdw) : Dead Load



Natural Stone Material

Dimensions of natural stone slabs :

• Length: (w)
• Height: (h)
• Thickness: (St)



Design weight for natural stone slabs : (ds kN kN/m3)

• Travertine: (24kN/m^3)
• Sandstone: (26kN/m^3)
• Marble &Limestone: (27kN/m^3)
• Granite: (28kN/m^3)
• Basalt: (30kN/m^3)

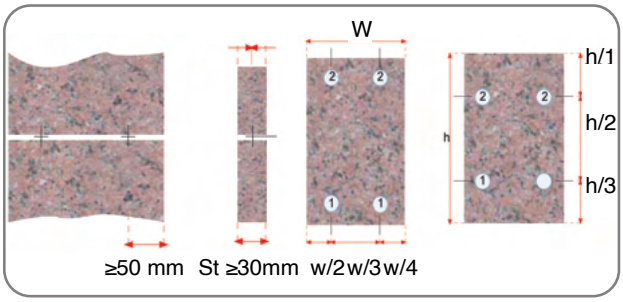
Panel weight calculation:
Fdw= h (m) * w (m) * st(m) * ds (kN/m3)

Structure - Edge Spacing

• Minimum distance from the corner of the slab to the pin centre should be 50 mm.

• The minimum thickness of the panel from the hole to the slab face should be 10 mm.

• The most secure method is to arrange the distance of the drilled pin hole centre from the edge of the slab at 1/4 the size of the slab.



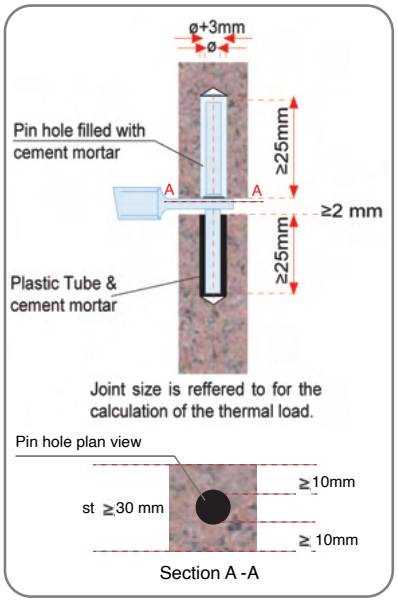
Anchor Pins

• Anchor pins are inserted into the drilled holes on the edge of the slab from four points.

• Drilled holes should be aprox. 3 mm wider than the pin diameter and minimum 25 mm in length.

• Minimum 2 mm space should be left between the slab below and the bottom edge of the adjustable arm.

• A plastic tube is inserted on the slabs below to absorb wind loads.



Applied Loads - (Actions)

The following applied loads are considered;

Dead loads:

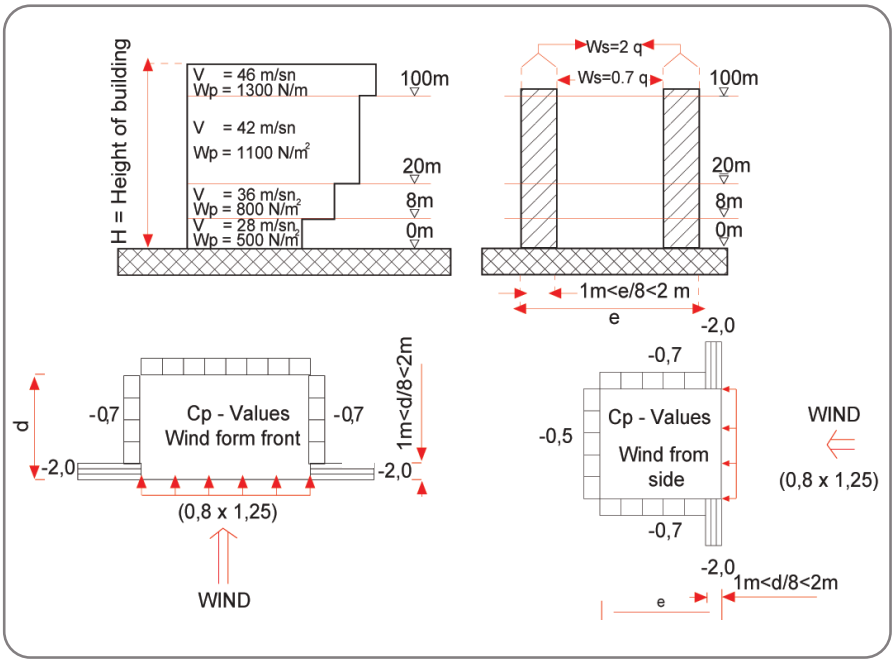
Weight of natural stone slabs is determined
Fdw= h (m) * w (m) * st(m) * ds (kN/m^3)
Fdw is multiplied with 1.35 safety factor.

Wind loads:

The max. speed is; vs.
The value of the dynamic pressure of the wind is q=k Vs2
The max. design pressure is; wp=cp.Q
The max. design suction is; ws=cs.Q
ws=0.7.Q (normal)
ws=2.0.Q (edge)
wp & ws are multiplied with 1.50 safety factor

Thermal loading:

The following temperature is considered.
Range on the stone;
Tmin °C < t °C < tmax °C
The max. thermal loading in the stone is;
Δt=tmax - tmin The max. thermal expansion for stone slab is; Δl=μ.Δt.L



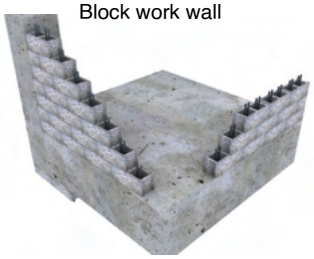
Stone Fixing Systems Design Principles

Wall Backing

The anchoring substrate (wall backing) must be load bearing. The wall type can be concrete, brickwork, filled hollow block or steel structure. Different types of bolts are used for fastening on to each type of wall backing.

Concrete wall

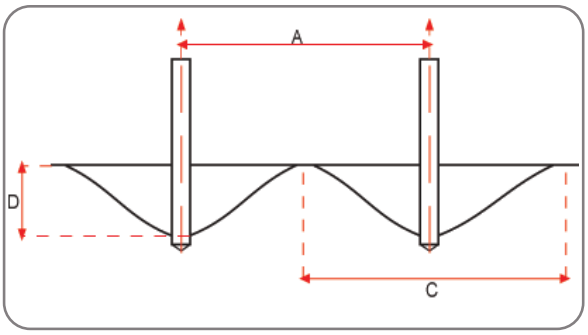
Block work wall



Masonry wall

Group of Bolts

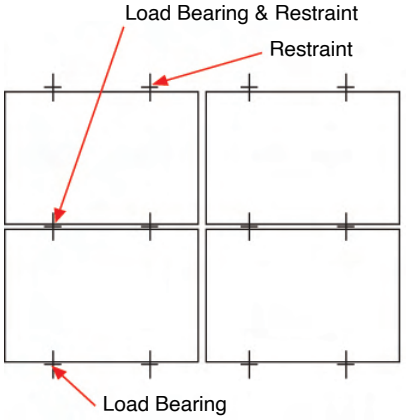
The distance between anchor bolts; A, which is necessary for a full cone of concrete to break away, is given by the crater diameter; C, depending on the type of anchor. This diameter is 1.5 to 2.5 times the depth of embedment, D.



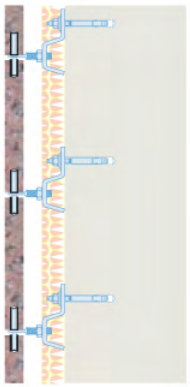
Application Type

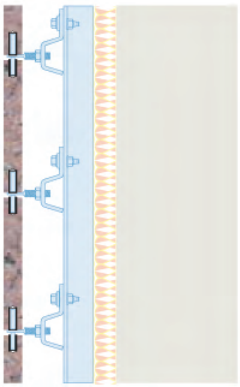
Installation at horizontal Joints

The anchors carry half the weight of the natural stone slabs in horizontal installation. Anchors bear half the weight of the slab above and also act as restraint, holding the slabs below and restraining them against wind pressure and suction.



Direct fixing to concrete
Min. Projection size 45 mm



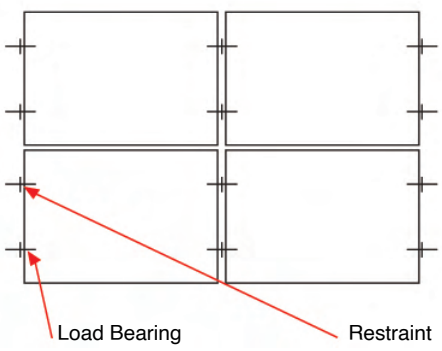


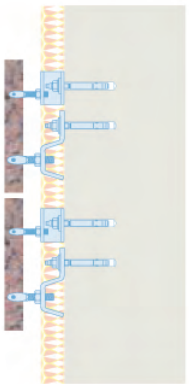
Indirect fixing to channels
Min. Projection size 90 mm.

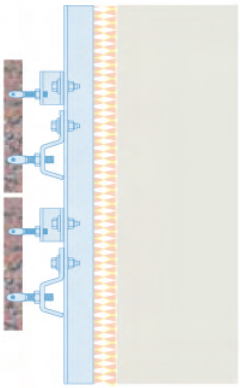
Installation at vertical Joints

The load bearing anchors carry the full weight of the natural stone slab in vertical installation. Each anchor bears half the weight of the slab on the right and half the weight of the slab on the left. Restraint anchors hold the slabs below and restrain them against wind pressure and suction.

Direct fixing to concrete
Min. Projection size 45 mm







Indirect fixing to channels
Min. Projection size 90 mm.

Stone Fixing Systems Design Principles

Load Principles

Vertical (Dead Load) and Horizontal (Wind Load) loads are determined according to the following diagram. The following principle is applied before designing a fixing system.

Legend

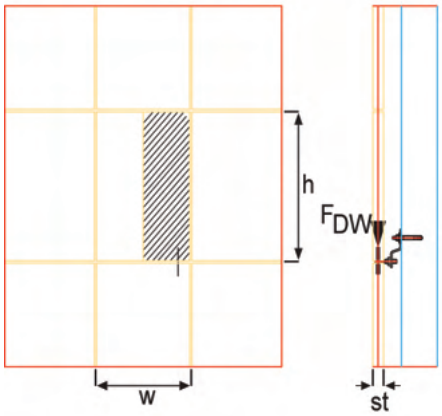
Fdw = Dead load
Fwp = Wind load at pressure case
Fws = Wind load at suction case

ds = Density of stone
qw = Design wind pressure
qs = Design wind suction

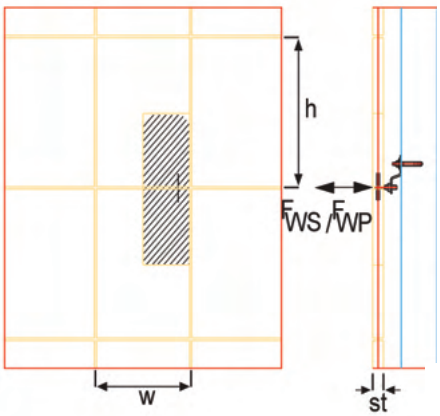
t = Thickness of stone
w = Width of stone
h = Height of stone

Load calculation when installing at horizontal joints

Support anchor in horizontal joint
Vertical load from dead load
Fdw = (st x w x h x ds) / 2 (for each anchor)

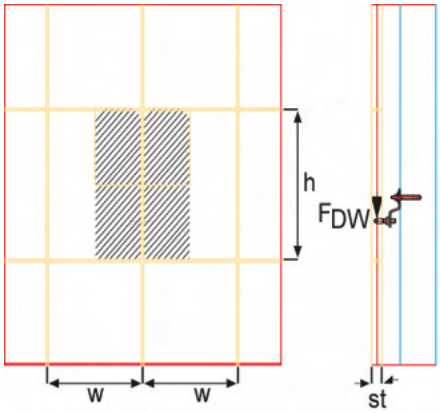


Restraint anchor in horizontal joint
Fwp = (w x h x qp) / 2 (for each anchor)
Fwp = (w x h x qs) / 2 (for each anchor)

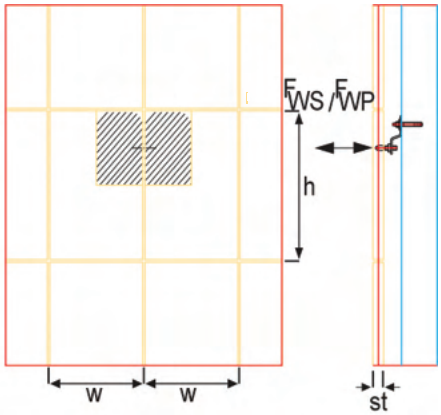


Load calculation when instalalting at vertical joints

Support anchor in vertical joint
Vertical load from dead load
Fdw = (st x w x h x ds) / 1 (for each anchor)



Restraint anchor in vertical joint
Fwp = (w x h x qp) / 2 (for each anchor)
Fws = (w x h x qs) / 2 (for each anchor)



Material Grade Specification

Use of corrosion resistant austenitic stainless steel grade is recommended for stone installation.

Stone anchors, adjustable arms and pins must be stainless steel grade AISI 304 - 1.4301 (A2) & AISI 316-1.4401 (A4).

Recommended material specifications for fixing systems are shown in the following table.

Subject to environmental corrosion impact levels: sub channel systems can be made out of hot dip galvanized steel with minimum 50 micron zinc coating.

Product Type	Stainless Steel AISI = W.-Nr.	Steel DIN = W. -Nr.
Anchors	304 = 1.4301 316 = 1.4401 316Ti = 1.4571	-
Channels	304 = 1.4301 316 = 1.4401	Hot dip galv. St 37-2 = 1.0037 Hot dip galv. St 44-2 = 1.0044
Hex. Bolts	DIN 933 304 -A2/50 & A2/70 316 - A4/50 & A4/70	Hot dip galv. Steel Strength class 4.6/8.8
Hexagon Nuts	DIN 934 & DIN 439 304 A2/50 & A2/70 A4/50-A4/70)	Hot dip galv. Steel Strength class 8.8
Washers	DIN 125 304 A2 316	Hot dip galv. Steel
Anchor bolts	304 -A2 316 - A4	Hot dip galv. Steel Strength class 4.6/8.8

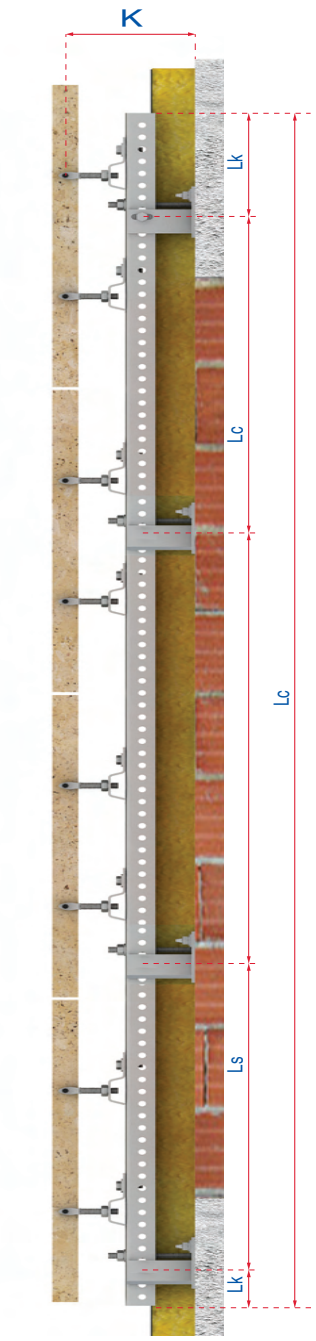
Sub Channel Systems - Design Principles

Ventilated façades are the most popular type of external wall caldding systems. These systems are preferred due to their functionality and most of all, because of their design possibilities to accommodate various types of materials to be installed on to facade of buildings.

The design of the fixing systems can be individually adopted to the structure and custom design can be made combining various types of components. The sub channel systems comprising of both steel and aluminium channels, act as the secondary structure between the wall and the cladding material. The system must be designed so to accommodate the building movements and thermal expansion of the cladding components, so to avoid any stress accumulation.

The sub channel systems can be adjusted in three dimensions and are fixed to the main structure free of stress. Unevenness of the main structure and various wall projections can be compensated for perfect horizontal and vertical alignment.

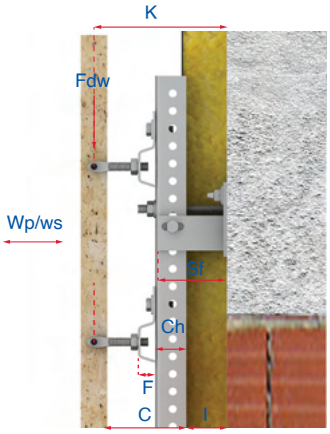
In order to achieve a secure and functional fixing system correct design principles have to be considered.



Required application information for design works

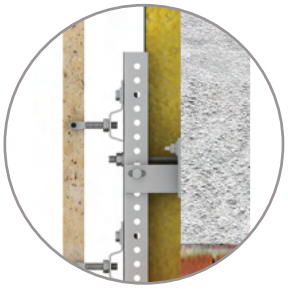
- Stone type and dimensions.
- Cavity structure: projection size and insulation.
- Application type: horizontal or vertical joint installation.
- Joint size.
- Structural wall backing.
- Height of facade.
- Relevant dynamic loads such as wind and seismic loads.
- Design criteria of the project.

Design parameters



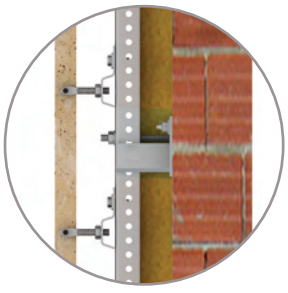
K:	projection size
Fdw:	dead Load
Wp / Ws :	wind pressure / wind suction
C:	wall cavity
I:	insulation thickness
Ch:	channel height
F:	anchor forming size
Sf:	support forming size
Lc:	channel length
Sc:	vertical channel spacing
Lk:	end channel spacing
Ls:	connection spacing

System overview



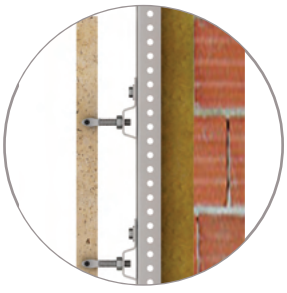
- Channel supports are used to fix the channels on to concrete beams with anchor bolts.

- Channel support bears the load that is transferred on to the channel.



- Channel restraints are used to fix the channels on the wall to hold the channels against wind pressure and suction.

- Channel restraints are used to fix the channel in the middle and at the bottom.



- Channel supports are fixed on to wall with suitable anchor bolts.

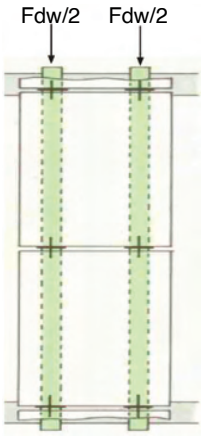
- Channel restraints are positioned in designated areas on order to prevent the channels from deflecting.

- Stone installation is made with suitable anchors by attachment on to the channels.

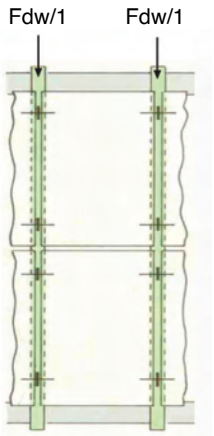
- Anchors are attached to the channel either by hex bolts or lock nuts.

Sub Channel Systems - Design Principles

Installation at horizontal joints



Installation at vertical joints



Fixing method & load distribution

• Sub channel systems are fixed to load bearing beams for support.

• Channels are fixed on to beams with channel supports.

• Fixing of channels in the middle to the wall with channel restraints are made to reduce deflection.

• When installation is at vertical joints, the sub channel system bears the whole load of the slabs installed.

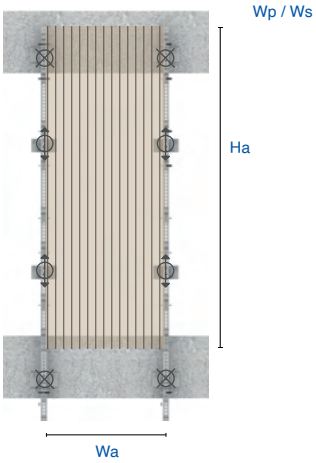
• When installation is at horizontal joints, the sub channel system bears half the load of the slabs installed.

Elevation

W: Stone panel Width
Lc: Channel length
Lf: Floor height

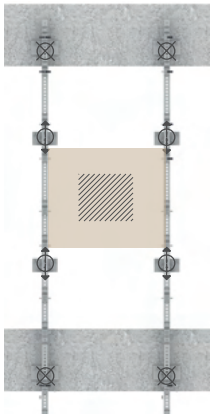
Wa: Cladding Width area
Ha: Cladding Height area
Sc: Channel spacing

Channel support



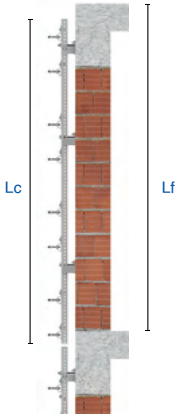
channel support - fixed
channel restraint - flexible

Channel Restraint



channel support - fixed
channel restraint - flexible

Section



Load calculation for channel supports

Load bearing channel supports brackets:
Subject to weight of cladding area

Fdw = St x Wa x Ha x ds x yf

Fdw:	Dead Load kN
St:	Stone panel thickness
Wa:	Width of area of cladding
Ha:	Height area of cladding
ds:	Volume of cladding material
yf:	Safety factor for dead load 1.35

To be verified against resistant loads

Load calculation for channel restraints

Channel restraint brackets:
subjected to wind pressure & suction load

W = Wn x b x a x yf

a:	distance between brackets
yf:	safety factor of wind load 1,5

Wn = Wm x æ x c

Wn:	normative zone wind load kN/m²
æ:	coefficient of wind load change according to certain height
c:	Aerodynamic coefficients
c:	+0,8 , for wind pressure load
c:	- 0,6 , for wind suction

Wn:	0,43 x 1, 05 x 0,8 = 0,36 kN
W:	0,36 x 1,25 x 1,0 x 1,4 = 0,63 kN

To be verified against resistant wind pressure load

Wn = 0,43 x 1, 05 x - 0,6 = - 0,27 kN
W =- 0,27 x 1,25 x 1,0 x 1,4 =- 0,47 kN

To be verified against resistant wind suction load

Channel restraint brackets:
subjected to wind suction load

W = Wn x b x a x yf

a:	distance between brackets
yf:	safety factor of wind load 1,5

Wn = Wm x æ x c

Wn:	normative zone wind load kN/m²
æ:	coefficient of wind load change according to certain height
c:	Aerodynamic coefficients
c:	- 0,6 , for wind suction

Wn = 0,43 x 1, 05 x - 0,6 = - 0,27 kN
W =- 0,27 x 1,25 x 1,0 x 1,4 =- 0,47 kN

To be verified against resistant wind suction load

Project References


Demir Bank, Istanbul


Adnoc HQ, Abu Dhabi


Usadba Centre, Moscow


Eschborn Plaza, Frankfurt


White Square Office Centre, Moscow

Four Seasons Hotel, Cairo


Bibliotheca Alexandrina, Alexandria


Sabanci University, Istanbul


Cultural Village, Doha


Yapi Kredi Bank, Istanbul


George Town College, Doha


Fairmont Hotel, Dubai


Texas College, Doha


Mauritius Bank


Is Bank Towers, Istanbul


Hilton Hotel, Jeddah

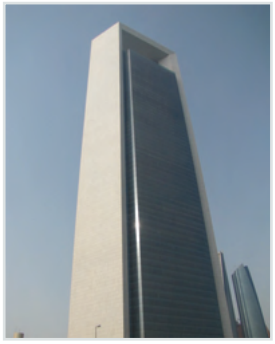

Kingdom Centre, Riyadh

Project References


Garanti Bank, Istanbul


Zadgo Gasco HQ, Abu Dhabi


Hilton Hotel, Adana


Adnoc New HQ, Abu Dhabi


Algiers Grand Mosque, Algeria


Al Nahyan Mosque, Abu Dhabi


Regents Crescent, London


Chelsea Barracks, London


Conference Palace, Abu Dhabi


Hilton Hotel, Bath


Voyotorog Building, Moscow

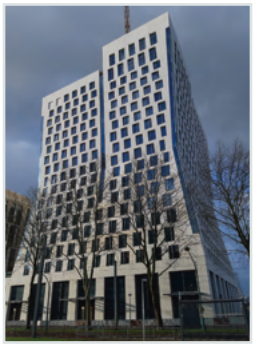

CMC College, Doha


US Embassy, Yerevan


Emirates Towers, Dubai


Museum of Islamic Arts, Doha


US Embassy, London


Hour Glass, Amsterdam

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