

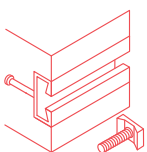


HALFEN

Halfen Cast-In Channels

Technical Product Information

New Zealand Edition with NZS Compliance



Anchoring & Fixing
Cast-In Channels, T-Bolts & Accessories

English / New Zealand

Leviat®

A CRH COMPANY

We imagine, model and make engineered products and innovative construction solutions that help turn architectural visions into reality and enable our construction partners to build better, safer, stronger and faster.

Leviat is a world leader in connecting, fixing, lifting and anchoring technology.

From the build of new schools, hospitals, homes and infrastructure, to the repair and maintenance of heritage structures, our engineering skills are making a difference around the world.

We provide technical design assistance at every stage of a project, from initial planning to installation and beyond.

Our technical support services range from simple product selection through to the development of a fully customised project-specific design solution.

Every promise we make locally, has the commitment and dedication of our global team behind it. We employ almost 3,000 people at 60 locations across North America, Europe and Asia-Pacific, providing an agile and responsive service worldwide.

Leviat, a CRH company, is part of the world's leading building materials business.

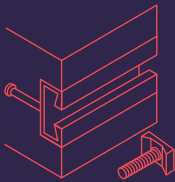




>3,000
People

60+
Locations

~20
Countries



Anchoring & Fixing

Systems for fixing secondary fixtures to concrete, including anchor channels, bolts and inserts; also tension rod systems for roofs and canopies.

- Cast-in Channels, T-Bolts & Accessories
- Threaded Inserts
- Rod Systems
- Attachment Points
- Post Installed Anchor Systems

Other areas of expertise:



Structural Connections

Systems to form robust, efficient connections, and continuity of concrete reinforcement as necessary, between walls, slabs, columns, beams and balconies, providing structural integrity as well as enhanced thermal and acoustic performance.



Lifting & Bracing

Systems for the safe and efficient transportation, lifting and temporary bracing of cast concrete elements and tilt-up panels before permanent structural connections are made.



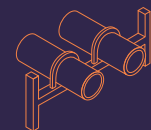
Façade Support & Restraint

Systems for the safe and thermally-efficient fixing of the external building envelope, including brick and natural stone, insulated sandwich panels, curtain walling and suspended concrete façades, and also the repair and strengthening of existing masonry installations.



Formwork & Site Accessories

Non-structural accessories that complement our engineered solutions and help keep your construction environment operating safely and efficiently, including moulds for casting standard and special concrete elements and construction essentials such as reinforcing bar spacers.



Industrial Technology

Mounting channels, pipe clamps and other versatile framing systems that provide safe fixing in a wide range of industrial applications.

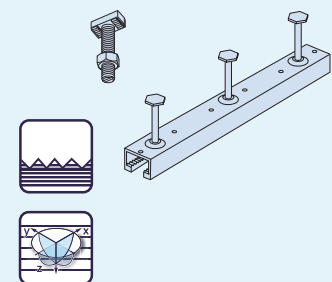
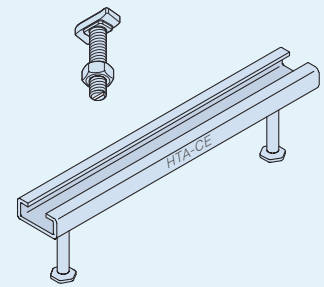
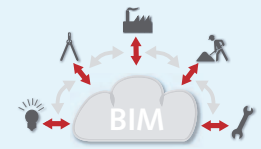
Leviat product ranges:

Ancon | Aschwanden | Connolly | Halfen | Helifix | Isedio | Meadow Burke | Modersohn | Moment | Plaka | Scaldex | Thermomass

Halfen Cast-in Channels

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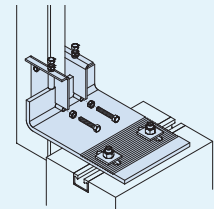
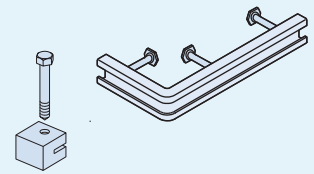
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The data in this catalogue is based partially on ICC-ES Evaluation or Appraisal Reports and partially on Eurocode EN 1990 – EN 1999. Special attention should be drawn to NZS compliant values taken from European Technical Assessments, resp. Eurocode EN 1990 – EN 1999. Please consider the footnotes on the respective tables for information about the reduction factors. For any questions, please contact your local distributor. Addresses can be found at the end of this catalogue.



NZS Compliance

Please note that during our transition period, you will get support for the Halfen products in New Zealand from www.ancon.co.nz

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Halfen Cast-in Channels

Integrated Quality – from Start to Finish

Quality and safety are the ultimate targets in the production of the original Halfen Anchor Channel system. Therefore all our production locations are ISO 9001 certified to provide products that meet strict quality management standards. On the one hand this involves continual inspections, machine maintenance and quality testing during the manufacturing process and on the other hand it involves stringent quality control procedures of incoming raw materials right through to dispatch of the finished product.

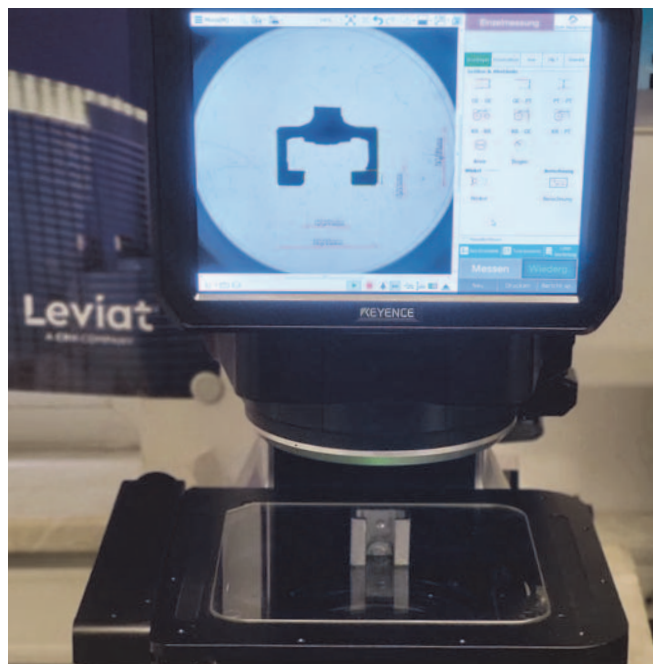
Quality always comes first for our products and is guaranteed during each step of production! The extent, type and frequency of production checks carried out by us is determined by standards set and recorded.

Halfen Anchor Channels and Halfen Bolts, originating from our certified manufacturing plants, are produced of strictly regulated raw material. The complete raw material or semi-finished goods are procured solely from resources that meet our stringent in-house material specifications. Our suppliers must be ISO 9001 certified and must provide complete documentation on the required performance and quality. Therefore, our suppliers have to prove compliance with our material specifications with a 3.1 inspection certificate in accordance to DIN EN 10204.

The inspection of incoming material is not limited to visual examination and dimensional checks. Every consignment is also analysed via spectral analysis. Moreover, the required tensile strength values, yield stress and rupture points are tested. Raw material is released for production only if all tests results are satisfying and comply with the provided 3.1 certification. The Halfen Anchor Channels and Halfen Bolts are continually checked during production for dimensional precision. The required frequency for quality checks is set in our quality control procedures.

At the end of the production process, before dispatch or storage, our (quality management system QMS) regulations require visual checks, dimensional control and tensile tests on a predetermined percentage of finished products. All tested anchor channels must prove a minimum safety factor against steel failure.

Our stringent Quality Assurance and Quality Control processes, part of the implemented QMS at our factories, ensure strict compliance to required quality standards and warrant the complete process chain, from the receipt of the raw material until final delivery of the finished products, are controllable and traceable. Therefore, complete traceability and a guarantee of the required performance and quality can be provided for all our products. Our focused approach on high quality and continuous improvement has been one of the reasons that our stakeholders have trusted us for the last almost 100 years! We are fully aware of our responsibility and will continue to maintain our excellent reputation with high quality products!



References

Tunnels



Lötschberg-Base tunnel, Switzerland

Bridges



Passerelle Simone de Beauvoir, Paris/France

Halfen Cast-in Channels

General

Sustainability

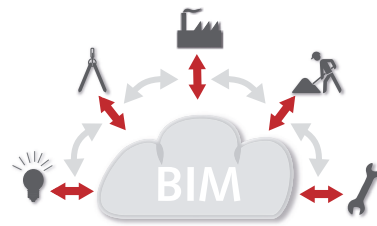
An EPD® (Environmental Product Declaration) provides transparent and comparable ecological data which helps to evaluate the sustainability of a building. Already during the planning phase the data provided here is of great significance for architects and planners. The data provided also helps to ensure the high demands on the environmental performance of the building are met. Health Product Declarations (abbrev. = HPD) complement our information on sustainability. The HPDs include a list of all components and information on the health effects of these components. The HPD for hot-dip galvanized Halfen Cast-in Channels helps to achieve additional points in the Leed v4 system.

[www.halfen.com/Downloads/Brochures/Environmental/Health declarations](http://www.halfen.com/Downloads/Brochures/Environmental/Health%20declarations)



BIM

Having completed various projects using BIM methodology, we have considerable experience as a BIM partner. All Leviat engineers are trained to supervise this process in precise detail. Our combination of extensive experience and highly-trained engineers means we are perfectly placed to meet the increasing demand for BIM projects. Examples of our previous projects developed using BIM can be found at [www.halfen.com / Service / BIM / BIM references](http://www.halfen.com/Service/BIM/BIM%20references).

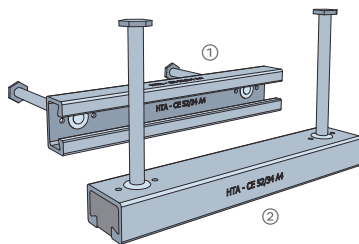


Fire-resistance / Material fatigue

A wide variety of Halfen Cast-in Channels are tested under fire exposure (according to TR 020 "Evaluation of anchorages in concrete with regard to fire resistance") as well as under cyclic loading. More details, characteristic resistances under fire exposure and fatigue resistances, are provided in the respective European Technical Assessments.

Type identification

- ① Inside on the bottom of the channel.
- ② Additionally on the channel side



Identification	
Channel material	Type identification example
1.0038 / 1.0044	HTA-CE 38/17 HZA 53/34
A4: 1.4404 / 1.4571	HTA-CE 38/17 - A4 HZA 53/34 - A4
HCR: 1.4529 / 1.4547	HTA-CE 38/17 - HCR

Sports



Rheinenergiestadion, Cologne/Germany

Curtain wall



Edificio Gas Natural, Barcelona/Spain

Halfen Cast-in Channels

Product Families in Overview

		<h3>HTA-CE cold-formed</h3>	<ul style="list-style-type: none"> ■ Medium performance - from lowest to medium load range ■ As with all Halfen Channels, perfect for adjustable, surface-flush fixings ■ Economic solution ■ Complies with NZS 3101. Compliance with International Building Codes independently appraised by the ICC Evaluation Service[Ⓞ] ■ European Technical Assessment ETA - 09/0339 by DIBt*
		<h3>HZA cold-formed, serrated</h3>	<ul style="list-style-type: none"> ■ Suitable for 3-D loads ■ Medium load capacities in longitudinal direction ■ Complies with NZS 3101. Compliance with the New Zealand Building Code independently appraised by the ICC Evaluation Service, reference ESA-2023. ■ Compliance with International Building Codes independently appraised by the ICC Appraisal Service[Ⓞ]. ■ European Technical Assessment ETA - 20/1081 by DIBt*
		<h3>HTA-CE hot-rolled</h3>	<ul style="list-style-type: none"> ■ Medium to high load capacity ■ Low stress profile with high resistance to dynamic and impact loads, unmatched by cold-formed alternatives ■ High resistance against local flexure due to optimized channel lip geometry ■ In combination with Halfen HSR Bolts, *medium load bearing in longitudinal channel direction is possible. (*proportionally to the channel cross-section area, load bearing is lower than in application of serrated channels) ■ Complies with NZS 3101. Compliance with International Building Codes independently appraised by the ICC Evaluation Service[Ⓞ]. ■ European Technical Assessment ETA - 09/0339 by DIBt*
		<h3>HZA DYNAGRIP[®] hot-rolled, serrated</h3>	<ul style="list-style-type: none"> ■ Superior performance ■ High load capacities in longitudinal direction due mechanical interlock between serrated channel lips and T-bolt heads ■ Best suitable in seismic regions ■ Complies with NZS 3101. Compliance with the New Zealand Building Code independently appraised by the ICC Evaluation Service, reference ESA-2023. ■ Compliance with International Building Codes independently appraised by the ICC Appraisal Service[Ⓞ]. ■ European Technical Assessment ETA - 20/1081 by DIBt*
		<h3>HZA-PowerSolution hot-rolled, serrated</h3>	<ul style="list-style-type: none"> ■ Highest performance level ■ Developed for applications in safety relevant structures with highest requirements ■ Suitable for crack width up to 1.5 mm ■ Tested for extra-ordinary impact loads ■ European Technical Assessment ETA - 17/0728 by DIBt*

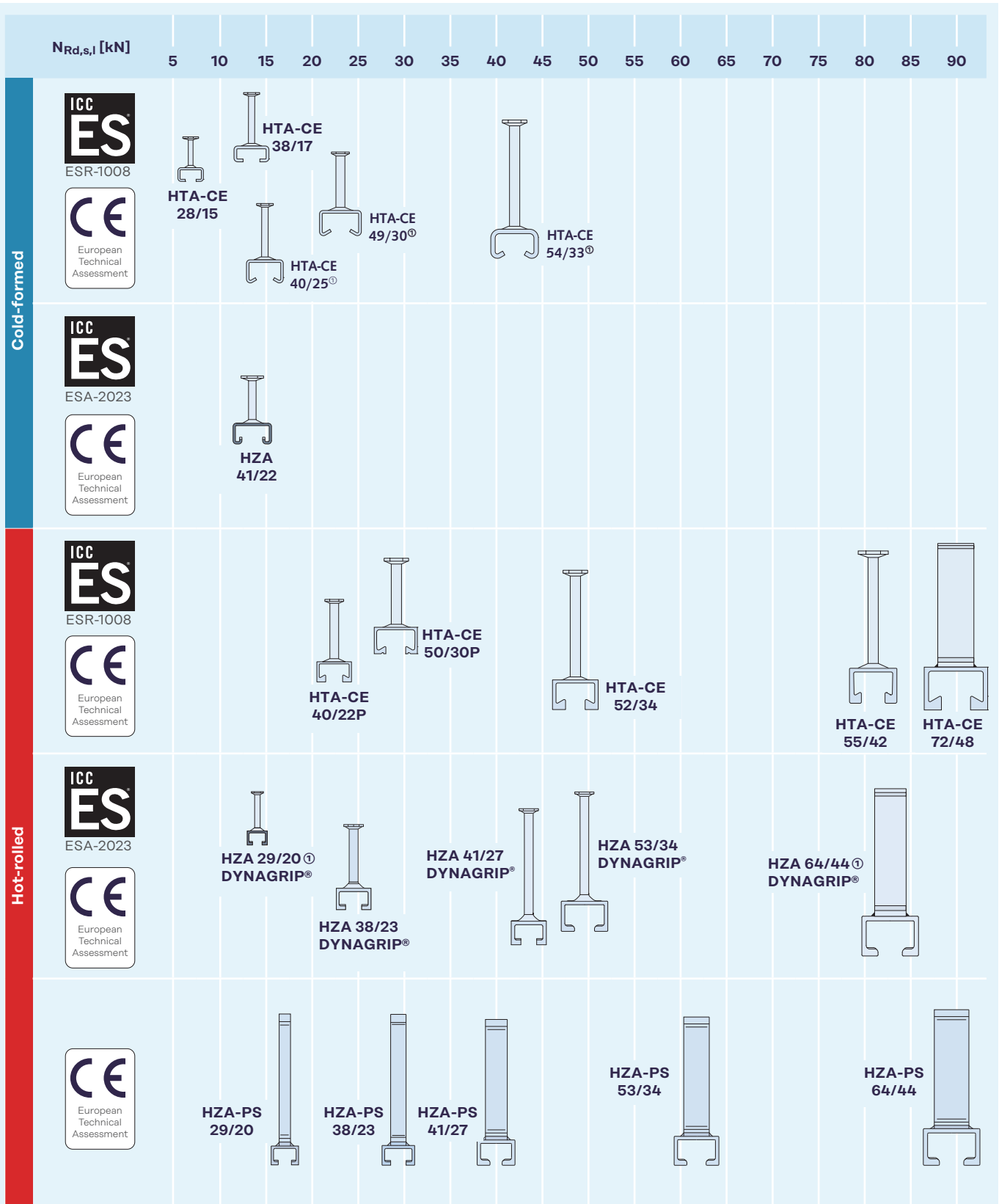
Ⓞ Refer to ESR-1008

*DIBt Deutsches Institut für Bautechnik = German Institute of Construction Engineering

<p>cold formed channel profile</p>	<p>hot rolled channel profile</p>	<p>serrated</p>	<p>3D - Loads</p>	<p>suitable for fatigue loads</p>	<p>suitable for seismic loading</p>	<p>suitable for applications in safety relevant areas in nuclear facilities</p>
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Halfen Cast-in Channels

Product Range – for Preliminary Computation



This overview shows the performance of the Halfen Cast-in Channels by comparing their design values of the load-bearing capacity of the channel lips. Other types of failure as shown on page 14 may also be decisive for the evidence. Not all channel types or sizes are stocked or supplied in NZ. Please contact Leviat to check on available Products.

① These channels are not part of the ICC-ES Report

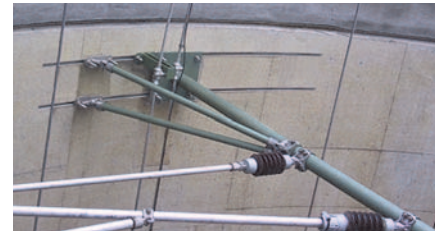
Halfen Cast-in Channels

Application Segments and Application Examples

Traffic infrastructure:

Tunnels, bridges, roads, airports and railway stations

- OCS support
- drainage pipe installation
- fixing of signage or traffic lights
- fixing of rescue gates, stairways, emergency or maintenance ways
- various adjustable fixings to concrete whether with a straight or rounded shape



Public and residential buildings:

Stadiums, sports and leisure, trade and utility buildings, office and residential towers or detached houses

- adjustable fixing of all kind of elements — concrete, masonry, steel, wood or synthetics to concrete
- curtain wall façades
- stadium seatings
- lifts and elevators
- brickwork, concrete, or natural stone facade claddings
- rail and banister fixings



Halfen Cast-in Channels

Application Segments and Application Examples

General infrastructure:

Power plants, energy & infrastructure, energy storage or transport, water and sewage projects

- cable tray support
- pipe support
- ventilation duct support
- fixing of stairs, ladders, signage, switch cabinets etc.
- application in critical buildings with high seismic risk or where protection against high impact loads is required



Industry:

All kind of plants; production, automotive, agriculture, building industry ...

- machinery fixing
- fixing of general infrastructure
- fixing of stairs, ladders, maintenance levels etc.
- fixings in highly stressed areas or when exposed to chemical environments
- fixing of elements exposed to fatigue loads



Halfen Cast-in Channels

General – all Channels

Hot-dip galvanized FV:

Dipped in galvanizing bath, with a temperature of app. 460°C; this method is used for the Halfen Anchor Channels and a range of Halfen Bolts.

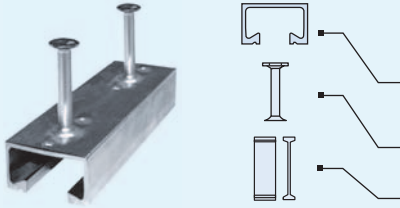


Zinc galvanized GV:

Halfen Bolts are hot-dip galvanized or electrogalvanized. We always guarantee the best possible corrosion protection. Passivation layers are Cr(VI)-free.

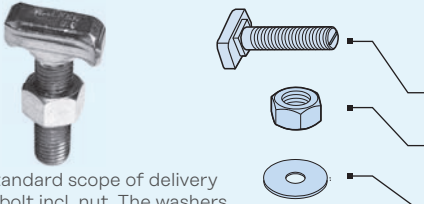


Halfen Cast-in Channels, steel, hot-dip galvanized

	Steel		
	Material	Standard	Zinc coat
	1.0038	EN 10 025-2 ①	FV: ≥ 55µm
	1.0044	EN 10 025-2 ①	FV: ≥ 55µm
Channel profile			
Bolt anchor B6	Steel	EN 10263 or EN 10269	FV: ≥ 55µm
Weld-on anchor	Steel	EN 10 025-2	FV: ≥ 55µm

① Steel according to EN 10 025-2 and Halfen specification

Halfen Bolts, galvanized steel

	Steel		
	Material	Standard	Zinc coat
	Steel (Sc) 4.6 or (Sc) 8.8	EN ISO 898-1	FV: ≥ 50µm GVs: ≥ 12µm
	Steel (Sc) 5 or (Sc) 8	EN 898-2	FV: ≥ 50µm GVs: ≥ 12µm
T-bolt			
Hexagonal nut			
Washer	Steel	EN ISO 7089, EN ISO 7093	FV: ≥ 50µm GVs: ≥ 12µm

(Sc) = Strength class

Stainless steel (SST):

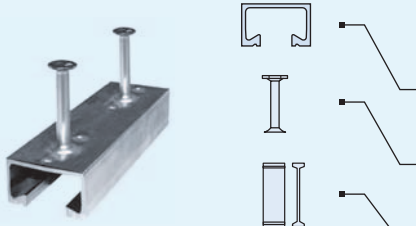
Chromium is the most important alloy element in stainless steel. A specific chromium concentration ensures the generation of a passive layer on the surface of the steel that protects the base material against corrosion. This explains the high corrosion resistance of stainless steel.



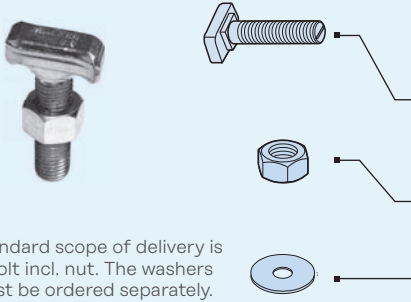
Materials:

- WB = Steel, mill finished
- FV= Steel, hot-dip galvanized
- GV= Steel, zinc plated (special coating)
- A4 = Stainless steel 1.4571/1.4404/1.4578
- FA = Stainless steel 1.4462
- HCR = Stainless steel 1.4547/1.4529

Halfen Cast-in Channels, stainless steel

	Stainless steel		
	Material	Standard	Corrosion resistance class ②
	1.4404 or 1.4571	EN 10 088	III
	1.4529 or 1.4547		V
Channel profile			
Bolt anchor B6	1.4404, 1.4571 or 1.4578	EN 10 088	III
	1.4529 or 1.4547		V
Weld-on anchor	1.4404 or 1.4571	EN 10 088	III
	Steel ③	EN 10 025-2	

Halfen Bolts, stainless steel






	Stainless steel		
	Material	Standard	Corrosion resistance class ②
	1.4404, 1.4571, 1.4578 (A4-50 or A4-70 ④)	EN 3506-1 and EN 10 088	III
	1.4462 (FA-70 ④)		III ④
	1.4529, (HCR-50)	EN 3506-1	V
T-bolt			
Hexagonal nut	1.4404, 1.4571, 1.4578 (A4-50, A4-70)	EN 3506-2 and	III
	1.4529, (HCR-50)	EN 10 088	V
Washer	1.4404, 1.4571	EN 10 088	III
	1.4529 or 1.4547		V

② See EN 1993-1-4, table A.3; ③ Corrosion protection of mill finished anchor, see page 13

④ Stainless steel, strength class 70 T-bolts are delivered subject to availability from stock in A4-70 grade material or in a higher FA-70 (1.4462) grade material. This applies to all Halfen Bolts listed as A4-70 and FA-70 material in this catalogue.

Halfen Cast-in Channels

General – all Channels

Corrosion protection requirements – Material and applications				
Description	1	2	3	4
	Dry interior rooms	Damp interior rooms	Medium corrosion level	High level of corrosion
Definition of application areas	Anchor channels may only be used in components in indoor environments. For example: living and office spaces, schools, hospitals, commercial shops with the exception of wet rooms as in column 2.	Anchor channels may also be used in components in areas with normal humidity. For example: kitchens, bathrooms and laundry-rooms in residential buildings. Exceptions; where permanent steam is present, and under water.	Anchor channels may also be used in outdoor environments (including industrial environments and coastal regions) or in wet rooms, if conditions are not especially aggressive (for example: continual immersion in sea water etc. as in column 4).	Anchor channels may also be used in exceptionally aggressive environments (for example: continual immersion in sea water) or in seawater spray zones, chloride environments in swimming pools or in environments with an extremely aggressive chemical atmosphere (for example: flue gas desulphurization plants or road tunnels where de-icer systems are in use).
Channel profile 	Steel 1.0038, 1.0044; EN 10025 Hot-dip galvanized $\geq 55\mu\text{m}$ ②	Steel 1.0038, 1.0044; EN 10025 Hot-dip galvanized $\geq 55\mu\text{m}$ ② Stainless steel 1.4307, 1.4567, 1.4541; EN 10088	Stainless steel 1.4404, 1.4571, 1.4062, 1.4162, 1.4362 EN 10088	Stainless steel 1.4462 ③, 1.4529, 1.4547 EN 10088
Anchor 	Steel 1.0038, 1.0214, 1.1132, 1.5525; EN 10263, EN 10269 Hot-dip galvanized $55\mu\text{m}$ ②	Steel 1.0038, 1.0214, 1.1132, 1.5525; EN 10263, EN 10269 Hot-dip galvanized $\geq 55\mu\text{m}$ ②; Stainless steel 1.4307, 1.4567, 1.4541; EN 10088	Stainless steel 1.4404, 1.4571, 1.4362, 1.4578 EN 10088 Mill finish, 1.0038 ③	
Special Halfen Bolts with shaft and bolts in accordance with EN ISO 4018 	Steel strength class 4.6/8.8 EN ISO 898-1 Zinc galvanized $\geq 5\mu\text{m}$ ④	Steel strength class 4.6 / 8.8; EN ISO 898-1, Hot-dip galvanized $\geq 50\mu\text{m}$ ①② Stainless steel, strength class 50, 70 1.4307, 1.4567, 1.4541; EN ISO 3506-1	Stainless steel Strength class 50, 70 1.4404, 1.4571, 1.4362, 1.4578 EN ISO 3506-1	Stainless steel Strength class 50, 70 1.4462 ③, 1.4529, 1.4547 EN ISO 3506-1
Washers* EN ISO 7089 and EN ISO 7093-1 Product classification A, 200 HV 	Steel EN 10025 Zinc galvanized $\geq 5\mu\text{m}$ ④	Steel EN 10025 Hot-dip galvanized $\geq 50\mu\text{m}$ ①② Stainless steel, Steel grade A2, A3; EN ISO 3506-1	Stainless steel Steel grade A4, A5 EN ISO 3506-1	Stainless steel 1.4462 ③, 1.4529, 1.4547 EN ISO 3506-1
Hexagonal nut EN ISO 4032 	Steel strength class 5/8 EN ISO 898-2 Zinc galvanized $\geq 5\mu\text{m}$ ④	Steel strength class 5/8 EN ISO 898-2 Hot-dip galvanized $\geq 50\mu\text{m}$ ①② Stainless steel, strength class 70, 80; Steel grade A2, A3 EN ISO 3506-2	Stainless steel Strength class 70, 80 Steel grade A4, A5 EN ISO 3506-2	Stainless steel Strength class 70, 80 1.4462 ③, 1.4529, 1.4547 EN ISO 3506-2

* All washers must be ordered separately

① or zinc galvanized with special coating $\geq 12\mu\text{m}$

② 1.4462 not suitable for swimming baths

③ Steel in accordance with EN 10025, 1.0038 not for anchor channels 28/15 and 38/17

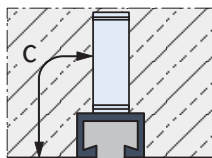
④ Zinc galvanized in accordance with EN ISO 4042

⑤ Hot-dip galvanized in accordance with EN ISO 10684

⑥ Hot-dip galvanized in accordance with EN ISO 1461

Halfen Channels (SST) mill finish welded-on anchors

Corrosion protection of the mill finished welded-on anchor is based on the following concrete cover c:



Concrete cover c

Concrete cover c [mm]					
	30	35	40	50	60
Profile HTA-CE	-	40/22P	52/34	55/42	72/48
	-	40/25	54/33	-	-
	-	-	50/30P	-	-
	-	-	49/30	-	-
Profile HZA	38/23	41/22	53/34	64/44	-

Halfen Channels (SST) made completely in stainless steel

The Halfen Cast-in Channels "entirely of stainless steel" are not restricted to any minimum concrete cover as no relevant corrosion occurs.

Areas of application

- bridge and tunnel construction (fastening of pipes, etc.)
- construction of sewage treatment plants (fixing of spillovers)
- chemical industry (installations exposed to aggressive substances)
- ventilated façades, e.g. masonry renders
- also for all structural reinforced concrete elements with higher demands on the concrete cover

Halfen Channels made in stainless steel – HCR

The high corrosion resistance (HCR) Halfen Cast-in Channels are mandatory when high concentrations of chlorides, sulphur and nitrogen oxides are present.

Areas of application

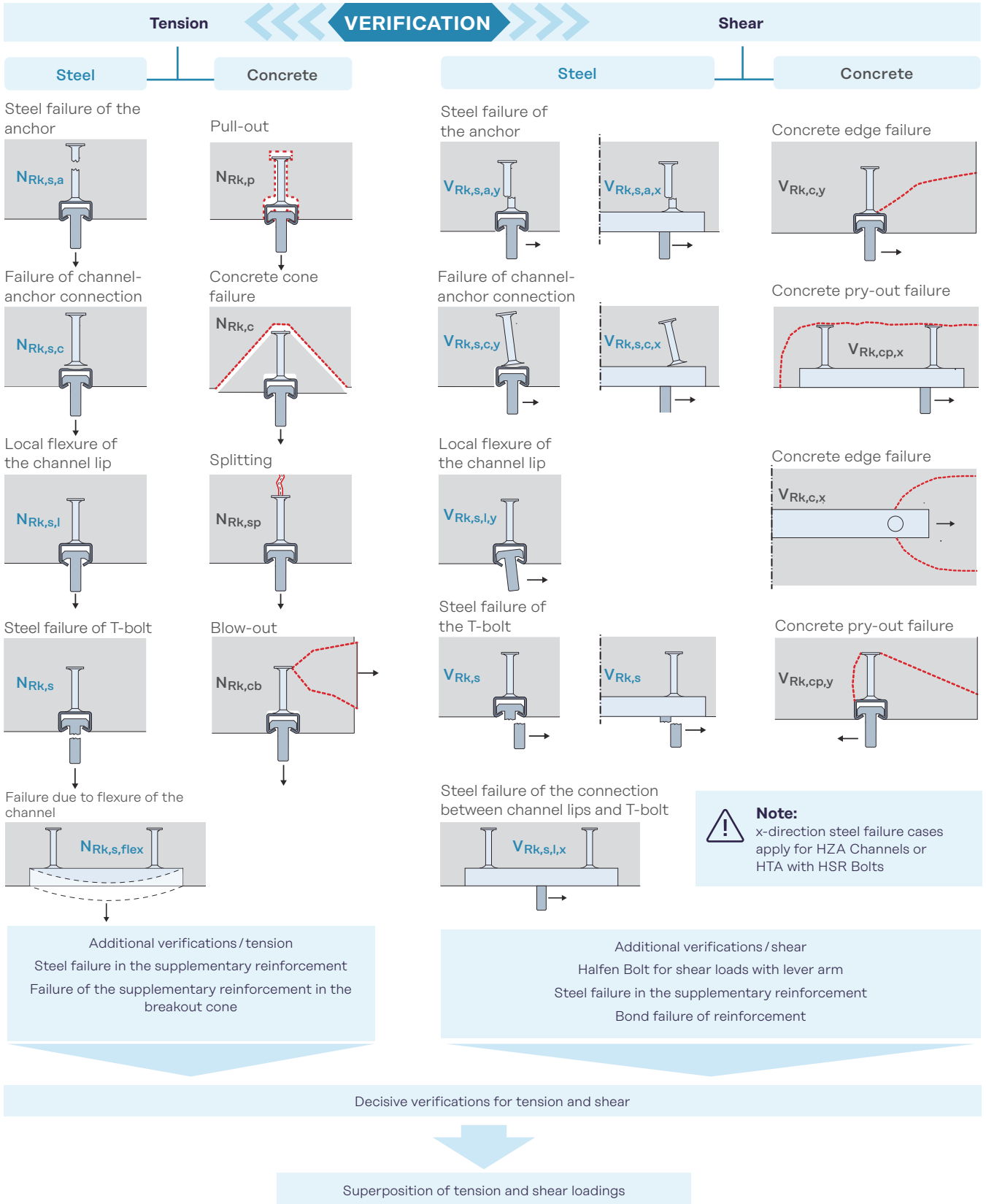
- road tunnels
- structures in salt water
- indoor swimming pools
- areas not routinely cleaned
- poorly ventilated parking garages
- in narrow, major city streets

Halfen Cast-In Channels

Dimensioning HTA-CE and HZA Cast-in Channels

Verification methods

in accordance with ICC-ES Evaluation Report ESR-1008, ICC-ES Appraisal Report ESA-2023, NZS 3101, EN 1992-4, EOTA TR 047



Halfen Cast-In Channels

Dimensioning HTA-CE and HZA Cast-in Channels

Calculation basics

The data in this catalogue is based partially on ICC-ES Evaluation or Appraisal Reports and partially on Eurocode EN 1990 – EN 1999.

Special attention should be drawn to NZS compliant values taken from European Technical Assessments, resp. Eurocode EN 1990 – EN 1999. Please consider the footnotes on the respective tables for information about the reduction factors.

For any questions, please contact your local distributor.

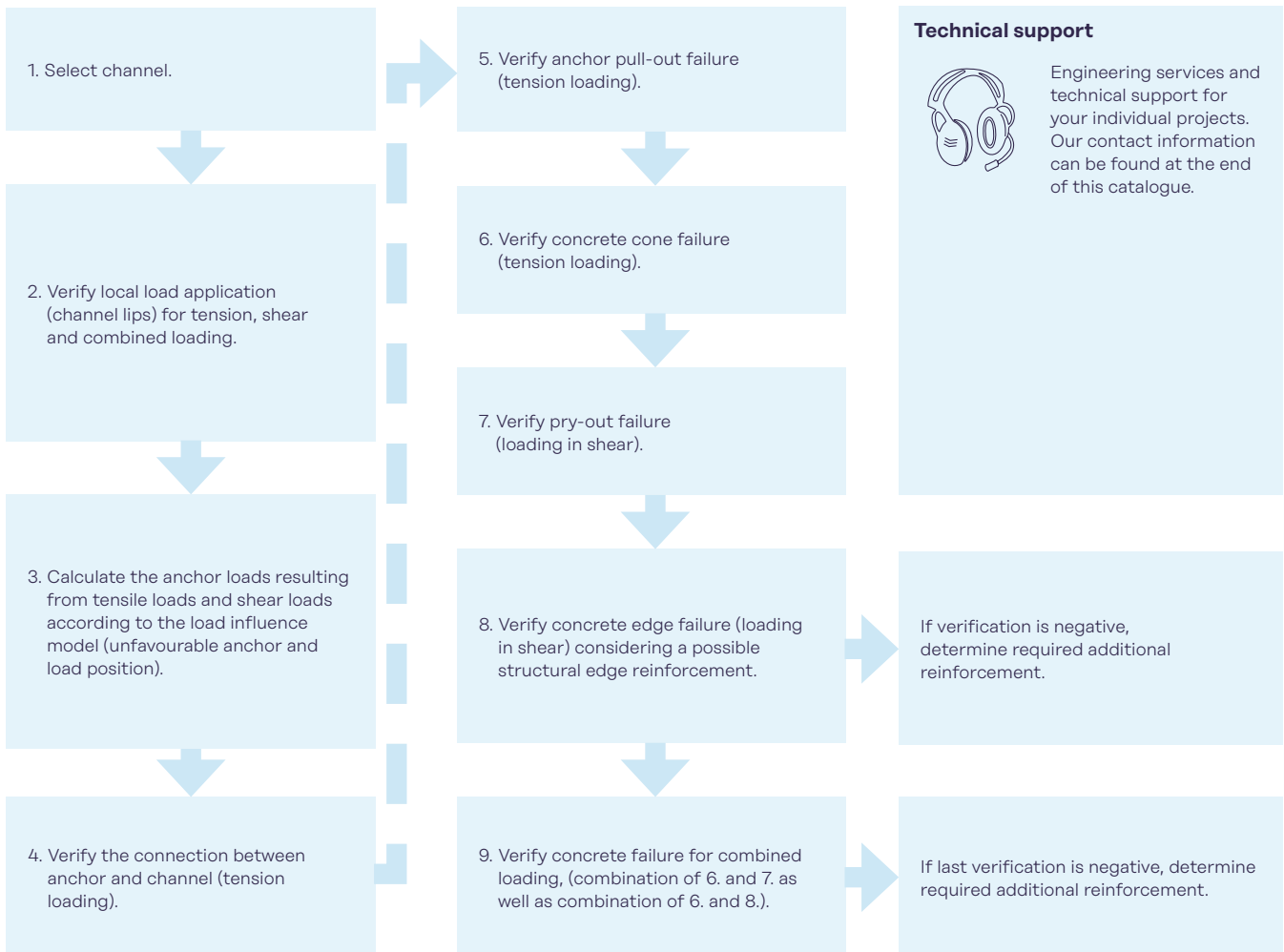
Addresses can be found at the end of this catalogue.



The following information is necessary to verify an anchor channel:

- type of Halfen Cast-in Channel and material
- length of the Halfen Cast-in Channel with number of anchors and spacing
- position of the Halfen Cast-in Channel in the concrete, defined by its distance from the lower, upper, left and right edges of the component
- thickness of the concrete elements
- concrete strength class
- condition of the concrete; cracked or verified as non-cracked
- dense reinforcement in the vicinity of the anchor channel
- Halfen Bolt thread size
- T-bolt positions
- tensile load and shear load applied to each T-bolt

Verification method



HTA-CE Cast-in Channels

The benefits at a glance

Benefits

In addition to their excellent adjustability, Halfen Cast-in Channels save considerable installation time.

The result — faster construction and therefore increased cost savings.

Safe and reliable

- no damage to the reinforcement
- approved for fire-resistant structural elements
- suitable for use in concrete pressure and tensile stress zones
- high corrosion resistance steels available
- hot-rolled profiles suitable for fatigue loads
- with ICC-ES Evaluation Report ESR-1008
- European Technical Assessment (ETA)

Quick and economical

- adjustable anchoring
- bolts instead of welding
- maximum efficiency when installing matrices and rows
- cost effective installation using standard tools
- optimised pre-planning reduces construction time
- large range of types available for various requirements
- no noise, no dust and no vibration during installation

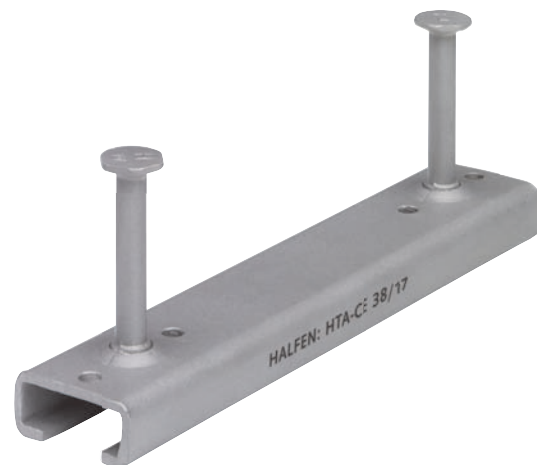
Halfen HTA-CE Cast-in Channels, hot-rolled



suitable for fatigue loads



Halfen HTA-CE Cast-in Channels, cold-formed



HTA-CE Cast-in Channels

Application Examples

Curtain wall



Crown Sydney/Australia

Sports



Seat fixing in stadiums

Lifts/Elevator fixings



Fixing guide-rails with Halfen Anchor Channels

Noise barriers



Fixings of noise barriers to concrete posts

Bridges



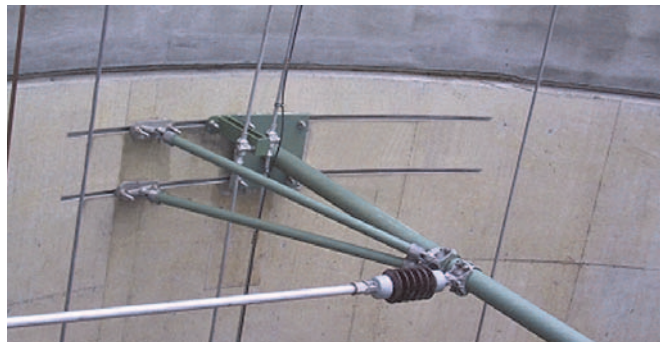
Fixings for drainage systems

Utility tunnels



Utility fixings in TBM tunnels with curved anchor channels

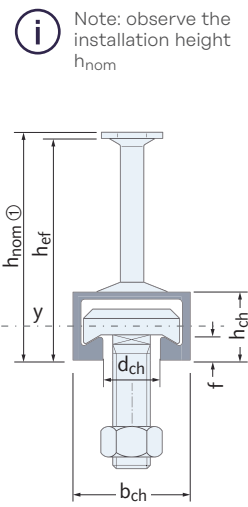
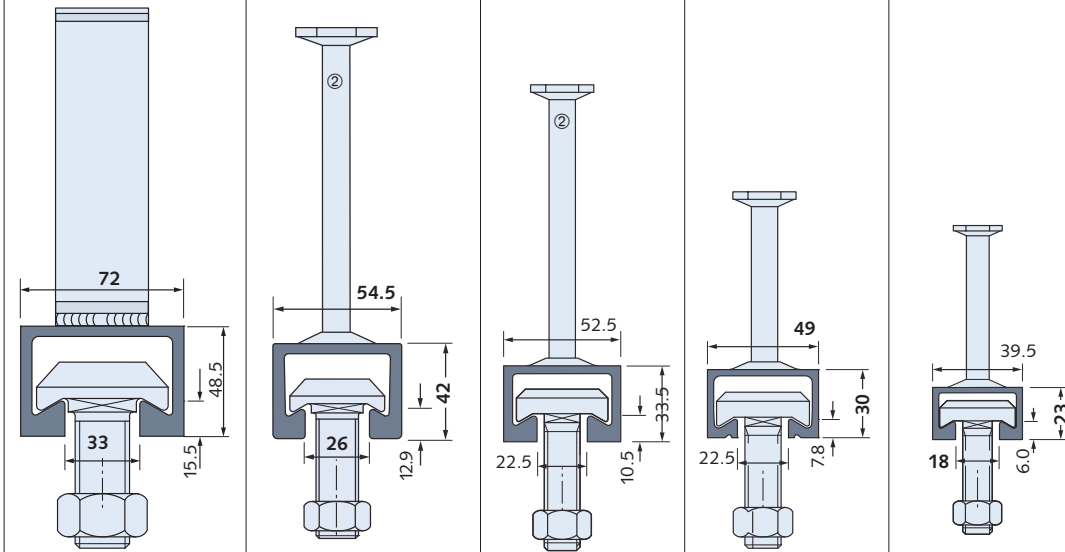
Tunnels



Fixing of overhead cables in railway tunnels

Halfen HTA-CE Cast-in Channels

Product Range – Overview: Channel and T-bolts

Dimensions and properties Halfen HTA-CE Cast-in Channel						
Profile	HTA-CE 72/48	HTA-CE 55/42	HTA-CE 52/34	HTA-CE 50/30P	HTA-CE 40/22P	
Type	hot-rolled	hot-rolled	hot-rolled	hot-rolled	hot-rolled	hot-rolled
Geometry Halfen HTA-CE Channels 						
						
Material description: see page 12	Steel	■	■	■	■	■
	A4	■	-	■	■	■
	HCR	-	-	-	-	-
T-bolts	HS 72/48	HS 50/30	HS 50/30	HS 50/30	HS 40/22	
Threads	M20-M30	M10-M20	M10-M20	M10-M20	M10-M16	
s_{I,N} [mm]	144	109	105	98	79	
Profile load capacity*						
N⁰_{Rd,s,I} [kN]	90.0	71.2	48.7	29.2	22.5	
V⁰_{Rd,s,I} [kN]	90.0	75.0	52.5	33.7	22.5	
M_{Rd,s,flex} [Nm]	7465	5211	3126	1905	1136	
Geometry						
h_{nom} [mm] ① ②	(191)	182 (185)	162 (164)	112	97	
b_{ch} [mm]	72	54.5	52.5	49	39.5	
h_{ch} [mm]	48.5	42	33.5	30	23	
I_y [mm⁴]	Steel	349721	187464	93262	52896	20029
	SST					
h_{ef} [mm]	179	175	155	106	91	
c_{min} [mm]	150	100	75	75	50	
c _{min} = minimal spacing channel/concrete edge s _{I,N} = axial spacing for T-bolts for N ⁰ _{Rd,s,I} SST = Stainless steel		N ⁰ _{Rd,s,I} = channel lip load capacity (tension) V ⁰ _{Rd,s,I} = channel lip load capacity (shear)		① Nominal size and tolerance ② weld-on I- or T-anchors subject to available stock; for these (h _{nom}) values are in brackets.		

* Other failure modes might be decisive and have to be verified for each individual case (taking the geometric boundary conditions into account). Reduction factors in accordance with ICC ESR-1008 are included within all design load capacities in this table.

** Other Halfen products are also available on request.

Halfen HTA-CE Cast-in Channels

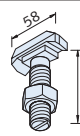
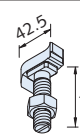

Product Range – Overview: Channel and T-bolts

Dimensions and properties Halfen HTA-CE Cast-in Channel						
Profile	HTA-CE 54/33	HTA-CE 49/30	HTA-CE 40/25	HTA-CE 38/17	HTA-CE 28/15	
Type	cold-formed	cold-formed	cold-formed	cold-formed	cold-formed	cold-formed
Geometry Halfen HTA-CE Channels <p>Note: observe the installation height h_{nom}</p>						
Material description: see page 12	Steel	■	■	■	■	■
	A4	■	■	■	■	■
	HCR	-	⊠	-	⊠	⊠
T-bolts	HS 50/30	HS 50/30	HS 40/22	HS 38/17	HS 28/15	
Threads	M10-M20	M10-M20	M10-M16	M10-M16	M6-M12	
$s_{I,N}$ [mm]	107	100	80	76	56	
Profile load capacity*						
$N_{Rd,s,l}^0$ [kN]	41.2	23.2	15.0	13.5	6.7	
$V_{Rd,s,l}^0$ [kN]						
$M_{Rd,s,flex}$ [Nm]	2536	1422	910	493	264	
Geometry						
h_{nom} [mm] ① ②	162 (164)	103	89	81	50	
b_{ch} [mm]	54	50	40	38	28	
h_{ch} [mm]	33	30	25	17.5	15.25	
I_y [mm ⁴]	Steel	72079	41827	20570	8547	4060
	SST			19097		
h_{ef} [mm]	155	94	79	76	45	
c_{min} [mm]	100	75	50	50	40	
c_{min} = minimal spacing channel/concrete edge $s_{I,N}$ = axial spacing for bolts for $N_{Rd,s,l}^0$ SST = general for all stainless steel variants		$N_{Rd,s,l}^0$ = channel lip load capacity (tension) $V_{Rd,s,l}^0$ = channel lip load capacity (shear)		① Nominal size and tolerance ② weld-on I- or T-anchors subject to available stock; for these (h_{nom}) values are in brackets.		

* Other failure modes might be decisive and have to be verified for each individual case (taking the geometric boundary conditions into account). Reduction factors in accordance with ICC ESR-1008 are included within all design load capacities in this table.

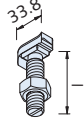
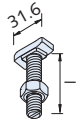
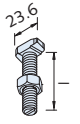
Halfen HTA-CE Cast-In Channels

Halfen HS Bolts

Halfen HS Bolts	Halfen Bolt	HS 72/48				HS 50/30				
	Suitable for profile	HTA-CE 72/48				HTA-CE 55/42, 52/34, 54/33, 50/30P, 49/30				
	Halfen Bolt dimensions									
Halfen Bolts type HS (no nib or serration) for profile types HTA  Other Halfen bolt lengths and materials are available on request! FV = Steel, hot-dip galvanised GV = Steel, zinc-plated A4 = Stainless steel HCR = Stainless steel Material details and corrosion protection: see page 12–13 *on request	l [mm]	M20	M24	M27	M30	M10	M12	M16	M20	
	20	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	FV8.8	FV4.6	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	A4-70	-	-
	40	-	-	-	-	-	FV8.8	FV4.6	FV4.6	-
		-	-	-	-	-	-	FV8.8	FV8.8	-
		-	-	-	-	-	-	A4-70	A4-70	-
	45	-	-	-	-	-	-	-	-	FV4.6
		-	-	-	-	-	-	FV8.8	-	FV8.8
		-	-	-	-	-	-	-	-	-
	50	FV4.6	FV4.6	-	-	-	-	FV4.6	FV4.6	-
		-	-	-	-	-	FV8.8	FV8.8	-	-
		-	A4-50	-	-	-	-	-	-	-
		-	-	-	-	-	-	A4-70	A4-70	-
	55	-	-	-	-	-	-	-	-	FV4.6
		-	-	-	-	-	-	FV8.8	-	FV8.8
		-	-	-	-	-	-	-	-	-
	60	-	-	-	-	-	-	FV4.6	FV4.6	-
		FV8.8	-	-	-	-	-	FV8.8	FV8.8	FV8.8
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
	65	-	-	-	-	-	-	-	-	FV4.6
-		-	-	-	-	-	-	-	FV8.8	
-		-	-	-	-	-	-	-	-	
70	-	-	-	-	-	-	FV8.8	-	-	
	FV4.6	FV4.6	FV4.6	FV4.6	-	-	-	-	FV4.6	
	-	FV8.8	-	-	-	-	-	-	-	
	GVs8.8	-	-	-	-	-	-	-	-	
75	-	-	-	-	-	-	-	-	FA-70	
	-	-	-	-	-	-	FV4.6	FV4.6	FV4.6	
	-	-	-	-	-	-	FV8.8	FV8.8	FV8.8	
	-	-	-	-	-	-	-	-	-	
80	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	A4-70	-	
100	FV4.6	FV4.6	-	FV4.6	-	-	FV4.6	FV4.6	FV4.6	
	-	-	FV8.8	-	-	-	FV8.8	FV8.8	FV8.8	
	-	-	-	-	-	-	-	-	-	
	GVs8.8	GVs8.8	-	-	-	-	-	-	-	
125	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	FV4.6	-	FV4.6	
	-	-	-	-	-	-	FV8.8	-	FV8.8	
150	-	-	-	-	-	-	-	-	-	
	FV4.6	FV4.6	-	FV4.6	-	-	-	FV4.6	-	
	-	-	-	-	-	-	GVs4.6	-	FV8.8	
	-	GVs8.8	-	-	-	-	-	-	-	
175	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	FA-70	FA-70	
	-	-	-	-	-	-	-	HCR-50*	-	
200	-	-	-	-	-	-	-	FV8.8	-	
	FV4.6	FV4.6	-	FV4.6	-	-	-	-	-	
	-	-	-	-	-	-	GVs4.6	GVs4.6	GVs4.6	
250	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	
300	-	-	-	-	-	-	GVs4.6	-	-	

Halfen HTA-CE Cast-In Channels

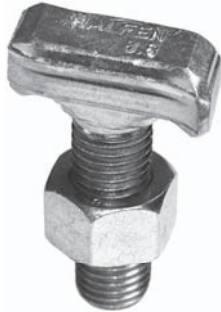
Halfen HS Bolts

Halfen Bolt	HS 40/22			HS 38/17			HS 28/15			
Suitable for profile	HTA-CE 40/22P, 40/25			HTA-CE 38/17			HTA-CE 28/15			
Halfen Bolt dimensions										
I [mm]	M10	M12	M16	M10	M12	M16	M6	M8	M10	M12
20	FV4.6	-	-	-	-	-	-	-	-	-
30	FV4.6	FV4.6	-	FV4.6	FV4.6	-	-	-	FV4.6	-
	FV8.8	FV8.8	-	GVs4.6	GVs4.6	GVs4.6	GVs4.6*	GVs4.6	GVs4.6	GVs4.6
	A4-70	A4-70	-	A4-70	A4-70	A4-50	-	A4-70	A4-70	-
40	FV4.6	FV4.6	FV4.6	-	-	FV4.6	-	-	-	-
	FV8.8	FV8.8	FV8.8	-	-	-	-	-	FV8.8	-
	-	-	-	GVs4.6	GVs4.6	GVs4.6	GVs4.6*	GVs4.6	GVs4.6	-
	A4-70	A4-70	A4-70	-	A4-70	A4-50	-	-	A4-70	-
45	-	-	-	-	-	-	-	-	-	-
	-	FV8.8	-	-	-	-	-	-	-	-
50	FV4.6	FV4.6	FV4.6	FV4.6	FV4.6	FV4.6	-	-	FV4.6	-
	-	FV8.8	FV8.8	GVs4.6	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	GVs4.6
	-	-	-	-	-	A4-50	-	-	A4-50	-
	A4-70	A4-70	A4-70	HCR-50*	A4-70	HCR-50*	-	-	HCR-50*	-
55	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
60	FV4.6	FV4.6	FV4.6	-	-	-	-	-	-	-
	FV8.8	FV8.8	FV8.8	-	-	FV8.8	-	-	-	-
	-	-	-	GVs4.6	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	-
	-	-	-	-	GVs8.8	-	-	-	-	-
	-	-	A4-70	-	A4-70	A4-50	-	-	A4-70*	-
65	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	FV8.8	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
80	FV4.6	FV4.6	FV4.6	-	-	FV4.6	-	-	-	-
	-	FV8.8	FV8.8	-	-	-	-	-	-	-
	-	-	-	GVs4.6	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	GVs4.6
	-	A4-70	A4-70	-	A4-70	A4-50	-	-	A4-70	-
100	FV4.6	FV4.6	FV4.6	-	-	FV4.6	-	-	-	-
	-	FV8.8	FV8.8	-	-	-	-	-	-	-
	-	-	-	GVs4.6	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	-
	-	-	-	-	A4-50	-	-	-	A4-50*	-
	-	-	FA-70	-	-	-	-	-	-	-
125	-	-	-	HCR-50*	-	HCR-50*	-	-	HCR-50*	-
	FV4.6	FV4.6	FV4.6	-	-	-	-	-	-	-
	-	-	-	-	GVs4.6	GVs4.6	-	-	GVs4.6	-
	-	-	-	-	-	-	-	-	A4-50*	-
150	-	-	FV4.6	-	-	-	-	-	-	-
	-	GVs4.6	-	GVs4.6	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	A4-50*	-
	-	-	-	-	-	HCR-50*	-	-	-	-
175	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
200	-	-	-	-	-	-	-	-	-	-
	-	GVs4.6	GVs4.6	-	GVs4.6	GVs4.6	-	-	GVs4.6	-
250	-	-	-	-	-	-	-	-	-	-
	-	-	GVs4.6	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-
	-	-	GVs4.6	-	-	-	-	-	-	-

Halfen HTA-CE Cast-In Channels

Halfen HS Bolts

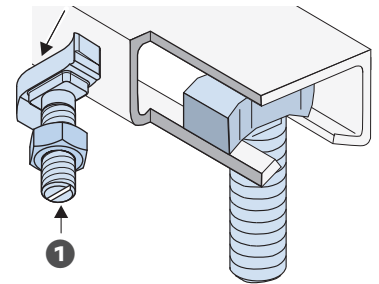
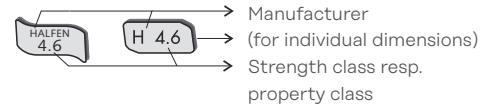
Halfen Bolts — Type HS



**Standard Halfen Bolts
(no nib or serration)
for all profile types HTA**

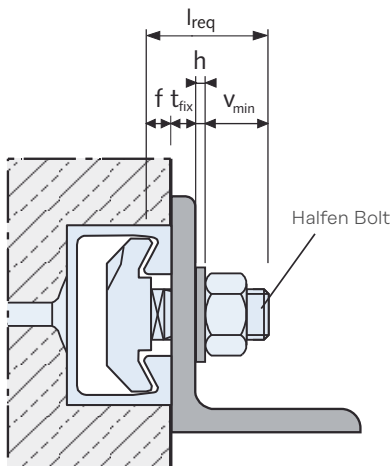
Two direction load capacity identified on ① T-bolt tip with 1 notch

- HALFEN 4.6** Strength class 4.6/8.8 galvanized (GVs) or hot-dip galvanized (FV)
- HALFEN A4-70** Material grade A4-50 / A4-70/FA-70 Stainless steel
- HALFEN HCR50** Strength class 50 Stainless steel (1.4529/1.4547)



Calculating the bolt length l_{req} for Halfen Bolts

$$l_{req} = t_{fix} + f + h + v_{min}$$



Dimensions v_{min}	
T-bolt diameter	v_{min} [mm]
M6	11.0
M8	12.5
M10	14.5
M12	17.0
M16	20.5
M20	26.0
M24	29.0
M27	31.5
M30	33.5

Lip dimensions f	
Channel profile	f [mm]
28/15	2.3
38/17	3.0
40/22P	6.0
40/25	5.6
49/30	7.4
50/30P	7.9
52/34	10.5
54/33	7.9
55/42	12.9
72/48	15.5

- l_{req} = required t-bolt length
- t_{fix} = thickness of clamped component
- f = profile lip height
- h = washer thickness
- v_{min} = nut height EN ISO 4032 + overhang approximately 5 mm (\geq M20: 7 mm)

Bolt design values

The table on the right lists the design resistance of Halfen Bolts with different thread diameters, materials and strength classes.

$N_{Rd,s,s}$ is the resistance against tension loads, $V_{Rd,s,s}$ is the the resistance against shear loads and $M^0_{Rd,s,s}$ is the flexural resistance when subjected to transverse load induced with a lever arm.

i Strength reduction factors from ESR-1008 are included.

The values in this table are conservatively simplified. Depending on the size of the bolt head or with more favorable load combinations, higher design resistances are possible. Detailed information can be found in the ESR-1008 report.

Design resistance									
Material / Strength class	M8	M10	M12	M16	M20	M24	M27	M30	
4.6	$N_{Rd,s,s}$ [kN]	9.9	13.9	16.5	41.1	73.5	105.9	137.7	168.3
	$V_{Rd,s,s}$ [kN]	5.7	9.0	13.1	24.5	38.2	55.0	71.6	87.4
	$M^0_{Rd,s,s}$ [Nm]	11.2	22.4	39.3	99.9	194.7	336.7	499.3	674.7
8.8	$N_{Rd,s,s}$ [kN]	19.0	30.1	37.9	60.1	127.4	183.5	238.6	291.7
	$V_{Rd,s,s}$ [kN]	10.5	16.6	24.3	45.2	70.5	101.6	132.1	161.5
	$M^0_{Rd,s,s}$ [Nm]	19.5	38.8	68.1	173.1	337.5	583.7	865.4	1169.4
A4-50	$N_{Rd,s,s}$ [kN]	13.7	21.7	31.6	37.3	91.8	132.3	172.1	210.3
	$V_{Rd,s,s}$ [kN]	5.7	9.0	13.1	24.4	38.1	54.9	71.4	87.2
	$M^0_{Rd,s,s}$ [Nm]	14.0	28.0	39.2	99.6	243.3	420.9	624.1	843.3
A4-70	$N_{Rd,s,s}$ [kN]	16.6	26.3	28.6	71.4	111.4	160.6	208.8	255.2
	$V_{Rd,s,s}$ [kN]	9.2	14.6	21.2	39.5	61.7	88.9	115.6	141.3
	$M^0_{Rd,s,s}$ [Nm]	17.0	33.9	59.6	151.5	295.3	510.7	757.3	1023.2

Halfen HTA-CE Cast-In Channels

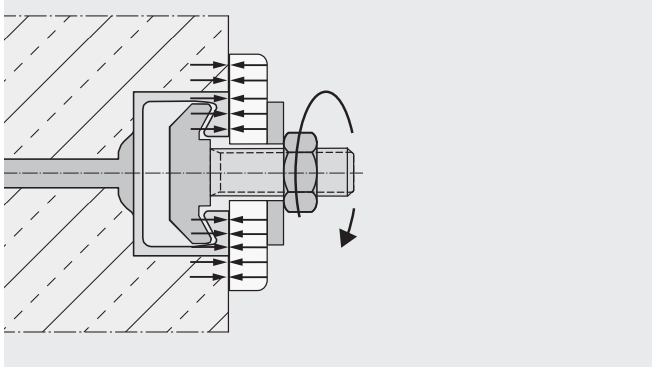
Halfen HS Bolts

Torque values HS

Standard

Components are braced against the concrete and anchor channel.

Torque is applied as in the following table and must not be exceeded.



Standard: Recommended torque values T_{inst}		
HTA-CE Profile	Halfen Bolt HS...M [mm]	Torque value T_{inst} [Nm]
		Steel 4.6; 8.8; Stainless steel; strength class 50; strength class 70
28/15	6	3
	8	7
	10	12
	12	15
38/17	10	14
	12	19
	16	40
40/22P 40/25	10	15
	12	25
	16	45
49/30 50/30P	10	15
	12	25
	16	60
	20	75
52/34 54/33	10	15
	12	25
	16	60
	20	120
55/42	10	15
	12	25
	16	60
	20	120
72/48	20	120
	24	200
	27	300
	30	380

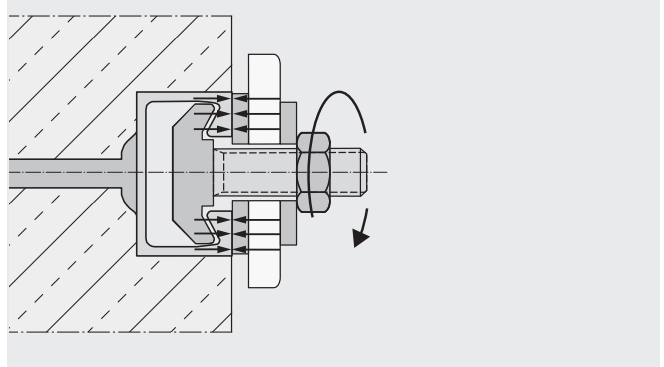


These tables, show the respective values of the tightening torque of the T-bolts from both approvals, ESR-1008 and ETA-09/0339 adapted to be conservative. Higher values are possible according to the respective situation and can be found in the approval that is used for the proof.

Steel-Steel

Components are braced against the anchor channels using suitable washers.

Torque is applied as in the following table and must not be exceeded.



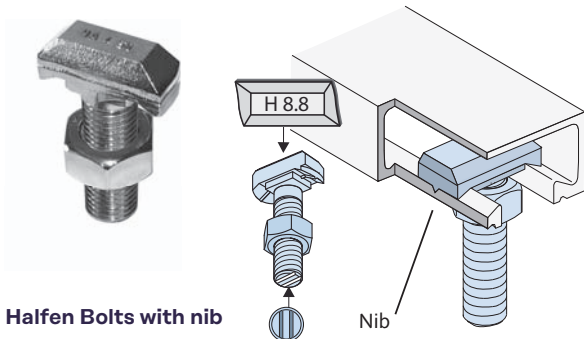
Steel-Steel: Recommended torque values T_{inst}					
HTA-CE Profile	Halfen Bolt HS...M [mm]	Torque value T_{inst} [Nm]			
		Steel 4.6	Steel 8.8	Stainless steel Strength class 50	Stainless steel Strength class 70
28/15	6	3	–	3	–
	8	7	20	8	15
	10	13	40	15	30
	12	18	70	25	50
38/17	10	15	40	15	30
	12	23	65	25	40
	16	60	135	45	130
	10	15	40	15	30
40/22P 40/25	10	15	40	15	30
	12	25	70	25	50
	16	65	180	60	130
	10	15	40	15	30
49/30 50/30P	10	15	40	15	30
	12	25	70	25	50
	16	65	180	60	130
	20	130	360	120	250
52/34 54/33	10	15	40	15	30
	12	25	70	25	50
	16	65	180	60	130
	20	130	360	120	250
55/42	10	15	40	15	30
	12	25	70	25	50
	16	65	180	60	130
	20	130	360	120	250
72/48	20	130	360	120	250
	24	230	620	200	440
	27	340	900	300	650
	30	460	1200	400	850

Tightening torques are also provided in the installation instructions, included with any box of bolts. Torque values apply only to bolts in delivery condition (unlubricated).

Halfen HTA-CE Cast-In Channels

Halfen HSR Bolts with Nib

Halfen Bolts — Type HSR (not part of the ETA)



Halfen Bolts with nib

- available for hot-rolled profiles: 40/22P, 50/30P, 52/34, 72/48
- only for carbon steel: FV
- load capacity in all directions
- load capacity in channel longitudinal direction according to expert report
- identification on T-bolt tip with 2 notches
- Tightening torques are provided also in the installation instructions, included with every box of bolts.

Bolt design values HSR

Available HSR				
Suitable for profile	72/48	52/34, 50/30P		40/22P
Halfen Bolt	HSR 72/48	HSR 50/30		HSR 40/22
Bolt dimensions				
I [mm]	M20	M16	M20	M16
40	-	FV8.8	-	GVs8.8, FV8.8
45	-	-	GVs8.8, FV8.8	-
60	-	GVs8.8, FV8.8	GVs8.8, FV8.8	GVs8.8, FV8.8
75	FV8.8	GVs8.8	GVs8.8, FV8.8	-
80	-	FV8.8	-	-
100	-	GVs8.8	-	-

GVs = Zinc galvanized with special coating
FV = Hot-dip galvanized

Torque values HSR	
HSR 8.8	Torque values [Nm]
M16	200
M20	400

Load capacity HSR	
Halfen Bolt HSR	Grade 8.8 in channel longitudinal direction
	F _{Rd} [kN]
40/22 - M16	6.3
50/30 - M16	6.3
50/30 - M20	10.5
72/48 - M20	10.5

i If loads in the channel's longitudinal direction have to be verified, we recommend using serrated Halfen HZA Channels with serrated Halfen HZS Bolts. See pages 28–36.

Halfen HTA-CE tender text example

Halfen HTA-CE type Channel 40/22P - FV - 300 - KF

Halfen HTA-CE Channel 40/22P with smooth channel lips for adjustable fixing of components,

according to ICC-ES Evaluation Report ESR-1008 in compliance with NZS 3101, suitable for anchoring in cracked or uncracked normal-weight concrete with compressive strength of 20 MPa to 69 MPa, under static, quasi-static, dynamic loading as well as fire exposure.

Type HTA-CE 40/22P - FV - 300 - KF

with

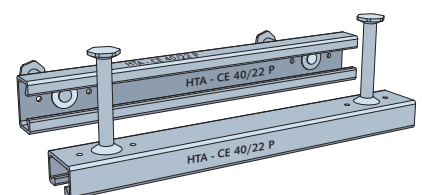
$N_{Rk,s,c} = 29 \text{ kN}$ = char. resistance, steel failure (tension), connection channel anchor

FV = Corrosion protection, hot-dip galvanized

300 = Channel length [mm] with 2 anchors,

KF = Foam strip filler,

or equivalent; deliver and install according to the manufacturer's instructions.



Halfen HTA-CE Cast-In Channels

HTA-CE Fatigue Loads/Edge and Bolt Spacing

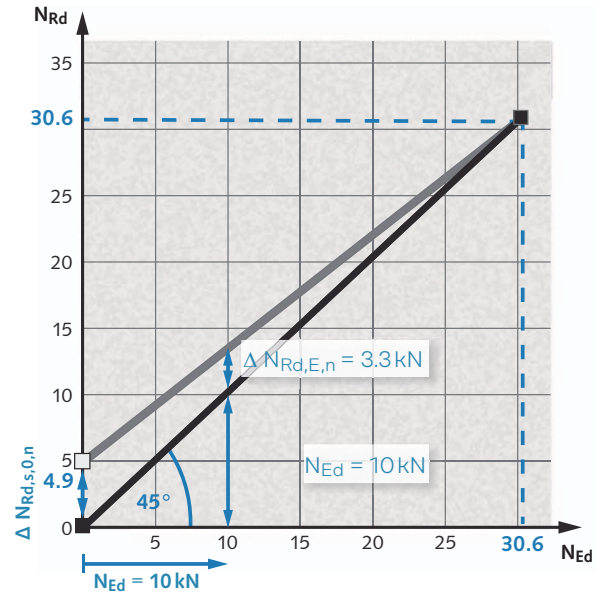
Design resistance for $n = 2 \times 10^6$ load cycles

Profile HTA-CE	Type	$\Delta N_{Rd,s,0,n}$	Allowable bolts	Material
40/22P	FV	2.94*	M12 M16	8.8 4.6 / 8.8
50/30P	FV	3.6*	M16 M20	4.6 / 8.8 4.6 / 8.8
52/34	FV	4.9*	M16 M20	8.8 8.8

* Safety factor of 1.35 included

Example (also see diagram to the right):
 Profile HTA-CE 52/34 - FV (standard, hot-dip galvanized),
 for $n = 2 \times 10^6$ load cycles:
 $N_{Rd} = 55 \div 1.8 = 30.6$ (taken from the ETA-09/0339)
 N_{Ed} from permanent load = 10 kN (assumption)
 $\Delta N_{Rd,E,n} = (30.6 - 10) \times 4.9/30.6 = 3.3$ kN

Diagram: HTA-CE 52/34 - FV
for $n = 2 \times 10^6$ load cycles



Minimum edge distances and minimum Halfen Bolt spacing

Anchors must be installed at a minimum distance from the component edges. The distance depends on the selected channel profile. According to the ETA, the spacing between bolts s_{cbo} must not be less than $s_{s,min} = 5 \times d_s$. Reduction of the load bearing capacity is required if $s_{cbo} < s_{sl,N}^*$.

The concrete load-bearing capacity must be verified for each individual case! (see ESR-1008)

* $s_{sl,N}$ = centre distance of the bolts
 subject to $N_{Rd,s,l}$
 See tables pages 18–19

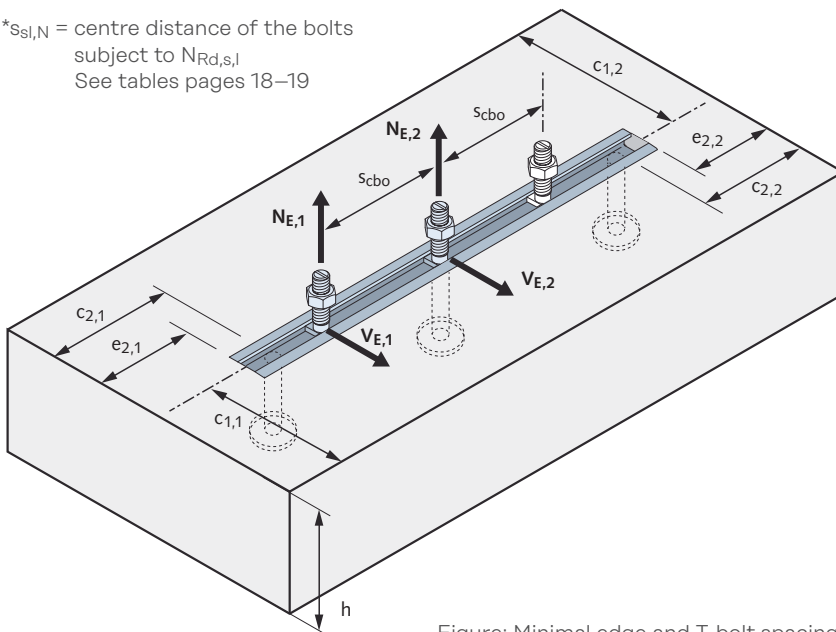


Figure: Minimal edge and T-bolt spacings

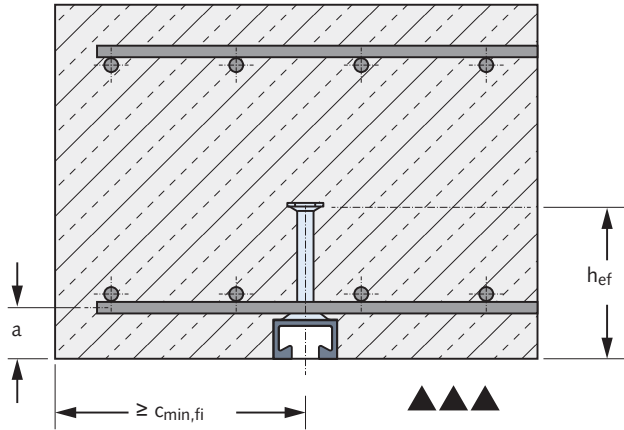
Edge and T-bolt spacing [mm]				
HTA-CE Profiles	M	$s_{s,min}$	c_{min}	e_{min}
28/15	6	30	40	15
	8	40	40	15
	10	50	40	15
	12	60	40	15
38/17	10	50	50	25
	12	60	50	25
	16	80	50	25
40/25 40/22P	10	50	50	25
	12	60	50	25
	16	80	50	25
49/30	10	50	75	50
	12	60	75	50
	16	80	75	50
	20	100	75	50
50/30P	10	50	75	40
	12	60	75	40
	16	80	75	40
	20	100	75	40
52/34 54/33	10	50	100	65
	12	60	100	65
	16	80	100	65
	20	100	100	65
55/42	10	50	100	65
	12	60	100	65
	16	80	100	65
	20	100	100	65
72/48	20	100	150	115
	24	120	150	115
	27	135	150	115
	30	150	150	115

Halfen HTA-CE Cast-In Channels

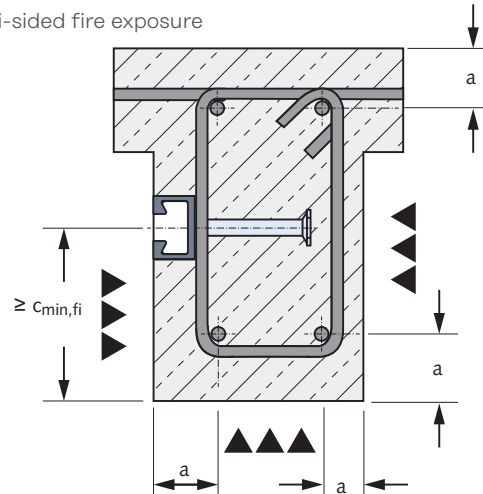
HTA-CE Fire Resistances

Halfen HTA-CE Cast-in Channels have been tested and classified for direct exposure to fire in accordance with EAD 330008 using the Standard ISO time-temperature curve (STC). The values shown in the table below are taken from ETA-09/0339.

Single-sided fire exposure



Multi-sided fire exposure



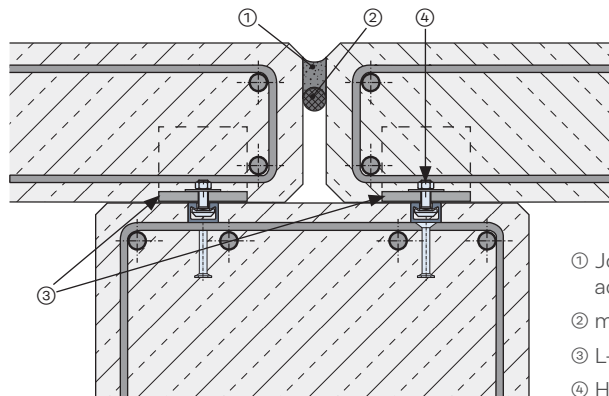
▲▲▲ fire exposure direction

Fire resistance capacities for HTA-CE Cast-in Channels — steel failure*												
Fire protection classes depending design resistances	HTA-CE	28/15	38/17	40/25	40/22P	49/30	50/30P	54/33	52/34	55/42	72/48	
	Halfen Bolt	M12	M16	M16	M16	M16	M20	M20	M20	M20	M24	
N_{Rd.s.fi} = V_{Rd.s.fi}	R30	1.9	3.2	3.6	6.0	4.0	9.5	8.9	10.1	10.3	14.8	
[kN]	R60	1.3	2.4	3.6	4.5	3.5	7.1	6.5	7.5	7.6	11.1	
	R90	0.7	1.4	2.0	2.9	2.5	4.8	4.2	4.8	4.9	7.3	
	R120	0.5	1.0	1.2	1.6	2.1	3.6	3.0	3.5	3.6	5.4	
Minimum axial spacing a [mm]	R30	35						50				
	R60	35						50				
	R90	45						50				
	R120	60						65	70			
Minimum edge spacing C_{min,fi} [mm]	fire exposure single-sided	90	152	158	182	188	212	310	310	350	358	
	fire exposure multi-sided	300	300	300	300	300	300	310	310	350	358	

Load capacities are valid for Halfen Cast-in Channels made of steel and stainless steel. Partial safety factor is = 1.0

* Concrete load capacity under fire exposure has to be verified for each individual case in accordance with EOTA TR 047 for strength classes C20/25 to C50/60.

Halfen Cast-in Channels are suitable for design connections of non-load bearing fire walls to concrete walls or columns.



- ① Joint sealing compound acc. to EN ISO 6927
- ② mineral fibre sealing rope
- ③ L-bracket ≥ 60 x 5 mm
- ④ Halfen Bolt diam. ≥ 10 mm

Halfen HTA-CE Cast-In Channels

HTA-CE Standard Lengths/HTA-CS – Curved Solution

HTA-CE Standard lengths

Standard lengths listed in the accompanying table are optimized lengths to reduce cut-offs.

Please contact Leviat for pricing and product information for items stocked locally. Non-stocked items subject to international freight lead times.

HTA-CE standard lengths and number of anchors				
Length [mm] / Number of anchors				
HTA-CE 72/48	HTA-CE 55/42	HTA-CE 40/25, 50/30P, 49/30, 52/34, 54/33	HTA-CE 40/22P	HTA-CE 28/15, 38/17
150/2	150/2	150/2	150/2	100/2
200/2	200/2	200/2	200/2	150/2
250/2	250/2	250/2	250/2	200/2
300/2	300/2	300/2	300/2	250/2
350/3	350/3	350/3	350/3	300/3
400/3	400/3	400/3	400/3	350/3
550/3	550/3	550/3	550/3	450/3
1050/5	1050/5	800/4	800/4 [ⓐ]	550/4
6070/25	6070/25	1050/5	1050/5	850/5
-	-	3030/13 [ⓐ]	1300/6 [ⓐ]	1050/6
-	-	6070/25	1550/7 [ⓐ]	3030/16
-	-	-	1800/8 [ⓐ]	6070/31
-	-	-	2050/9 [ⓐ]	-
-	-	-	2300/10 [ⓐ]	-
-	-	-	2550/11 [ⓐ]	-
-	-	-	3030/13 [ⓐ]	-
-	-	-	6070/25	-
Anchor spacing ≤ 250 mm				Anchor spacing ≤ 200 mm

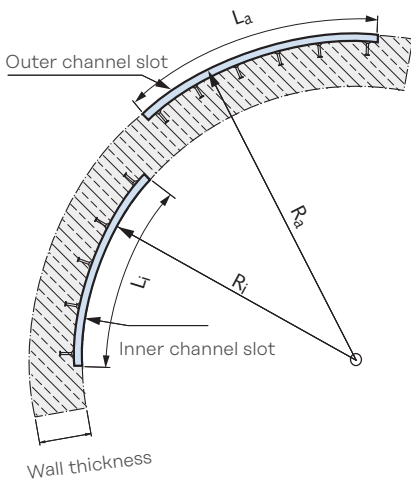
ⓐ Does not apply to HTA-CE 52/34, HTA-CE 54/33

ⓑ Does not apply to HTA-CE 40/22P - A4

Halfen HTA-CS Channels — Curved Solution

Areas of application:

- tunnel construction
- precast segments for utility tunnels
- curved walls
- sewage plants



R_i = Radius of inner channel slot

R_a = Radius of outer channel slot

L = Length of channel after bending (maximum 5400 mm)



Curved Halfen Cast-in Channels in tunnel segments

Ordering example:

Halfen Cast-in channel, curved
HTA-CS 52/34-Q - A4, $R_i = 4000$ mm, $L = 1050$ mm

HTA-CS Smallest radius [m]*									
Profile	HTA-CS 72/48	HTA-CS 54/33	HTA-CS 52/34	HTA-CS 50/30P	HTA-CS 49/30	HTA-CS 40/22P	HTA-CS 40/25	HTA-CS 38/17	HTA-CS 28/15
Material									
Inner channel slot: min. R_i	■ on request	0.80m	0.75m	on request	0.80m	on request	1.10m	0.70m	0.75m
	■ on request	0.80m	0.80m	on request	0.80m	on request	0.90m	0.70m	0.75m
Outer channel slot: min. R_a	■ on request	4.00m	3.60m	on request	3.00m	on request	2.20m	3.20m	2.00m
	■ on request	4.00m	3.60m	on request	5.70m	on request	1.70m	5.40m	7.80m

■ hot-dip galvanized ■ stainless A4

* please contact our technical support team for more detailed information

Halfen HZA Cast-in Channels, serrated

The benefits at a glance

In addition to their excellent adjustability, Halfen Cast-in Channels save considerable installation time.

The result – faster construction and therefore increased cost savings.

Safe and reliable

- load bearing capacity in all directions
- HZA and HZA DYNAGRIP® with Appraisal Report ESA-2023
- European Technical Assessment ETA
- innovative serration on channel lips and T-bolt heads provides additional mechanical interlock connection
- approved for fire-resistant structural elements
- hot-rolled channels, suitable for fatigue loads
- suitable for use in earthquake safety design
- hot-rolled channels are free from inherent stress

Quick and economical

- adjustable anchorage
- bolts instead of welding
- maximum efficiency when installing in rows
- cost-effective installation using standard tools
- optimized pre-planning reduces construction time
- user-friendly installation; no noise, dust and vibration

HZA Cast-in Channels, cold-formed, serrated



European Technical Assessment



serrated



3D - Loads



approved for seismic loading



HZA DYNAGRIP® Cast-in Channels, serrated



European Technical Assessment



serrated



3D - loads



suitable for fatigue loads



suitable for seismic loading



HZA-PS Cast-in Channels, hot-rolled, serrated



European Technical Assessment



serrated



3D - loads



suitable for fatigue loads



suitable for seismic loading



suitable for applications in safety relevant areas in nuclear facilities



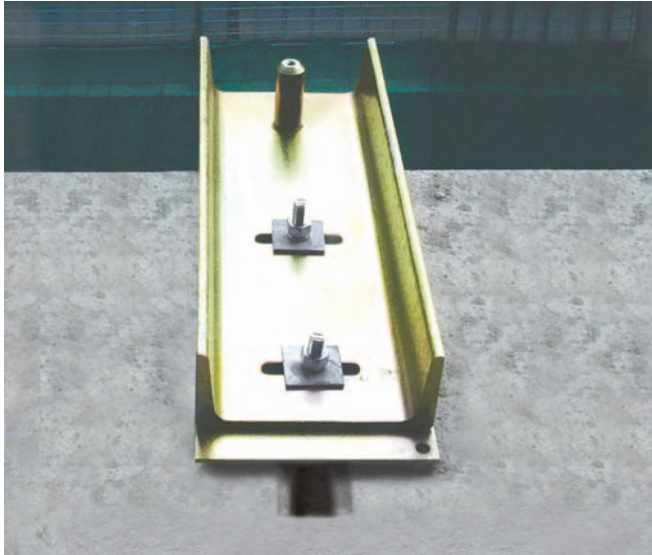
HZA-PS Cast-in Channels

More Information on the HZA-PS is available at:
www.ancon.co.nz

Halfen HZA Cast-In Channels

Application Examples: Installations with Halfen HZA Cast-In Channels

Curtain wall



Fixings of a Curtain wall façade, HZA near edge installation

Façade



Fixings for emergency access balconies (Vertical installation of Halfen Channels)

Industrial plant installations



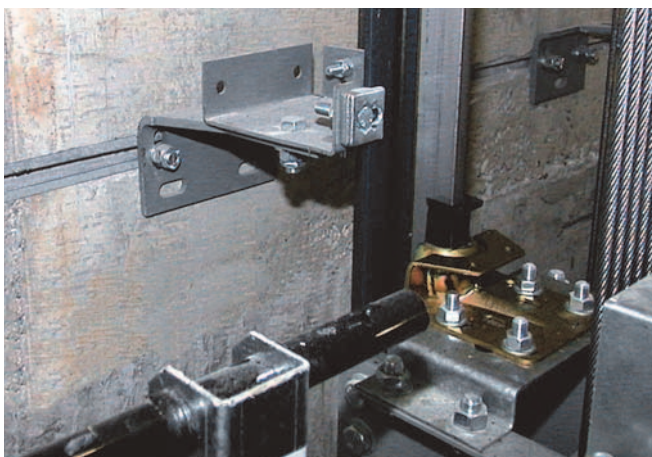
Pipe supports on vertical HZA Channels

Ski lift



Fixing of the drive unit for a ski lift

Lifts/Elevators



Fixing for guide-rails

Industrial building



Vertical channels in columns to attach further components

Halfen HZA Cast-In Channels

Product Range

Dimensions and properties Halfen HZA Cast-in Channels, serrated						
Profile	HZA 64/44 DYNAGRIP®	HZA 53/34 DYNAGRIP®	HZA 41/27 DYNAGRIP®	HZA 38/23 DYNAGRIP®	HZA 29/20 DYNAGRIP®	HZA 41/22
Geometry Halfen HZA Channels	hot-rolled					cold-formed

① Nominal size and tolerance

Material material description: see page 12	Steel	■	■	■	■	■	■
	A4	■	■	-	■	-	■
T-bolt	HZS 64/44	HZS 53/34	HZS 38/23	HZS 38/23	HZS 29/20	HZS 41/22	
Threads	M20-M24	M16-M20	M12-M16	M12-M16	M12	M12-M16	
$s_{i,N} = s_{i,v}$ [mm]	128	105	80	76	58	83	
Profile load capacity*							
$N^0_{Rd,s,l}$ [kN]	Steel	89.6	59.0	40.2	29.5	17.2	13.6
	SST	70.8	52.5	-	29.5	-	13.6
$V^0_{Rd,s,l,y}$ [kN]	Steel	101.6	51.1	34.8	25.5	13.0	14.7
	SST	61.4	51.1	-	25.5	-	14.7
$V_{Rd,s,l,x}$ [kN]	Steel	55.8	38.4	15.3	12.7	9.5	7.9
	SST	51.6	28.4	-	12.7	-	7.9
$M_{Rd,s,flex}$ [Nm]	Steel	5895	3481	1955	1414	742	623
	SST	6734	3067	-	1414	-	623
Geometry							
h_{nom} [mm] ① ②	(187)	161 (165)	155	99	87	85	
b_{ch} [mm]	64.0	52.5	40.0	38.0	29.0	41.3	
h_{ch} [mm]	44.0	34.0	27.0	23.0	20.0	20.7	
I_y [mm ⁴]	240300	92600	39000	21100	10200	12600	
h_{ef} [mm]	178	155	148	94	82	82	
c_{min} [mm]	125	100	75	75	50	50	

c_{min} = minimal spacing channel/concrete edge
 $s_{i,N}$ = axial spacing for bolts for $N^0_{Rd,s,l}$
SST = general for all stainless steel variants

$N^0_{Rd,s,l}$ = channel lip load capacity (tension)
 $V^0_{Rd,s,l}$ = channel lip load capacity (perpendicular shear)
 $V_{Rd,s,l,x}$ = channel lip load capacity (longitudinal shear)

① Nominal size and tolerance
 ② weld-on I- or T- anchors subject to available stock; for these (h_{nom}) values are in brackets.

* Other failure modes might be decisive and have to be verified for each individual case (taking the geometric boundary conditions into account). Reduction factors in accordance with ICC ESA-2023 are included within all design load capacities in this table.



All hot-rolled profiles are suitable for fatigue loads. Additionally the channels HZA 53/34, HZA 38/23 and HZA 41/27 have an ETA approval for fatigue loading.

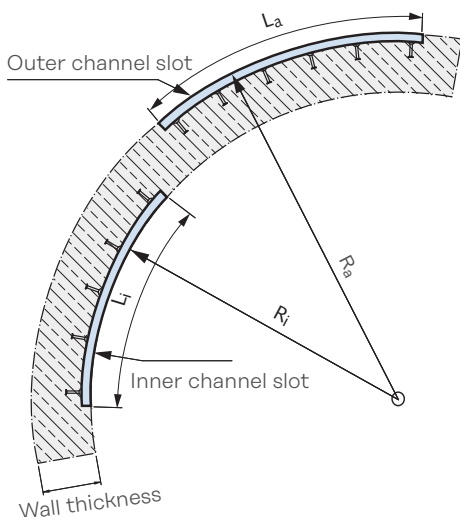
Halfen HZA Cast-In Channels

Standard Lengths/Halfen HZA Channels Curved Solution

Halfen HZA Channels — Standard lengths

Standard lengths – Length [mm] / Number of anchors									
	HZA 64/44; 53/34	HZA-PS 64/44; 53/34	HZA 41/27	HZA-PS 41/27	HZA 38/23	HZA-PS 38/23	HZA 29/20	HZA-PS 29/20	HZA 41/22
<p>This tables lists the standard lengths of cast-in channel in the Halfen HZA Product range.</p> <p>Standard lengths listed in the accompanying table are optimized lengths to reduce cut-offs.</p> <p>Please contact Leviat for pricing and product information for items stocked locally.</p> <p>Non-stocked items subject to international freight lead times.</p>	-	-	-	-	-	-	-	-	100/2
	150/2	-	150/2	-	150/2	-	150/2	-	150/2
	200/2	200/2	200/2	200/2	200/2	200/2	200/2	200/2	200/2
	250/2	-	250/2	-	250/2	-	250/2	-	250/2
	300/2	-	300/2	-	300/2	-	300/3	-	300/2
	350/3	350/3	350/3	350/3	350/3	350/3	350/3	350/3	350/3
	400/3	-	400/3	-	400/3	-	400/3	-	400/3
	550/3	550/3	550/3	550/3	550/3	550/3	550/4	550/4	550/3
	-	800/4	-	800/4	800/4	800/4	-	800/5	-
	1050/5	1050/5	1050/5	1050/5	1050/5	1050/5	1050/6	1050/6	1050/5
	-	3030/13	-	3030/13	3030/13	3030/13	3030/16	3030/16	-
	6070/25	6070/25	6070/25	6070/25	6070/25	6070/25	6070/31	6070/31	6070/25

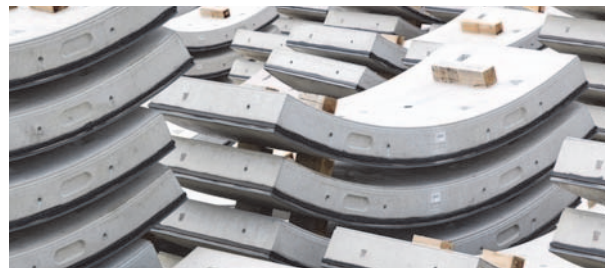
Halfen HZA Channels curved solution



R_i = Radius of inner channel slot
 R_a = Radius of outer channel slot
 L = Length of channel after bending (maximum 5400 mm)

Areas of application:

- tunnel construction
- reinforced concrete tunnels for utilities
- curved walls
- sewage plants



Curved Halfen Cast-in Channels in tunnel segments

Ordering example:

Halfen Cast-in channel, curved
 HZA-CS 53/34-Q - A4, $R_i = 4000$ mm, $L = 1050$ mm

Smallest radius [m]*							
Profile	Material	HZA-CS	HZA-CS	HZA-CS	HZA-CS	HZA-CS	
		64/44	53/34	41/27	38/23	29/20	41/22
Inner channel slot: min. R_i	■	on request	on request	on request	2.60m	0.85m	0.70m
	■	on request	on request	-	1.20m	-	0.70m
Outer channel slot: min. R_a	■	on request	on request	on request	1.40m	1.10m	2.20m
	■	on request	on request	-	3.50m	-	4.80m

■ hot-dip galvanized ■ A4 stainless steel

* please contact our technical support for more information

Halfen HZA Cast-In Channels

Halfen HZS Bolts

Available Halfen HZS Bolts

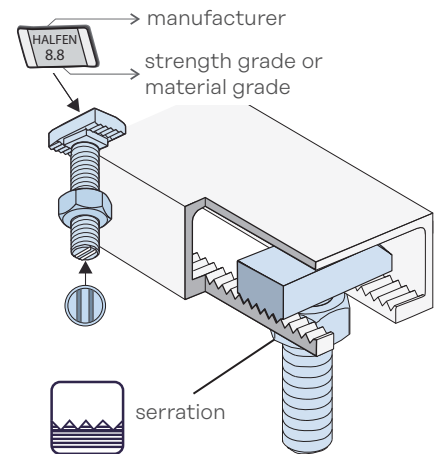


Halfen HZS Bolt, serrated, incl. nut



Please order washer separately

- The serration additionally ensures a positive load transmission in the longitudinal channel direction. The danger of T-bolt slippage is minimized.
- The Halfen Bolt is marked on the shaft end with 2 notches.
- Strength grade or material grade is marked on the T-bolt heads



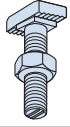
Halfen HZS Bolts										
Halfen Bolt	HZS 64/44		HZS 53/34		HZS 38/23		HZS 29/20	HZS 41/22		Other Halfen bolt lengths and materials are available on request! FV = Steel, hot-dip galvanised GV = Steel, zinc-plated A4 = Stainless steel
Suitable for profile	64/44		53/34		41/27; 38/23		29/20	41/22		
Bolts dimensions										
∅	M20	M24	M16	M20	M12	M16	M12	M12	M16	Material details and corrosion protection: see page 12–13 *on request
l [mm]										
30	-	-	-	-	GVs 8.8	-	GVs 8.8	-	-	
35	-	-	-	-	-	-	-	A4-50 FV 8.8	-	
40	-	-	-	-	GVs 8.8	GVs 8.8	GVs 8.8	-	-	
50	-	-	-	-	FV 8.8* GVs 8.8	GVs 8.8	FV 8.8* GVs 8.8	A4-50 FV 8.8	A4-50 FV 8.8	
60	-	-	A4-70 FV 8.8* GVs 8.8	-	GVs 8.8	A4-70 FV 8.8 GVs 8.8	GVs 8.8	-	-	
65	-	-	-	FV 8.8* A4-70 GVs 8.8	-	-	-	-	-	
80	A4-70* FV 8.8* GVs 8.8*	A4-70* GVs 8.8*	FV 8.8*	FV 8.8*	GVs 8.8	A4-70 FV 8.8* GVs 8.8	GVs 8.8	A4-50	-	
100	-	FV 8.8*	A4-70 FV 8.8* GVs 8.8	A4-70 GVs 8.8	GVs 8.8	GVs 8.8	-	-	FV 8.8	
125	A4-70* GVs 8.8*	-	-	-	-	-	-	-	-	
150	-	A4-70* GVs 8.8*	-	-	-	GVs 8.8	-	-	-	

Halfen HZA Cast-In Channels

Halfen Bolts: Dimensioning

Halfen HZS Bolts — Load capacity and bending moment

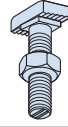
Design resistance HZS with hot-rolled HZA DYNAGRIP® Cast-in Channels



DYNAGRIP®
HZA 64/44; HZA 53/34; HZA 41/27;
HZA 38/23; HZA 29/20

Material / Strength class		M12	M16	M20	M24
8.8	$N_{Rd,s,s}$ [kN]	43.8	81.6	127.4	183.6
	$V_{Rd,s,s}$ [kN]	24.3	45.2	70.6	101.6
	$M^0_{Rd,s,s}$ [Nm]	68.9	173.6	336.8	583.7
A4-70	$N_{Rd,s,s}$ [kN]	38.4	71.4	111.5	160.6
	$V_{Rd,s,s}$ [kN]	21.2	39.5	61.7	89.0
	$M^0_{Rd,s,s}$ [Nm]	59.5	151.6	295.6	510.9

Design resistance HZS with cold-formed HZA Cast-in Channels



HZA 41/22

Material / Strength class		M12	M16
8.8	$N_{Rd,s,s}$ [kN]	31.5	62.6
	$V_{Rd,s,s}$ [kN]	24.3	45.2
	$M^0_{Rd,s,s}$ [Nm]	68.9	173.6
A4-50	$N_{Rd,s,s}$ [kN]	30.2	48.0
	$V_{Rd,s,s}$ [kN]	13.1	24.4
	$M^0_{Rd,s,s}$ [Nm]	49.1	125.3

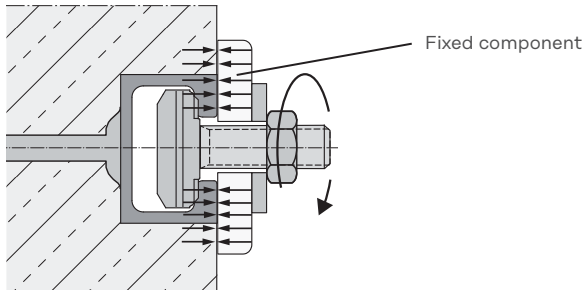
i Strength reduction factors from ICC ESA-2023 are included. The values in this table are simplified for the safe side. Depending on the size of the bolt head or with more favorable load combinations, higher design resistances are possible. Detailed information can be found in the ICC ESA-2023 report.

HZA 64/44 and HZA 29/20 and all M24 bolts are not part of the ICC Approval.

Torque values for Halfen HZS Bolts

Standard

Components are braced against the concrete and anchor channel. Torque is applied as in the following table and must not be exceeded.

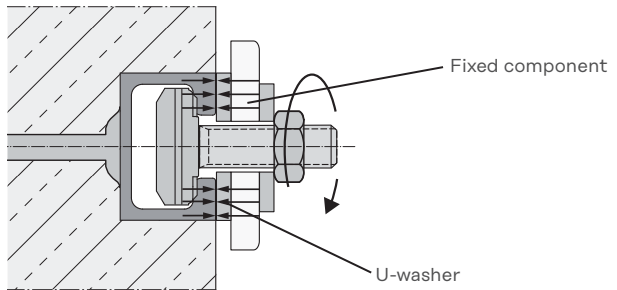


Standard torque values

HZA Profile	Halfen Bolt HZS...M [mm]	Torque value T_{inst} [Nm]		
		Steel 8.8	Stainless steel Strength class 50	Stainless steel Strength class 70
41/22	12	30	20	-
	16	40	50	-
29/20	12	35	-	-
38/23	12	70	-	50
	16	94	-	75
41/27	12	70	-	-
	16	129	-	-
53/34	16	185	-	130
	20	235	-	165
64/44	20	315	-	250
	24	375	-	335

Steel-Steel

Components are braced against the anchor channels using suitable washers. Torque is applied as in the following table and must not be exceeded.



Torque values steel-steel

HZA Profile	Halfen Bolt HZS...M [mm]	Torque value T_{inst} [Nm]		
		Steel 8.8	Stainless steel Strength class 50	Stainless steel Strength class 70
41/22	12	50	20	-
	16	140	50	-
29/20	12	75	-	-
38/23	12	70	-	50
	16	185	-	130
41/27	12	70	-	-
	16	185	-	-
53/34	16	185	-	130
	20	360	-	250
64/44	20	360	-	250
	24	625	-	435

These tables, show the respective values of the tightening torque of the bolts from both approvals, ESA-2023 and ETA-09/0339 adapted to be conservative. Higher values are possible according to the respective situation and can be found in the approval that is used for the proof.

Tightening torques [lbf] and [Nm] are also provided in the installation instructions of the bolts.

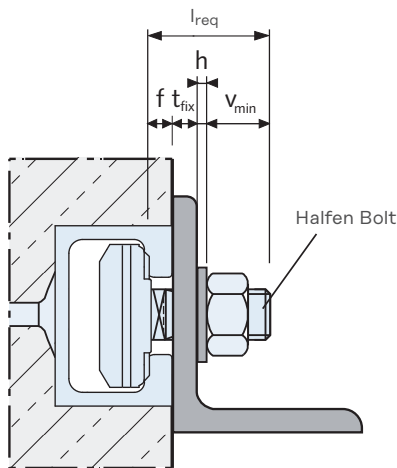
! Torque values apply only to bolts in delivery condition (unlubricated).

Halfen HZA Cast-In Channels

Minimum Edge Distances and Minimum Bolt Spacing/Bolt Length

Calculating the bolt length l_{req} for Halfen HZS Bolts

$$l_{req} = t_{fix} + f + h + v_{min}$$



Dimensions v_{min}	
T-bolt diameter	v_{min} [mm]
M12	17.0
M16	20.5
M20	26.0
M24	29.0

Lip dimensions f	
Channel profile	f [mm]
64/44	10.0
53/34	7.5
41/27	7.0
38/23	5.5
29/20	5.0
41/22	7.0

- l_{req} = required T-bolt length
- t_{fix} = thickness of clamped component
- f = profile lip height
- h = washer thickness
- v_{min} = nut height EN ISO 4032 + overhang approximately 5 mm (\geq M20: 7 mm)

Minimum edge distances and minimum Halfen Bolt spacing

Anchors must be installed at a minimum distance from the component edges. The distance depends on the selected channel profile. According to the ETA, the spacing between bolts s_{cbo} must not be less than $s_{s,min} = 5 \times d_s$. Reduction of the load bearing capacity is required if $s_{cbo} < s_{sl,N}^*$ (see table on page 30).

The concrete load-bearing capacity must be verified for each individual case! (see ESA-2023)

* $s_{sl,N}$ = centre distance of the bolts subject to $N_{Rd,s,l}$ See tables on page 30

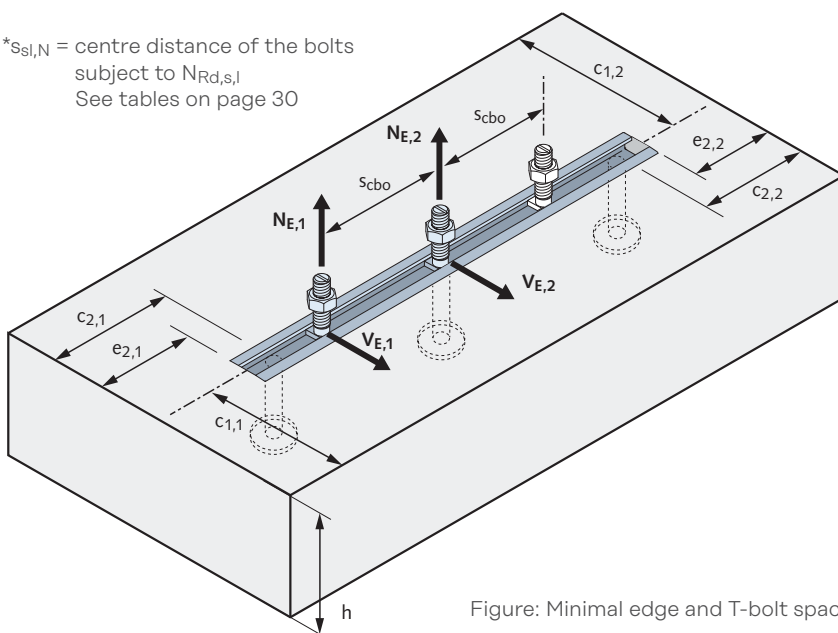


Figure: Minimal edge and T-bolt spacings

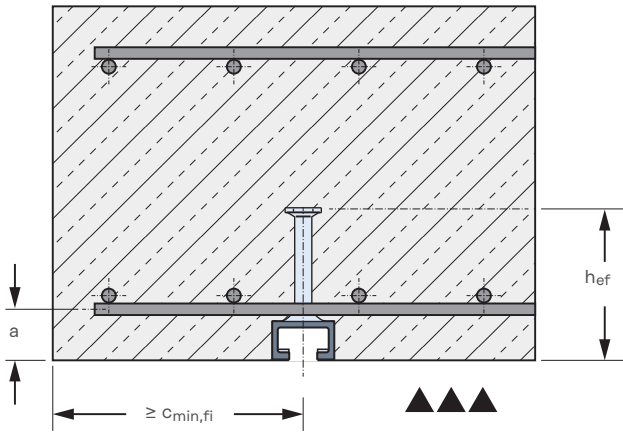
Edge and T-bolt spacing [mm]				
HZA Profiles	M	$s_{s,min}$	c_{min}	e_{min}
64/44	24	120	125	90
	20	100		
53/34	20	100	100	65
	16	80		
41/27	16	80	75	40
	12	60		
38/23	16	80	75	47
	12	60		
29/20	12	60	50	22
41/22	16	80	50	22
	12	60		

Halfen HZA Cast-In Channels

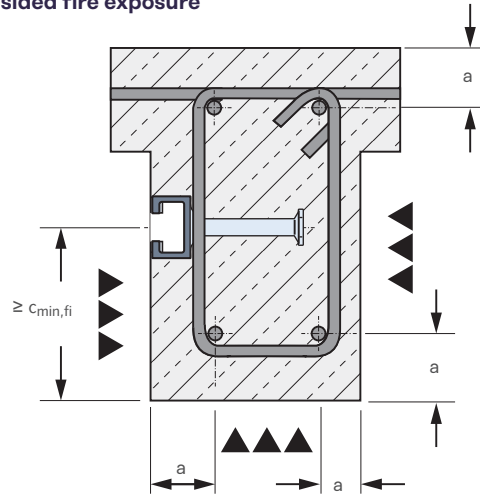
HZA Fire Resistances

Halfen HZA Cast-in Channels have been tested and classified for direct exposure to fire in accordance with EAD 330008 using the Standard ISO time-temperature curve (STC). The values shown in the table below are taken from ETA-20/1081.

Single-sided fire exposure



Multi-sided fire exposure



▲▲▲ fire exposure direction

Fire resistance capacities for HZA Cast-in Channels, serrated — steel failure*													
Fire protection classes depending design resistances	HZA	29/20		38/23		41/27		53/34		64/44		41/22	
	Halfen Bolt	M12	M12	M16	M12	M16	M16	M20	M20	M24	M12	M16	
$N_{Rd,s,fi} = V_{Rd,s,y,fi}$ [kN]	R30	2.7	3.5	4.5	3.5	4.5	4.5	10.3	10.3	17.0	2.4	2.3	
	R60	2.1	2.7	3.3	2.7	3.3	3.3	7.8	7.8	14.8	1.7	1.8	
	R90	1.5	1.9	2.1	1.9	2.1	2.1	5.3	5.3	9.9	1.1	1.2	
	R120	1.3	1.5	1.5	1.5	1.5	1.5	4.0	4.0	7.4	0.7	1.0	
Minimum axial spacing a [mm]	R30	25	30		35		40		50		25		
	R60	25	30		35		40		50		25		
	R90	35	35		35		40		50		35		
	R120	50	50		50		50		50		50		
Minimum edge spacing $C_{min,fi}$ [mm]	fire exposure single-sided	164	188		296		310		356		164		
	fire exposure multi-sided	300	300		300		310		356		300		

Load capacities are valid for serrated Halfen HZA Cast-in Channels made of steel and stainless steel. Reduction factor is = 1.0

* Concrete load capacity under fire exposure has to be verified for each individual case in accordance with EOTA TR 047 for strength classes C20/25 to C50/60.

Halfen HZA Cast-In Channels

Fatigue Loads

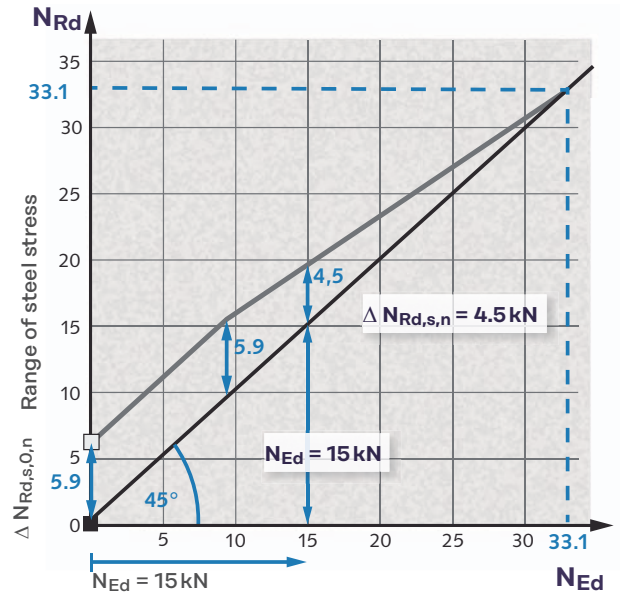
HZA Cast-in Channels; design resistance for $n = 2 \times 10^6$ load cycles

Profile HZA	Type	$\Delta N_{Rd,s,0,n}$	$N_{lod,s,n}$	Allowable bolts	Material
38/23	FV	3.4*	6.2**	M16	8.8
41/27		3.4*	6.2**	M16	
53/34		5.9*	9.2**	M20	
64/44		8.7*	20.2**	M24	

*Safety factor of 1.35 included in accordance with ETA-20/1081
 ** For $N_{lod,s,n}$ safety factor is 1.8

Example (also see diagram to the right):
 Profile HZA 53/34 - FV (serrated, hot-dip galvanized),
 for $n = 2 \times 10^6$ load cycles:
 $N_{Rd} = 59.6 \div 1.8 = 33.1$ (taken from the ETA-20/1081)
 N_{Ed} from permanent load = 15 kN (assumption)
 $\Delta N_{Rd,E,n} = (33.1 - 15.0) \times 5.9 / (33.1 - 9.2) = 4.5$ kN

Diagram: HZA 53/34 - FV for $n = 2 \times 10^6$ load cycles



Tender text example

Halfen HZA type Channel 53/34 - FV - 350 - KF

Halfen HZA Channel, serrated 53/34 DYNAGRIP® with serrated channel lips for adjustable fixing of components,

according to ICC-ES Appraisal Report ESA-2023 in compliance with NZS 3101, suitable for anchoring in cracked or uncracked normal-weight concrete with compressive strength of 20.0 MPa to 69.0 MPa, under static, quasi-static, dynamic loading as well as fire exposure.

Type HZA 53/34 - FV - 350 - KF

with

$N_{Rk,s,c} = 59$ kN = char. resistance, steel failure (tension), connection channel anchor

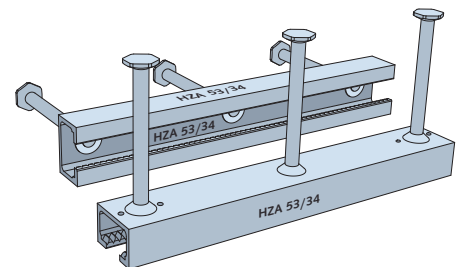
$\Delta N_{Rk,s,lo,n} = 8,0$ kN = char. fatigue resistance (2×10^6 load cycles), steel failure (tension),

FV = Corrosion protection, hot-dip galvanized

350 = Channel length [mm] with 3 anchors,

KF = Foam strip filler,

or equivalent; deliver and install according to the manufacturer's instructions.



Halfen HTA-CE/HZA Cast-In Channels

Installation Aids/Further Channel Parts

ANK-E end anchor; for on-site custom cut-length of Halfen Cast-in Channels

Notes for assembling end anchor, type ANK-E

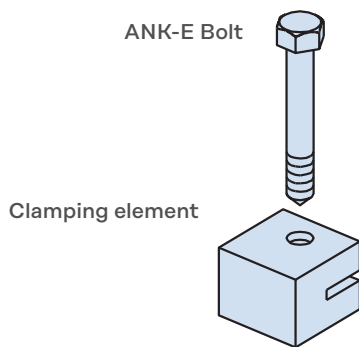
Cut the Halfen Cast-in channel at the selected point. The cut face must be at a right angle to the longitudinal axis of the channel. The end projection "e" should not be less than 35mm and not more than 175 (225)mm*.

Select the correct ANK-E End anchor for the Halfen Cast-in channel profile; see table on the right. Slide the clamping element on to the back of the channel. If necessary, push in the foam filler at the end of the channel.

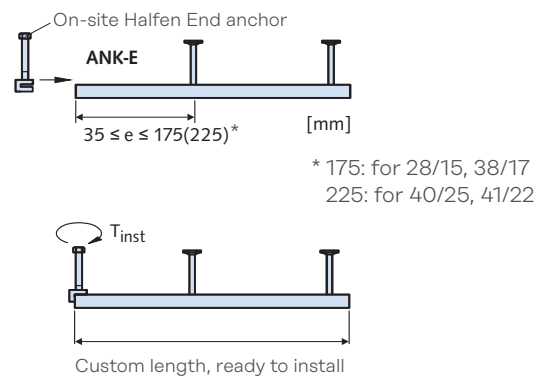
Tighten the bolt by applying the required torque. See table (right) for correct torque value.

End anchor selection			
for profile	End anchor	Thread	Torque T_{inst} [Nm]
28/15 - FV	ANK-E1 - FV	M8	10
28/15 - A4	ANK-E1 - A4	M8	10
38/17 - FV	ANK-E2 - FV	M10	20
40/25 - FV			
41/22 - FV ①			
38/17 - A4	ANK-E2 - A4	M10	20
40/25 - A4			
41/22 - A4 ①			

① Short HZA 41/22 sections may be used with one end anchor only. Not included in the approval.



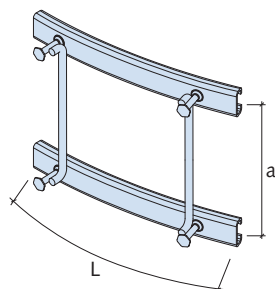
Custom lengths



Halfen Channel pairs

Material/type:
Channel (Type straight or curved):
FV = Hot-dip galvanized
A4 = Stainless steel

Spacer:
Reinforcement steel B500B or B500B/A SST, \varnothing 10-16mm
Recommended for stainless steel type spacers in: B500B/A SST.



Ordering example:

Type: Halfen Channel pair HTA-CE 38/17
Dimensions: L = 350mm, a = 200 mm
Material: hot-dip galvanized, with filler
Radius: $R_i = \dots$ (for curved type)

Halfen Corner channel

Material/type:
Channel (Type straight or curved):
FV = Hot-dip galvanized
A4 = Stainless steel

Standard type:
a/b = 125/250mm
Other lengths for a and b and other profiles are available on request

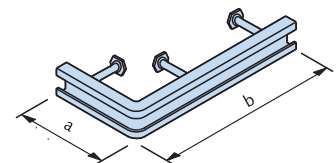


Figure: HTA-CE 38/17 – Corner piece

Area of application:

- fixing for Halfen Console anchors for supporting brickwork cladding
- other near edge fixings

Halfen HTA-CE/HZA Cast-In Channels

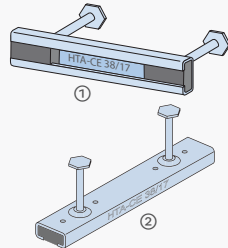
Installation/Assembly

1.1 Delivery and identification

We can supply ready to install short channels and standard lengths.

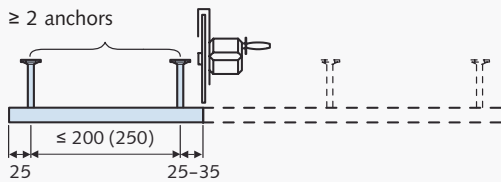
Product identification

- ① inside the channel
- ② also on the channel side



1.2 Installing to formwork

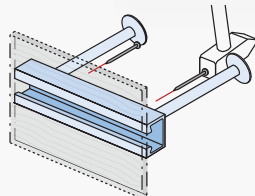
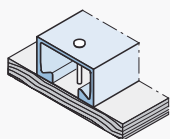
If required, Halfen Cast-in Channels can also be cut to size on site.



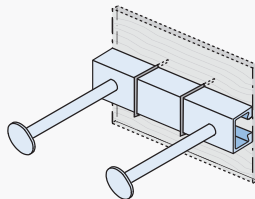
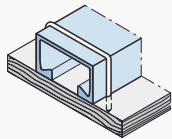
2.1 Fixing to the formwork

Timber formwork

2.1.1 with nails

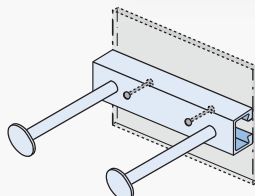
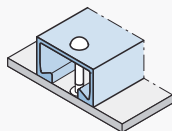


2.1.2 with staples

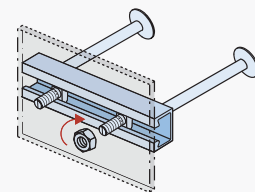
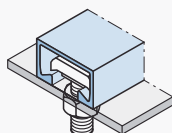


Steel formwork

2.1.3 aluminium rivets



2.1.4 Halfen Bolt and nut



2.1 Fixing to the formwork, continued

Steel formwork

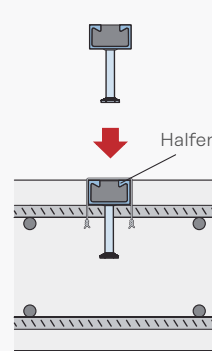
2.1.5 Halfen HFK Fixing cone



2.2 Top face installation

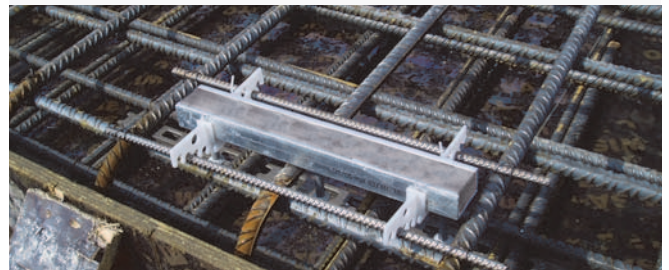
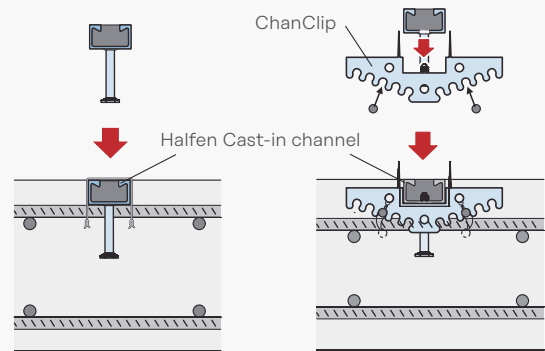
2.2.1

directly to reinforcement:
with tying wire

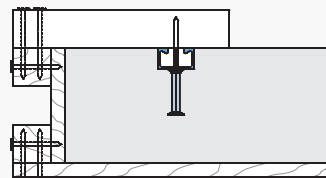


2.2.2

with Halfen HCP ChanClip



2.2.3 Installation using an auxiliary aid



Halfen HTA-CE/HZA Cast-In Channels

Installation/Assembly

3.1 Removing the filler

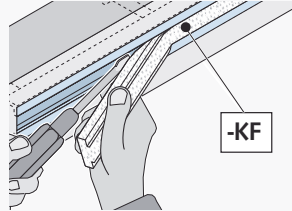
Strip filler, available in two versions:



KF – PE strip filler with reinforcement layer



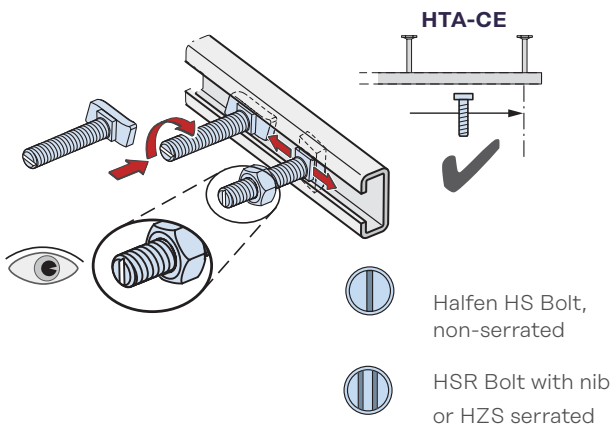
KF – PE strip filler



Removing the strip filler

Grip the strip filler at one end and pull out in one piece by hand; use a tool, e.g. a screwdriver.

4.1 Installing Halfen Bolts



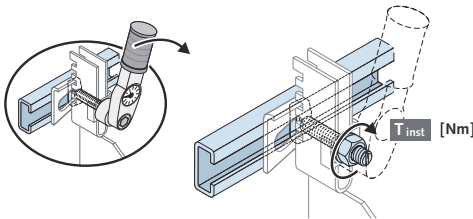
Safe assembly with Halfen Cast-in Channels

Halfen Bolts can be inserted anywhere in the channel slot, turned 90° and then locked in place by tightening the nut. Do not position bolts at channel ends past the last anchor.

On channels with bolt anchors, the anchor locations are visible through the channel slot.

Check

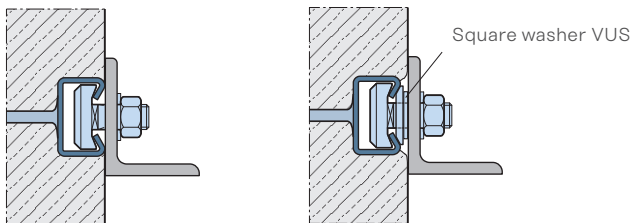
Bolts: After installation check that the bolts are properly aligned; the notch or notches in the tip of the shank must be at right angles to the longitudinal axis of the channel.



Fixings

The T-bolt heads must sit flush on both lips of the anchor channel and be secured by tightening the nut with a torque wrench with the required value. Observe the torque values in the tables on page 23-24 for HS/HSR or page 33 for HZS.

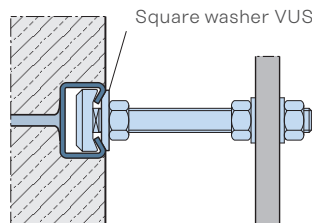
Direct attachment ①



Surface-flush installation Non-flush installation

- ① If the front surface of the channel is set back from the concrete surface, the attached structure must be shimmed with a washer (VUS).
In case of shear stress, add bolt flexure to the tensile force.

Stand-off installation ②



- ② Always install a square washer for stand-off installations.

Example:

Halfen Channel: HTA-CE 49/30
Halfen Bolt: HS 50/30 - M16
Washer: VUS 49/30 - M16



Assembly instructions

Multi-language assembly instructions are delivered with the Halfen Cast-in Channels and with each Halfen Bolt card box. Additionally they can be found at [www.halfen.com / Downloads / Brochures / Assembly Instructions](http://www.halfen.com/Downloads/Brochures/Assembly%20Instructions).

Halfen HTA-CE/HZA Assembly

Installation in Pre-stressed Concrete

Halfen Anchor Channels, hot-dip galvanized with stainless steel anchors

Requirements according to EN 1992-1-1/NA (EC 2 with German National Annex, 2nd edition, 2016, chapter 8.10.1.1) "Ensure at least 20 mm concrete between pre-stressed tension strands and galvanized components." Otherwise there is a risk of hydrogen induced cracking.

Solution

If hot-dip galvanized channels are used together with stainless steel bolt anchors then the pre-stressed tension-strands are allowed to have contact with the stainless steel bolt anchor.

Types:

Lengths available:
up to 6.07 m

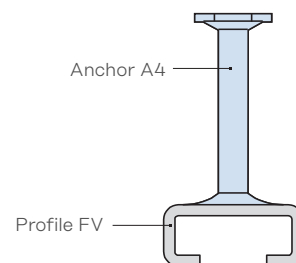
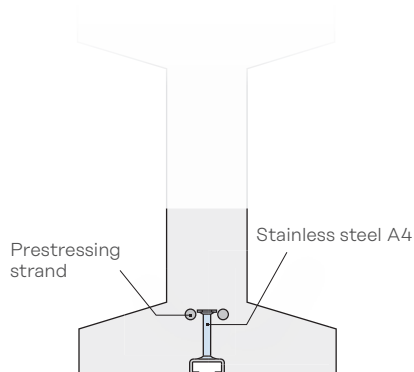
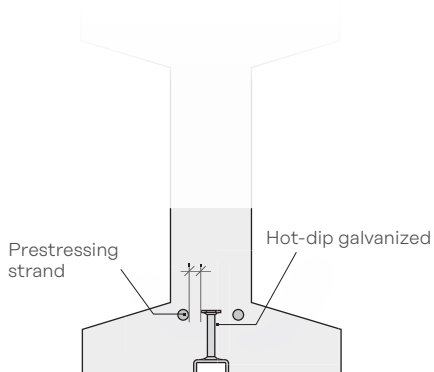
Available profiles:

50/30P

49/30

40/25

38/17



Halfen Cast-In Channels

Dimensioning HTA-CE and HZA Cast-in Channels

Halfen HTA-CE/HZA Software

The Halfen Calculation program for Halfen Cast-in Channels according to the ETA provides the user with a convenient and very powerful calculation tool.

Verifications

All necessary verifications are processed by the user-friendly dimensioning software. In just a few seconds the user is provided with a list of suitable Halfen Cast-in Channels for the relevant load situation.

Boundary conditions

The calculation takes into account all necessary boundary conditions, typical examples being:

- cracked or non-cracked concrete
- the geometry of the concrete components, in particular the distances from the channel to the component edge
- various reinforcement patterns
- consideration of several dimensioning or characteristic loads
- position of the loads with a definable adjustment range, and the option of shifting the defined T-bolt pattern along the complete channel length
- verification of the required Halfen Bolts and if required also for stand-off installations
- verification of longitudinal forces in Halfen HZA serrated cast-in channels

Input

The geometry and loads are entered interactively. Entries are displayed promptly in a 3D graphic. Entries can also be changed directly in the graphic. Click on the load, the measurement or the component line you want to change, to make the required modification.

Input loads

In addition to direct input of bolt loads, it is also possible to calculate the resulting loads by entering the actions/loads caused by secondary components (for example, curtain wall applications).

Results

After calculation, the software output provides either the results for a preselected profile, or in the case of automatic selection a list of all suitable profiles. Profiles and bolts with incomplete verifications are high-lighted in red.

Visual control

All verifications for the current channel profile are listed in a tree structure. Green check-marks indicate successful verifications. Red check-marks indicate unsatisfactory verifications.

For further visual control a progress bar on the right indicates the status of the verification process. Here too, red bars mean that a load has been exceeded, while green bars symbolize verifications that meet the criteria.

Detailed calculation information (with load positions, section sizes and utilization factors) can also be selected in a tree menu.

After selecting a Halfen Cast-in Channel and suitable T-bolts, the dimensioning results can be imported into the data list and saved.

Print-outs

Print-outs are possible in a brief and in a verifiable long version. The long version includes all decisive verifications, a diagram of necessary reinforcement and a 2D graphic of the geometry and load.

The latest version of the dimensioning program is available for download on the Internet at www.ancon.co.nz

System requirements:

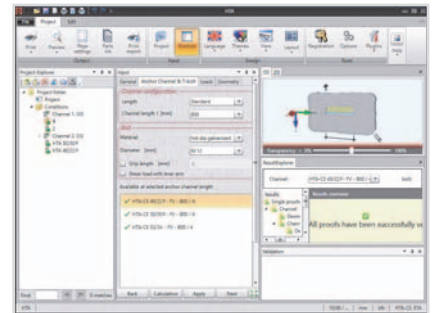
Windows 11, Windows 10, Windows 8,
Microsoft .NET Framework 4.7.2 or higher version
(.NET framework can be downloaded from our software portal)

The Halfen design software also contains calculation kernels for verifications according to AS 5216 and ICC-ES-AC232*.

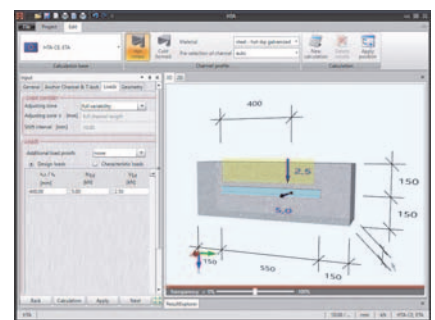
The values of ICC ESA-2023 are not part of the design software

* ICC ESR-1008 values are part of the ICC-ES -AC232 calculation kernel. For any questions, please contact your local distributor. Addresses can be found at the end of this catalogue.

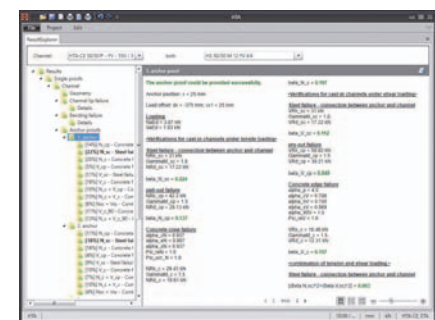
All software can be found under: www.ancon.co.nz



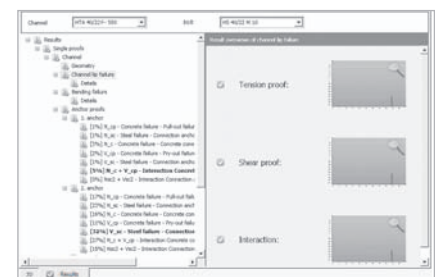
Input screen, Halfen Anchor Channel Software



Interactive 3D display



Results list



Overview of results



Print preview

Halfen Curtain Wall System

The benefits at a glance

Modern buildings require façades of the highest quality that can be installed quickly and safely.

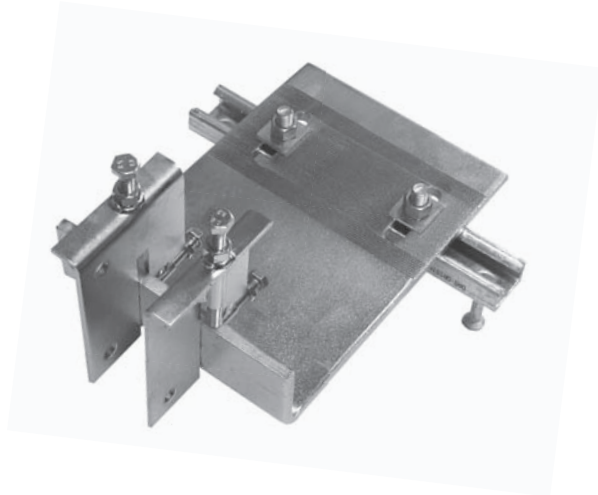
This is the reason the Halfen Curtain Wall System is chosen more and more frequently by architects and investors.

Fast and cost-effective

- 3-dimensional adjustable connection when used with cast-in channels
- uses bolts instead of welding
- fast assembly reduces installation time

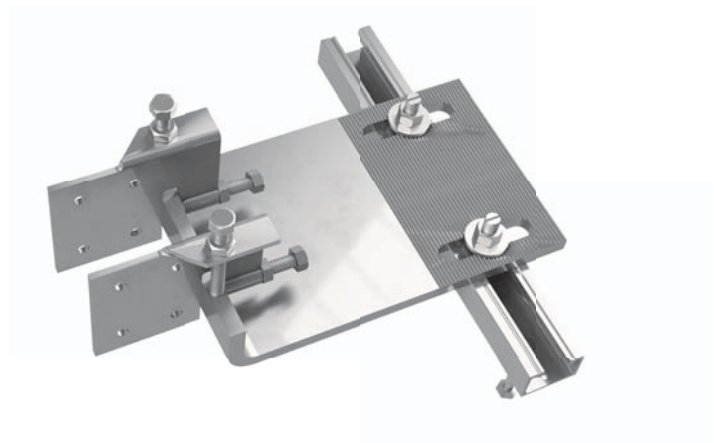
HCW-B2 Bracket

For modular façades. Anchored to the top surface of floor slabs.



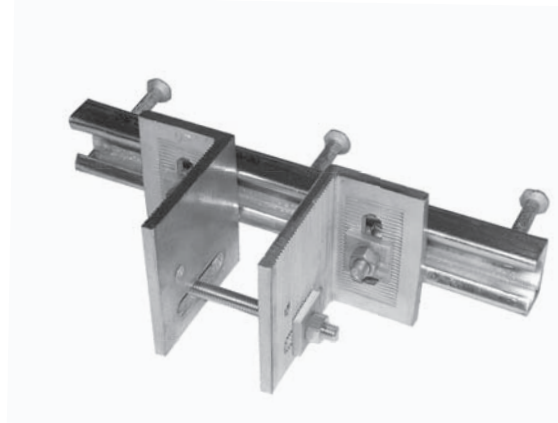
HCW-B1 Bracket

For post and beam façades. Anchored to the top surface of floor slabs.



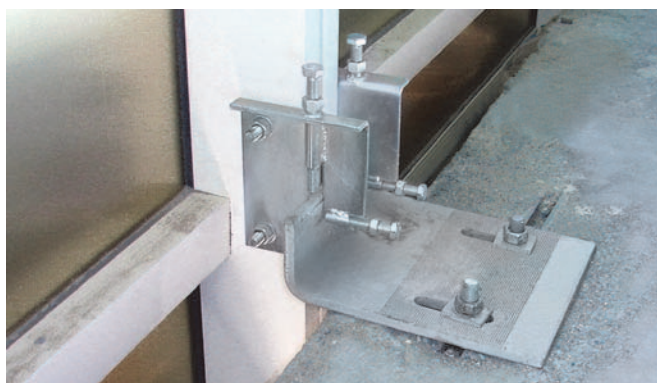
HCW-ED/-EW Brackets

For post and beam façades. Anchored to the edges of slabs.



Halfen Curtain Wall System

Application Examples



Fixing of a curtain wall system using HCW-B2 Brackets connected to HTA-CE Cast-in Channels



Liberty Life, Johannesburg



Torre Espacio, Madrid



Fixing of a post and beam façade using HCW-ED Brackets on HTA-CE Cast-in Channels



Post office Tower, Bonn



Sage Centre, Gateshead



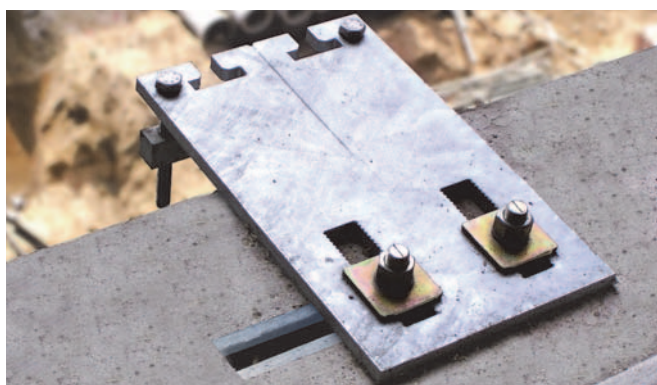
Fixing of a modular façade using HCW-ED Brackets on HTA-CE Cast-in Channels



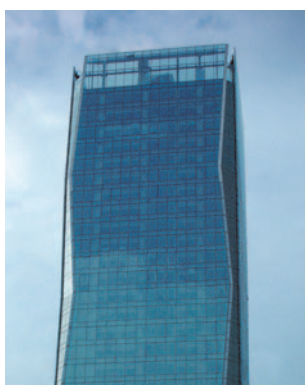
Burj Khalifa, Dubai



Edificio Gas Natural, Barcelona



Typical curtain wall fixing with HTA-CE Cast-in Channels



Westin Libertador Hotel, Lima



World Financial Center, Shanghai

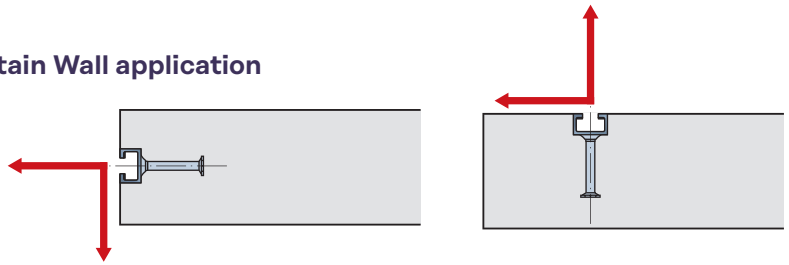
Halfen Curtain Wall Support Systems

Product Range

Halfen Cast-in Channels and bolts for Curtain Wall application

Load case: for standard slab thickness with standard tensile and transverse tensile loads

Halfen Channels HTA/HZA with bolt anchors or weld-on I-anchors

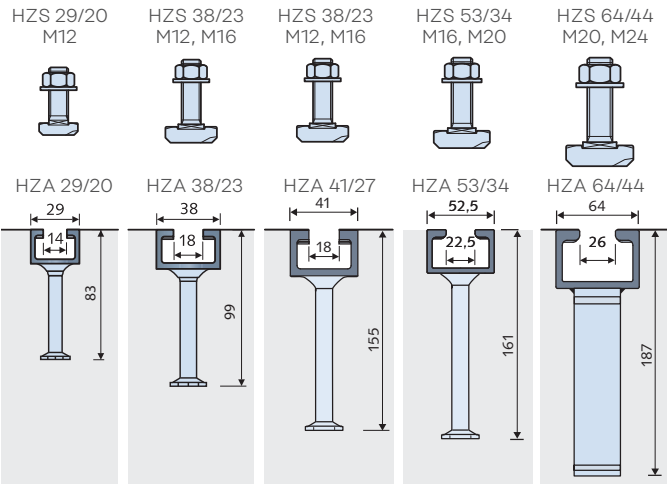


Hot-rolled serrated channels and bolts



ESA-2023

see pages 28–36



Hot-rolled (standard) channels and bolts

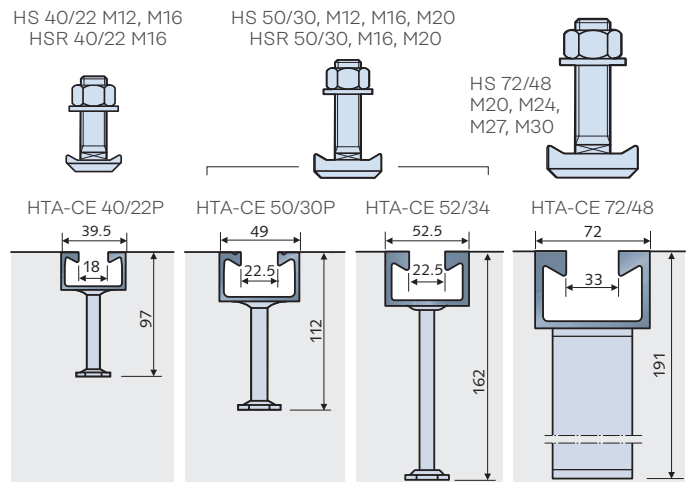


ESR-1008

see pages 16–27



i HSR T-bolt application is possible in accordance with an expert report for load capacity in channel longitudinal direction.

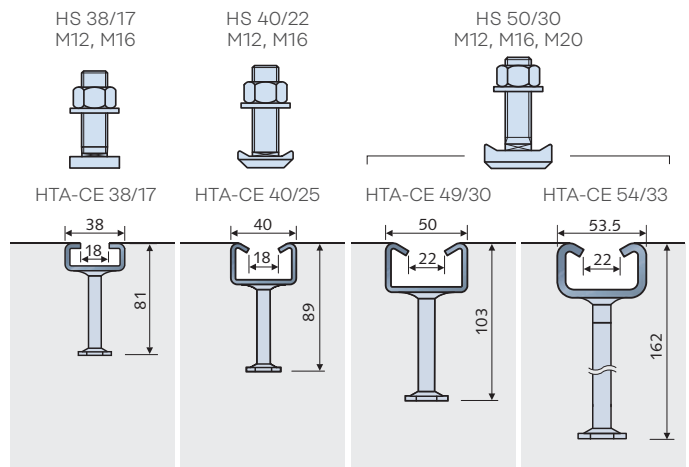


Cold-rolled (standard) channels and bolts



ESR-1008

see pages 16–27



Halfen Curtain Wall Support Systems

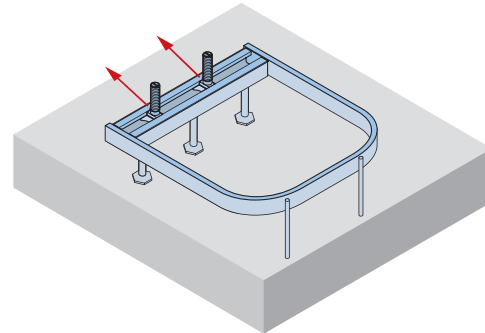
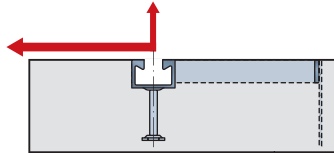
Product Range

Halfen HCW 52/34 Channels for Curtain Wall application

Load case: for thin slabs (thickness ≥ 12.5 cm) with high transverse tensile loads and small edge distance

Halfen Curtain wall channel HCW 52/34

(not included in the HTA-CE approvals)



HCW 52/34 and Halfen Bolt

see pages 47–48

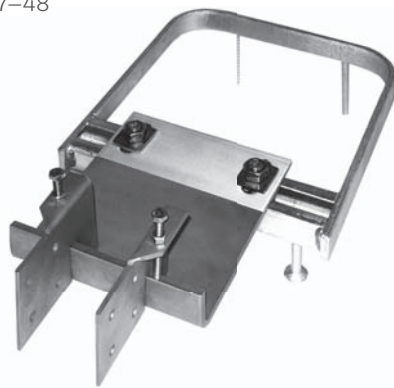
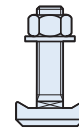


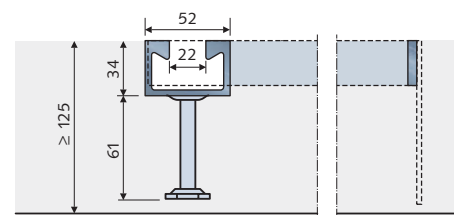
Fig. HCW 52/34 with bolts and bracket

HS 50/30 M16, M20

Grade 8.8

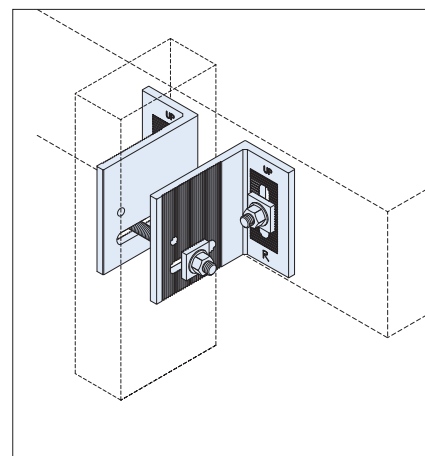
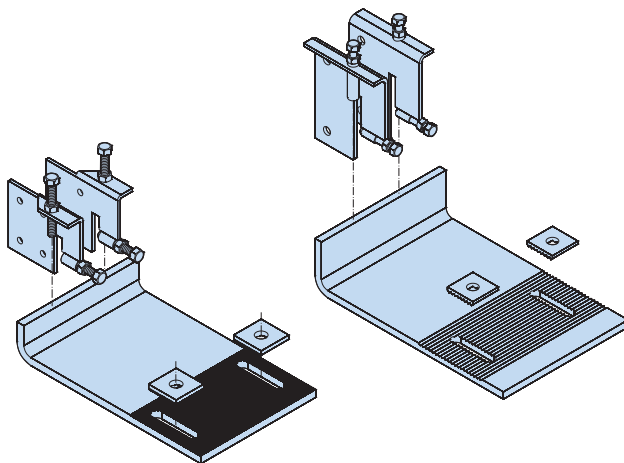


HCW 52/34



Curtain wall installation brackets

see pages 49–53



Halfen Curtain Wall Support Systems

Design principles

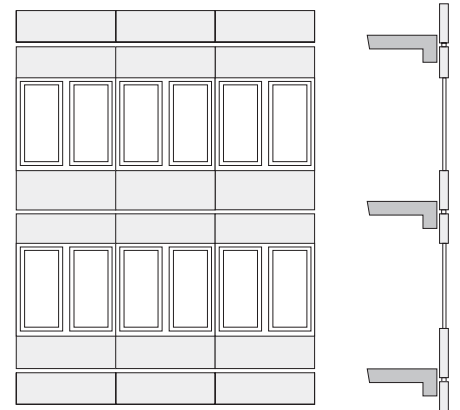
Halfen Curtain wall system

The curtain wall facade system gets its name from the fact that the construction hangs like a curtain in front of the floor slabs. (See figure 1 section)

The system is thin and lightweight, usually aluminum and glass. The façade is attached to the main structure of the building using only the required number of point-load connections. It is not structural, and by design, only able to carry its own weight, but it transfers load of wind and gravity to the structure of the building.

Specifically, this includes sufficient stability against wind loads, adequate ability to shrink and expand as well as insulation against frost in winter, heat in summer and against external noise.

In addition, various requirements must be met to protect against fire and other critical situations.



Curtain wall

Figure 1 partial (view) of a façade (section)

Post and beam façade and the modular façade

Basically, we distinguish between two methods of curtain wall façades:

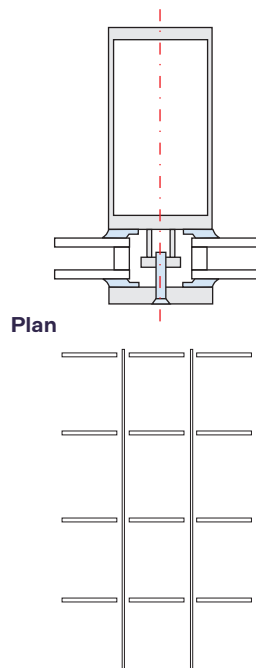
- the post and beam façade
- and the modular façade.

Post and beam façade

One basic distinctive difference is the way expansion in the façade is distributed (for example; thermal expansion). With the post and beam façade (see figure 2) the vertical and horizontal frame supports are installed in spacings corresponding to the façade elements. The supports are installed with an expansion gap between components allowing for sufficient expansion.

The respective longitudinal and transverse connections have an expandable joint. The filler elements (glass or panel) installed in a post and beam structure permit movement within the tolerance of the designed expansion joint. The glass and filler elements are delivered separately and are then installed on site, requiring on-site scaffolding.

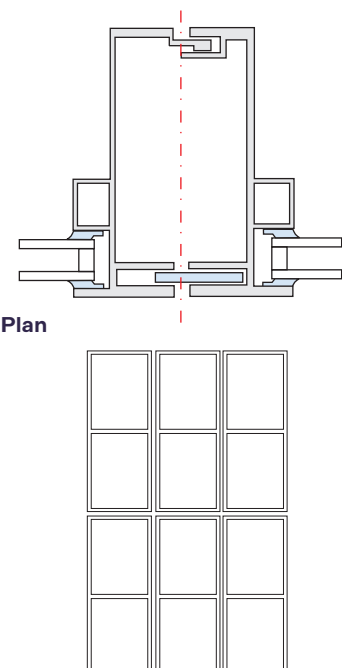
Post and beam façade



View

Figure 2

Modular façade



View

Figure 3

Modular façade

With the modular façade method (see figure 3), the façade is made of prefabricated elements, in which glass, natural stone or infills are pre-installed. The façade profiles are designed as a key and slot system to allow for expansion.

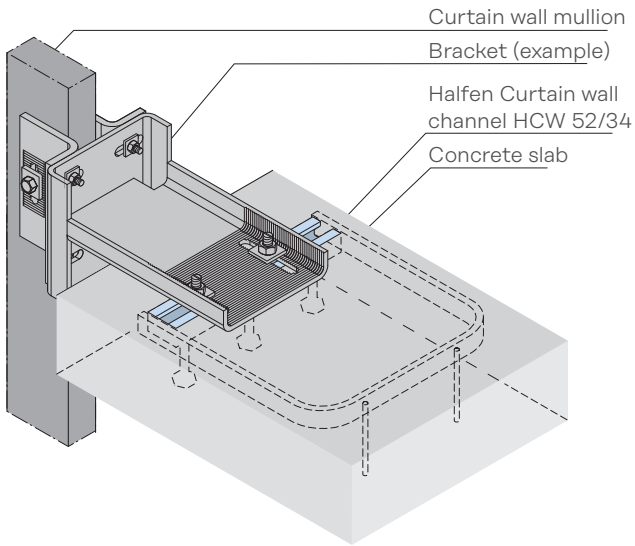
This method provides immediate weather protection and allows the building contractor to start interior work on the respective floor directly after the prefabricated modules have been installed.

Scaffolding is not required with this method of construction.

Halfen Curtain Wall Support Systems

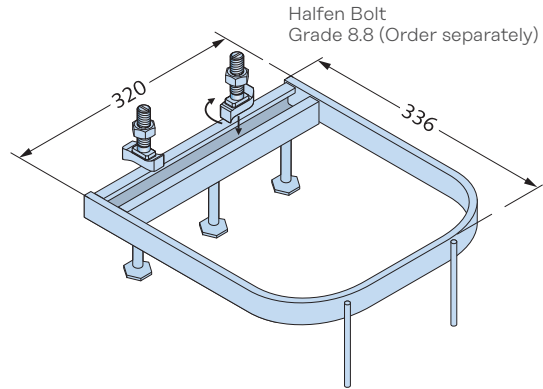
Halfen Channel HCW 52/34

Typical installation



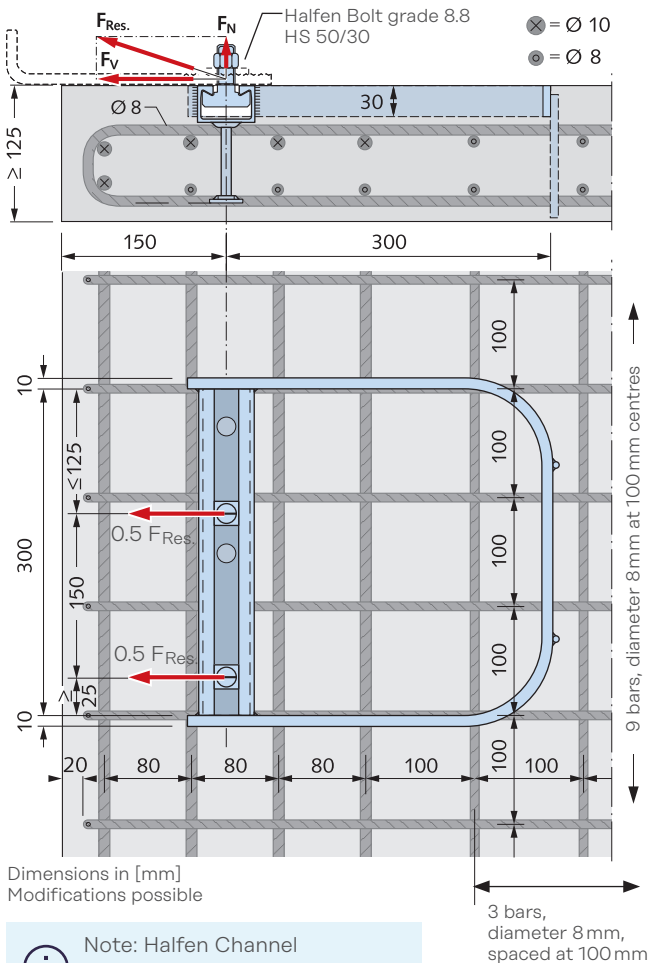
Product description

Identification: HCW 52/34
Material: hot-dip galvanized

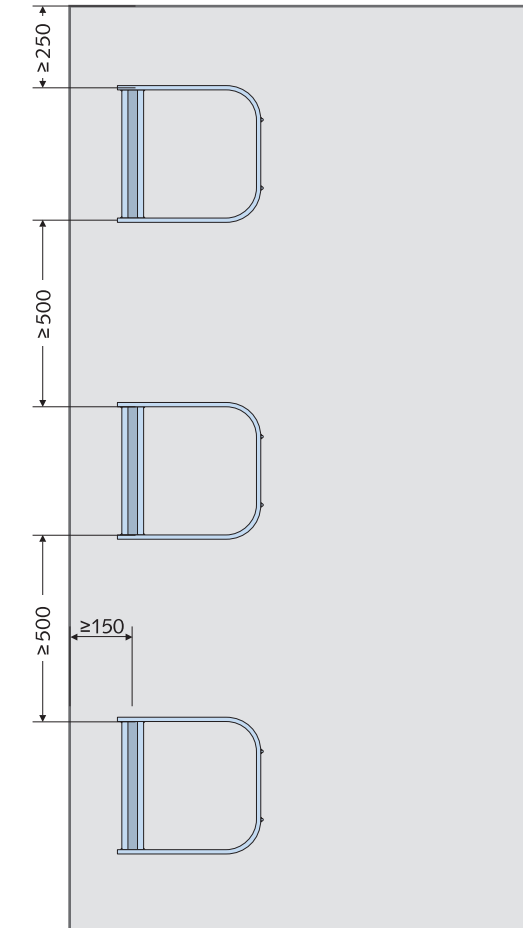


Dimensions in [mm]

Reinforcement requirements



Edge and element spacing



Halfen Curtain Wall Support Systems

Halfen Channel HCW 52/34

Channel load data

The following rupture loads were averaged from three tests:

F_V failure	=	142.3 kN
F_N failure	=	47.4 kN
$F_{res, failure}$	=	$\sqrt{F_N^2 + F_V^2}$ = 150.0 kN

The load deformation diagram (see right) may be used to determine allowable loads based on acceptable displacement and the required safety factor according to local building codes. The diagram is based on the following:

tensile and transverse loads were increased at a ratio of 1:3 up to breaking point

concrete slab thickness ≥ 125 mm and reinforcement as shown on page 47

concrete strength class $\geq C 20/25$ N/mm²

load is transferred into the channel via two Halfen Bolts HS 50/30 M20 Grade 8.8. The T-bolt spacing is 150 mm. A sample calculation is shown below.

The safety factor is freely selected. However, it must be determined which factors are actually to be implemented, whether these are based on project specific boundary condition or on valid building regulations.

Calculation example: Assumed safety factor $\gamma = 3$
(failure test load / working load)

Average failure load from the tests:

Transverse tensile stress	F_V ultimate	=	142.3 kN
Tensile stress	F_N ultimate	=	47.4 kN
Res. diagonal tensile load	$F_{res, ultimate}$	=	150.0 kN

Actual working loads at bolts (specification by façade engineer):

Transverse tensile stress	$F_V = 35$ kN
Tensile stress	$F_N = 10$ kN

Allowable load with $\gamma = 3$ against average ultimate load from tests:

perm. F_V	=	$142.3/3$	=	47.4 kN
perm. F_N	=	$47.4/3$	=	15.8 kN
perm. F_{res}	=	$150/3$	=	50.0 kN

Control:

Working load $F_V = 35$ kN < 47.4 kN

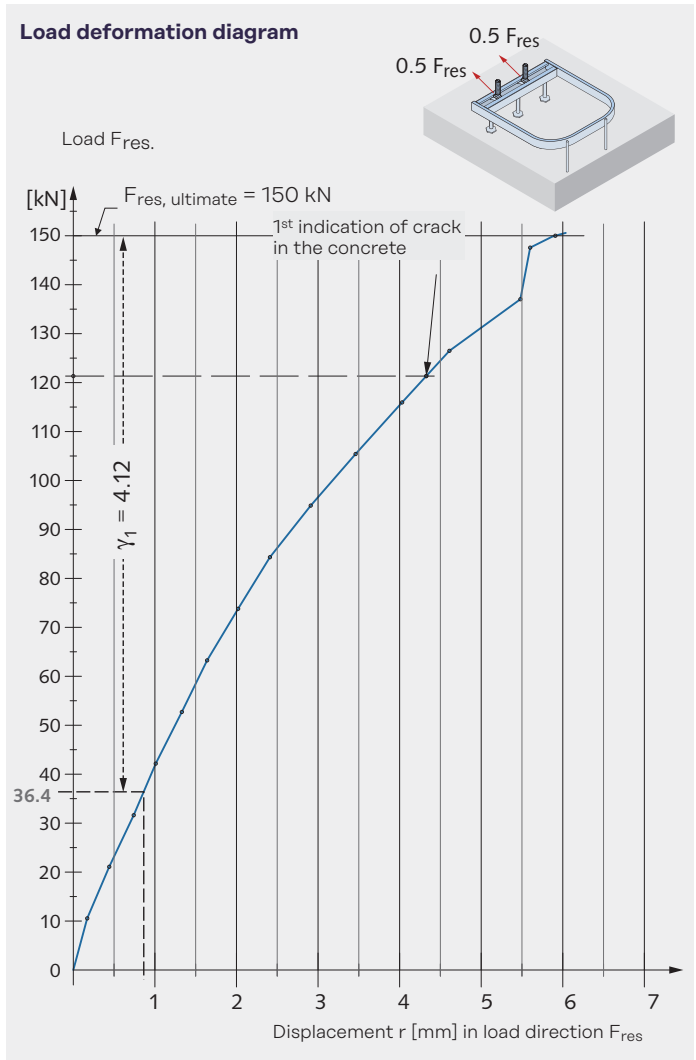
Working load $F_N = 10$ kN < 15.8 kN

Working load $F_{res} = \sqrt{(10)^2 + (35)^2} = 36.4$ kN < 50 kN

Displacement at working load < 1 mm (see diagram).

Actual safety factor for average

ultimate load $\gamma_1 = (150/36.4) = 4.12$.



Corresponding Halfen Bolts HS 50/30

Depending on the load size, we also recommend using Halfen Bolts HS 50/30 M16 or M20, grade 8.8 in combination with Halfen Cast-in channel HCW 52/34. The bolts stated below are hot-dip galvanized. Other bolt sizes and materials can be supplied. Please contact us for detailed information. Addresses can be found at the end of this catalogue.

Type selection Halfen Bolts HS 50/30 FV Grade 8.8

Thread	Material grade	Available length L [mm]	Allowable resulting T-bolt load (all directions) perm. F_s [kN]	Allowable bending moment [Nm]	Recommended torque [Nm]
M 16	8.8	40, 60, 80, 100	36.1	111	60
M 20	8.8	45, 60, 80, 100	56.4	216	120



If the Halfen Bolt is stressed in the direction of a slot its load capacity must be verified taking bolt flexure into account.

Halfen Curtain Wall Support Systems

Edge of Slab Brackets HCW-ED Post and Beam Façades

Application example

Halfen Edge of slab brackets are connected in pairs, one each side of the mullion, and are available in two types:

Type HCW-ED Brackets are designed to support both vertical and horizontal loads.

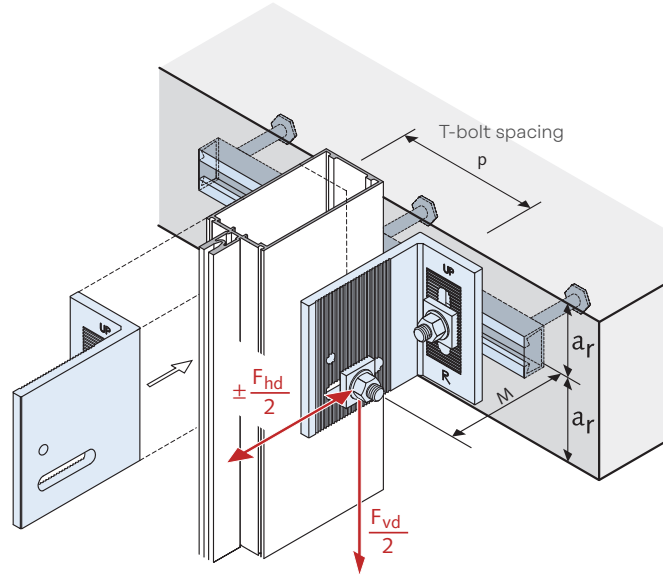
Type HCW-EW Brackets are designed to support only horizontal wind loads.

The brackets guarantee a simple adjustable connection. The Halfen Bolts (connection: bracket to Halfen Channel) and the standard hexagonal bolts M12 (connection: bracket to façade mullion) must be grade strength 8.8.

A round auxiliary hole in the long arm of the brackets can be used for temporary attachments. For example; temporary fixing of brackets to support the post with self-tapping screws until the final connection is made.

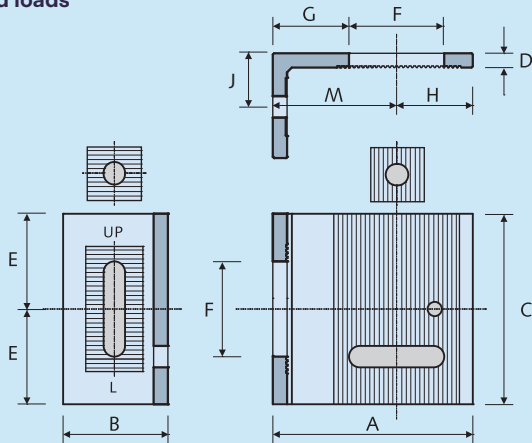
The brackets are made of high quality aluminium material. Special nylon discs are placed between the "Wind load" Bracket HCW-EW and support post.

To guarantee correct installation, the HCW-ED brackets are marked 'R' for right, 'L' for left and 'UP' for top.

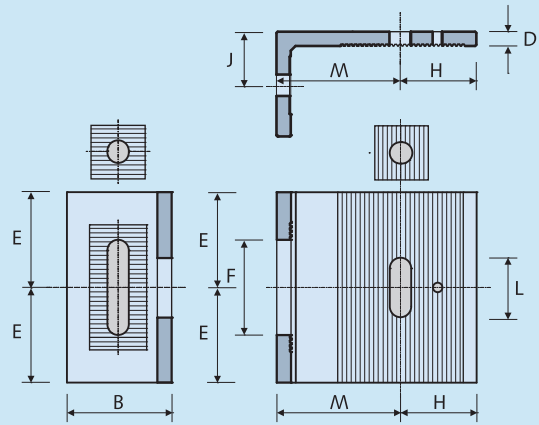


Bracket dimensions [mm]

HCW-ED Brackets for dead loads and wind loads



HCW-EW Brackets wind loads only



Serrated washers must be ordered separately

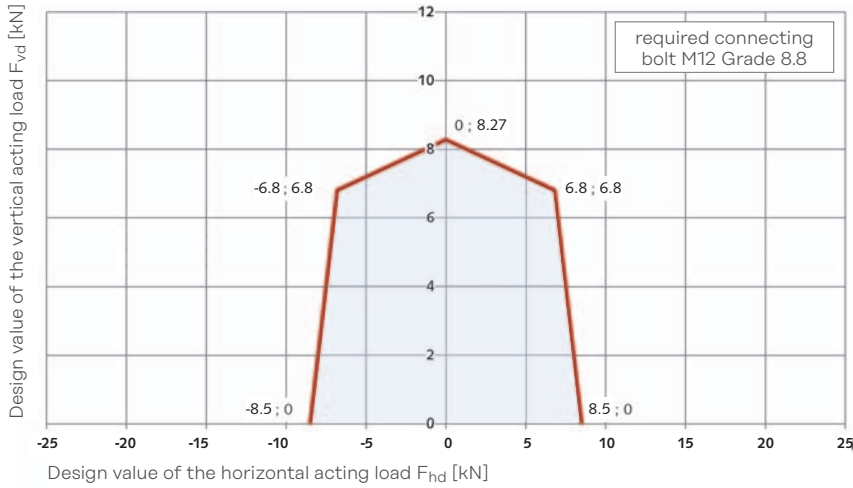
Serrated washers must be ordered separately

Size	Bracket code	A	B	C	D	E	F	G	H	J	L	M
Small	HCW-ED 1 HCW-EW 1	108	70	114	10	57	64	25	51	36	40	57
Medium	HCW-ED 2	133	70	127	10	64	64	51	51	36	40	82
Large	HCW-ED 3 HCW-EW 3	159	70	140	10	70	64	76	51	36	40	108

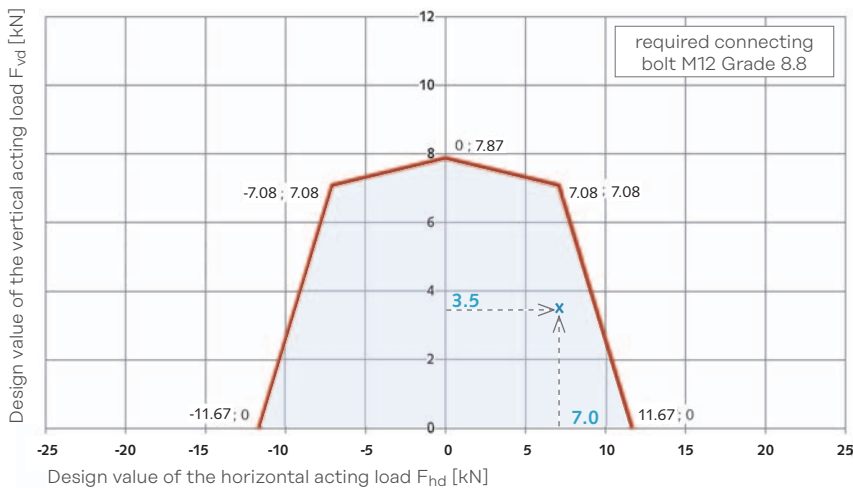
Halfen Curtain Wall Support Systems

Dimensioning

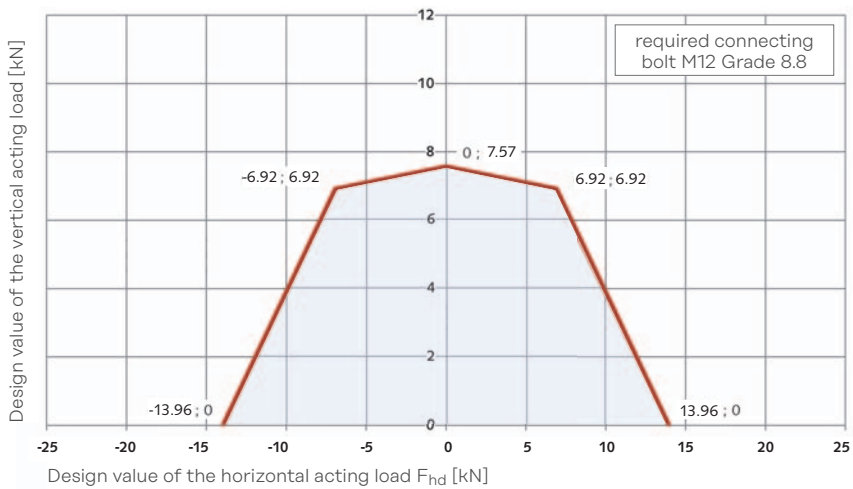
Interaction diagram for type HCW-ED1 (small)



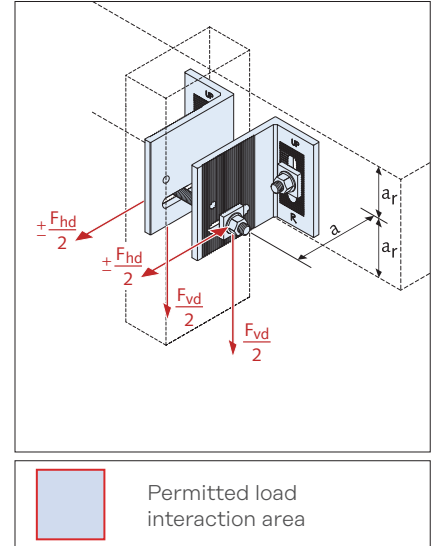
Interaction diagram for type HCW-ED2 (medium)



Interaction diagram for type HCW-ED3 (large)



Calculation basis



i F_{Rd} values are in accordance with expert report. The report is available on request.

Halfen Curtain Wall Support Systems

Design loads HCW-EW; HCW-ED

Design loads using two HCW-EW Brackets, loads in the Halfen Bolts (HCW-ED)

Design wind loads for type HCW-EW

Max. applied design load F_{hd} [kN]			
Size	Bracket code	max. F_{vd} [kN]	max. F_{hd} [kN]
Small	HCW-EW 1	0	8.5*
Large	HCW-EW 3	0	13.96*

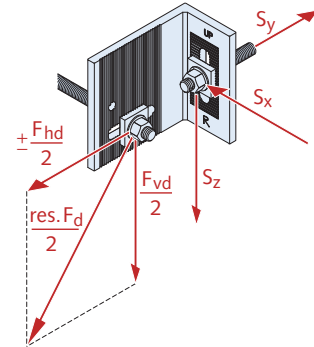
HCW-EW Brackets are only suitable for wind loads.
 *Safety factors from EN 1992 included

Forces acting on the Halfen Bolts at the channel (HCW-ED)

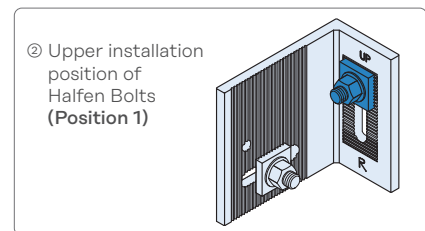
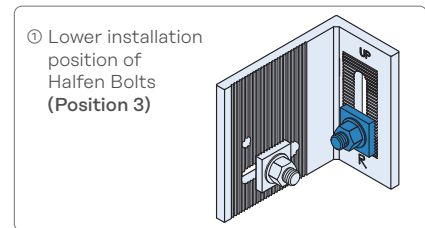
The components of the design-reaction forces in the Halfen Bolts at the connection of the curtain wall bracket to Halfen Cast-in channel, are calculated by multiplying the design loads F_{vd} and F_{hd} at connection curtain wall bracket and façade support post with the factors s_x , s_y and s_z . The factors are dependent on the bracket geometry, the load direction and the bolt position (see figure on the right). See table below for multiplication factors for determining the design reaction forces in the Halfen Bolts.

Calculation basis

Definition of the loads in the
 - bracket/post connection
 - bracket/channel connection



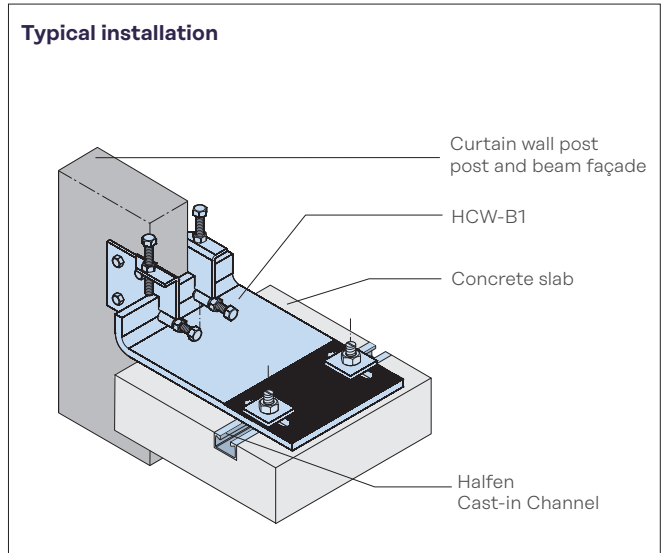
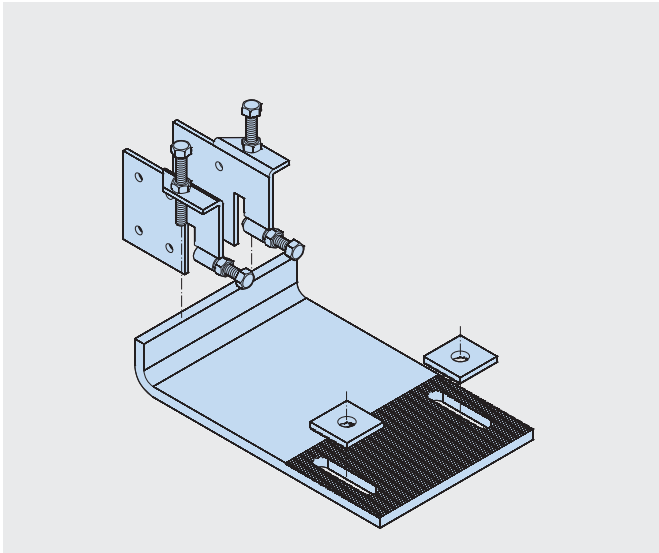
Lower installation position of Halfen Bolt (Position 3)									
Bracket	Dead load $S_i = (F_{vd} / 2) \times s_i$			Wind load $S_i = (F_{hd} / 2) \times s_i$			Resulting load 45° $S_i = (res. F_d / 2) \times s_i$		
	s_x	s_y	s_z	s_x	s_y	s_z	s_x	s_y	s_z
HCW-ED 1	0.5	3.2	-1.0	-1.0	1.0	0.0	-0.3	3.0	-0.7
HCW-ED 2	0.5	3.6	-1.0	-0.5	1.0	0.0	0.0	3.3	-0.7
HCW-ED 3	0.5	4.0	-1.0	-0.4	1.0	0.0	0.1	3.5	-0.7
Upper installation position of Halfen Bolt (Position 1)									
HCW-ED 1	0.6	1.3	-1.0	-1.0	3.6	0.0	-0.3	3.4	-0.7
HCW-ED 2	0.6	1.6	-1.0	-0.5	3.1	0.0	0.0	3.4	-0.7
HCW-ED 3	0.6	1.9	-1.0	-0.4	2.9	0.0	0.1	3.4	-0.7



Halfen Curtain Wall Support Systems

Top of Slab Brackets HCW-B1

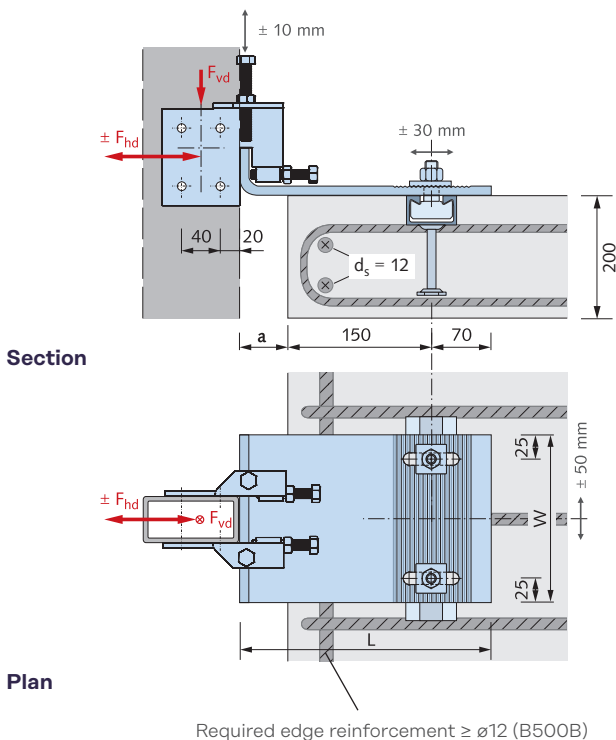
Support brackets for horizontal and vertical loads



Halfen Brackets HCW-B1

Halfen Brackets HCW-B1 for installing to the top of concrete slabs, are available in two load ranges and three cantilever sizes. The brackets are made in grade S355 quality galvanized steel. Vertical adjustability is ± 10 mm. Three-dimensional adjustability is ensured when used in combination with Halfen HTA-CE Cast-in Channels.

The lateral connecting plates are connected to the façade posts using M8 screws (not included). The façade planner is responsible for providing the static verification for the support posts. Use M16 Halfen Bolts, grade 8.8 (order separately), to connect the base bracket to the Halfen Cast-in channel. Depending on the façade type, the connection between the connecting plate and the base bracket can be designed either laterally adjustable or as a fixed point.



Dimensioning / Type selection

Design load ranges		
Load range [kN]	dead load F_{vd} [kN]	wind load F_{hd} [kN] (wind suction + compression)
4/12	4	± 12
7/20	7	± 20

F_{vd} , F_{hd} : allowable design loads with a partial safety factor $\gamma_F = 1.35$ for dead load and $\gamma_F = 1.5$ for wind load.

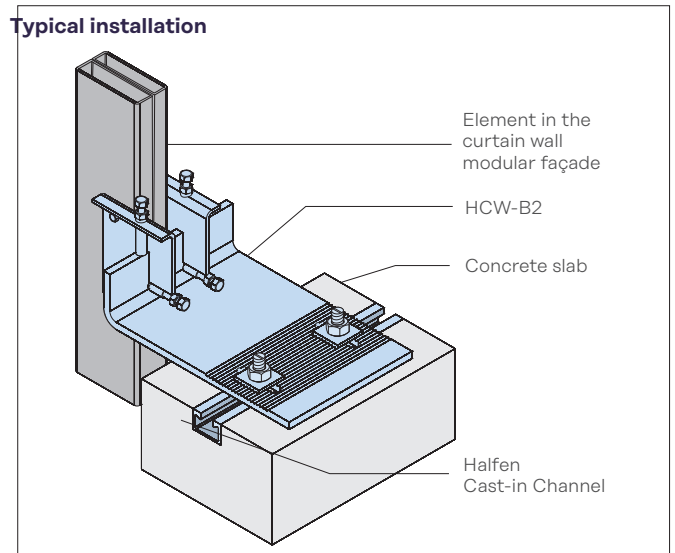
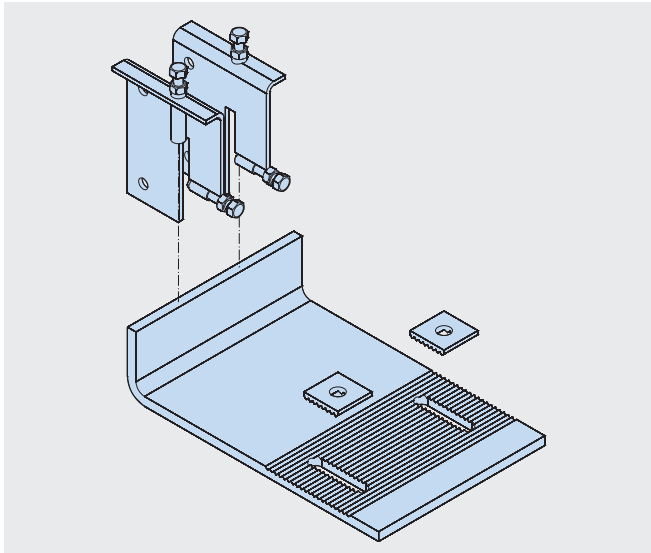
Type selection						
Load range [kN]	a [mm]	Item name HCW-B1-...	L [mm]	W [mm]	Halfen Channel ①	Recommended Halfen Bolt
4/12	50	...-4/12-50	270	150	HTA-CE	HS 40/22
	75	...-4/12-75	295	150	40/22P-250	M16×60
	100	...-4/12-100	320	150	2 Anchors	8.8
7/20	50	...-7/20-50	270	175	HTA-CE	HS 50/30
	75	...-7/20-75	295	175	50/30P-300	M16×60
	100	...-7/20-100	320	200	3 Anchors	8.8

① Recommended Halfen Channel exploiting full load capacity of bracket

Halfen Curtain Wall Support Systems

Top of Slab Brackets HCW-B2

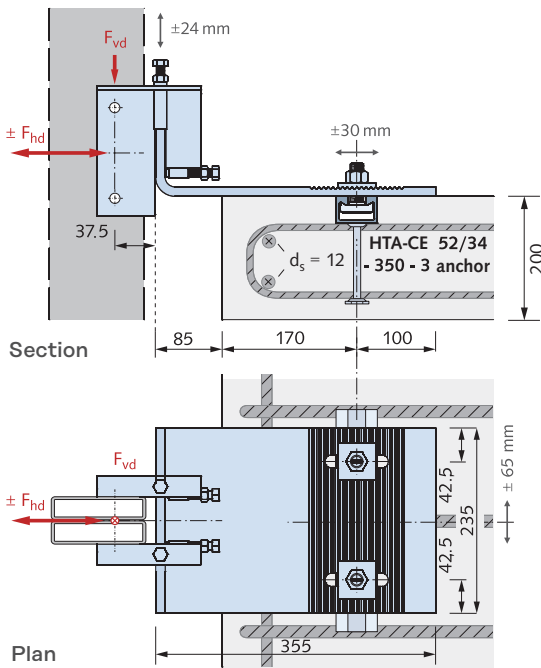
Brackets for horizontal and vertical loads



Halfen Brackets HCW-B2

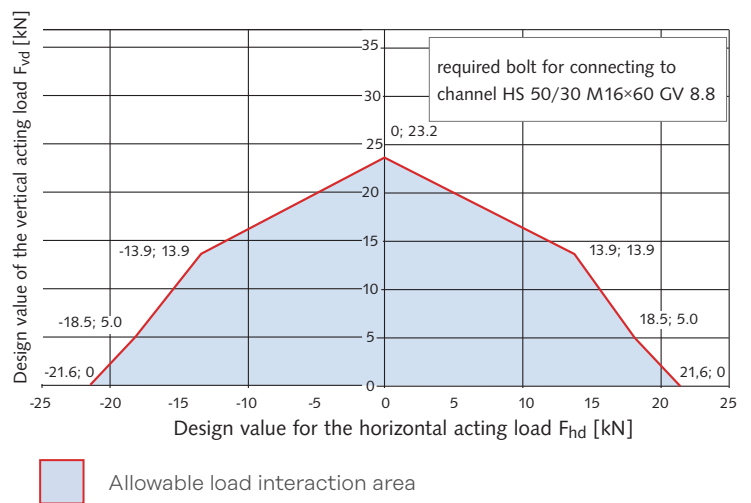
Halfen Brackets HCW-B2 are made in grade S355 quality galvanized steel. The vertical adjustability is ± 24 mm. Three-dimensional adjustability is ensured when used in combination with Halfen Cast-in Channels HTA-CE. The lateral connecting plates are connected to the façade posts using M12 screws (not included in delivery). The façade planner is responsible for providing the static verification for the support posts.

Use M16 Halfen Bolts, grade 8.8 (order separately), to connect the base bracket to the Halfen Cast-in channel. Depending on the façade type, the connection between the connecting plate and the base bracket can be designed either laterally adjustable or as a fixed point.



Required edge reinforcement $\geq \varnothing 12$ (B500B)

Dimensioning



This diagram is based on Eurocode

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