Leviat®
A CRH COMPANY

HALFEN

HALFEN HZA-PS POWER SOLUTION
Technical Product Information

NEW Seismic C1/ C2 assessment report and ETA for 29/20 to 64/44

HZA-PS 22-EN

Leviat®
A CRH COMPANY

We are one team.
We are Leviat.

Leviat is the new name of CRH's construction accessories companies worldwide.

Under the Leviat brand, we have united the expertise, skills and resources of HALFEN and its sister companies to create a world leader in fixing, connecting and anchoring technology.

The products you know and trust, including the HALFEN HZA-PS Power Solution, will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

This is an exciting change. Join us on our journey.

Read more about Leviat at Leviat.com

Our product brands include:

Ancon®

HALFEN

PLAKA

60
locations

sales in
30+
countries

3000
people worldwide

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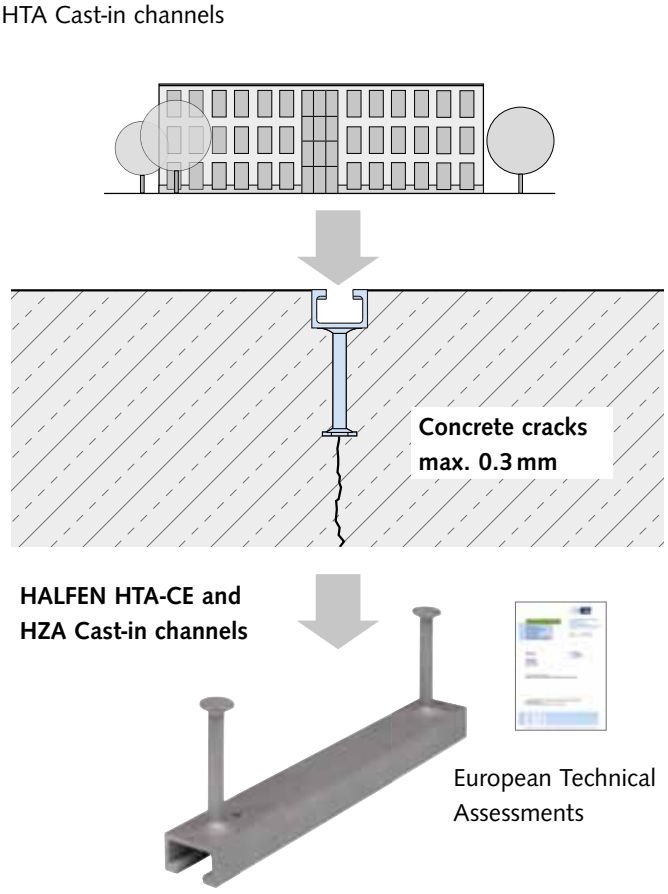
Leviat.com

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Standard application

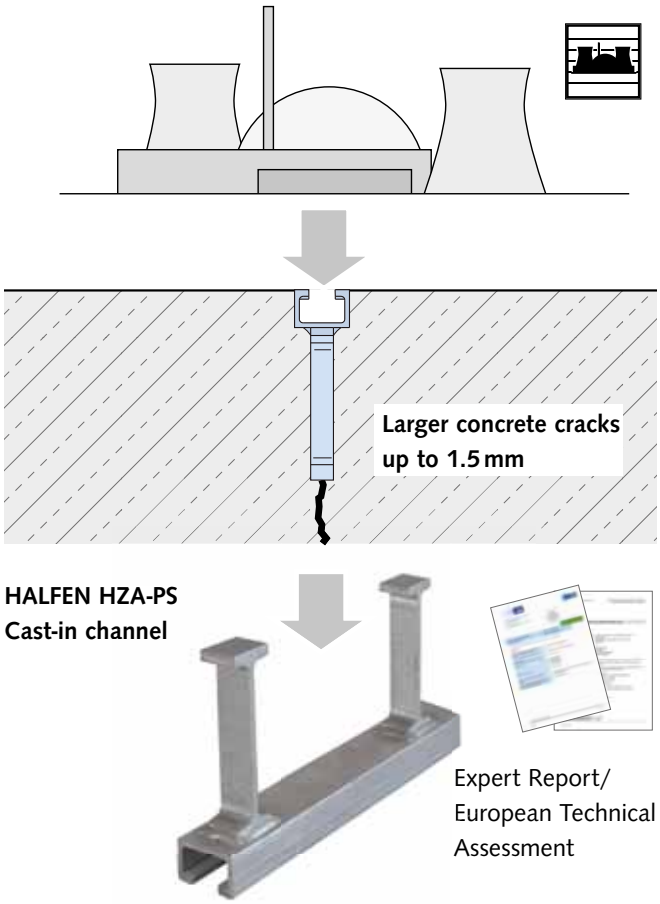
HALFEN HTA-CE and HZA Channels are officially approved and recommended for applications in normal concrete projects; office buildings, schools, industrial buildings or in non-critical areas of nuclear power plants.
In these applications the maximum crack width in the concrete is 0.3 mm. For more information please see the Technical Product Information for HALFEN Cast-in channels. Free download at:
www.halfen.com/brochures/construction/fixing systems/HTA Cast-in channels



European Technical Assessments

Safety relevant applications

Higher safety requirements for exterior (EVA) or interior (EVI) impact loads must be considered in safety relevant areas e.g. in nuclear power plants or other nuclear facilities. The suitability of the HZA-PS Channels for extraordinary impact loads has been verified in simulated application tests. All these tests were done in concrete with opening and closing cracks varying from 1.0 mm up to 1.5 mm. The results are summarized in evaluation report 09.05.18-E (see also pages 8 and 9).



Expert Report/ European Technical Assessment

Nuclear power plant under construction

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Approvals

HALFEN Cast-in channels are available in hot-dip galvanized or in stainless steel. Building authority approved by the German Institute of Construction Engineering *(DIBt, Deutsches Institut für Bautechnik).*

Cast-in channels are embedded in the concrete, flush with the surface. HALFEN T-bolts or serrated t-bolts, nuts and washers are used to reliably attach structural elements to the channels.

HTA-CE:	ETA-09/0339
HZA-PS:	ETA-17/0728
HZA Dynagrip:	ETA-20/1081

CE European Technical Assessment ETA-09/0339

CE European Technical Assessment ETA-17/0728

CE European Technical Assessment ETA-20/1081

Evaluation Report

HALFEN HZA-PS Cast-in channels are suitable for applications in safety relevant areas of nuclear power plants and other nuclear facilities.
HALFEN HZA-PS Cast-in channels meet the high requirements for extraordinary impacts from external (EVA) and internal (EVI) loads e.g. earthquakes, plane crash or explosions.

evaluated by the:

technische universität dortmund

Faculty for Architecture and Building Engineering
Concrete structures – Connection technology

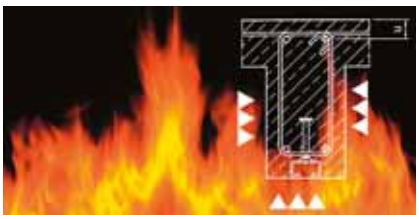
HZA-PS 53/34; HZA-PS 38/23; HZA-PS 29/20
Evaluation Report
Technical University
of Dortmund 09.05.18-E

HZA-PS 53/34
Seismic C1/C2 assessment report, Technical University of Kaiserslautern

Fire Protection

HALFEN HTA-CE, HZA and HZA-PS Cast-in channels, in combination with HALFEN Channel bolts, have been certified for use in fire-exposed structural elements.

The anchor channels have a fire rating of up to 120 minutes for concrete structures if installed according to the approvals stated above.



Sustainability

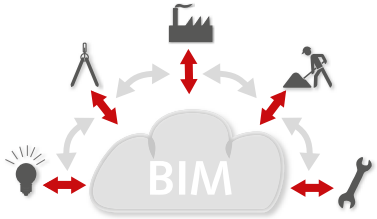
An EPD® (Environmental Product Declaration) provides transparent and comparable ecological data which helps to evaluate the sustainability of a building.

The new HPD (Health Product Declaration) for hot-dip galvanized HALFEN Cast-in channels helps to achieve additional points in the Leed-v4-system.

BIM

We already have considerable experience as a BIM partner and we successfully completed various projects using the BIM methodology.

Examples of previous projects developed using BIM can be found at **www.halfen.com/Service/BIM/BIM references**.



Quality

Our subsidiaries are Quality Management certified according to **ISO 9001:2015**, Certificate no. SZI-Q-1765-A.

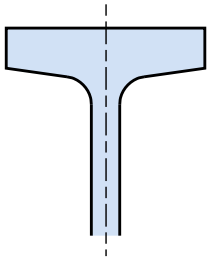
SZI DIN EN ISO 9001:2015 certified
www.szigmbh.com

The approvals can be found at:
www.halfen.com/downloads/brochures

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

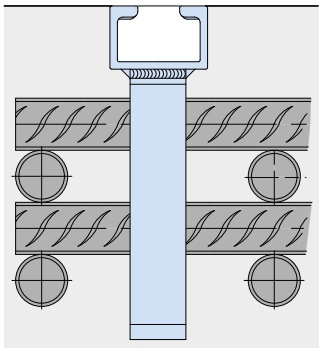
The anchor head

The wide, almost parallel anchor head is a positively interlock connection and results in very effective load transmission due to the low bearing pressure under the head. Furthermore, there is an additional enormous advantage when used in concrete designed for possible wide cracks. With the minor movement of the anchorage system during opening and closing of cracks, a reliable fixing with low deformation can be guaranteed.



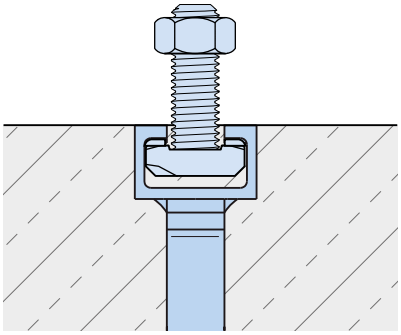
Anchoring depth

Deep anchorage guarantees high load capacity and compensates for weakness in the concrete caused by larger cracks. Concrete elements designed for safety relevant areas are generally densely reinforced. The increase in anchorage depth helps to ensure an ideal load distribution into the reinforcement. Simultaneously the channels (maximum height is 44 mm) are easily installed in the standard concrete cover which is about 45–60 mm.



Channel profile

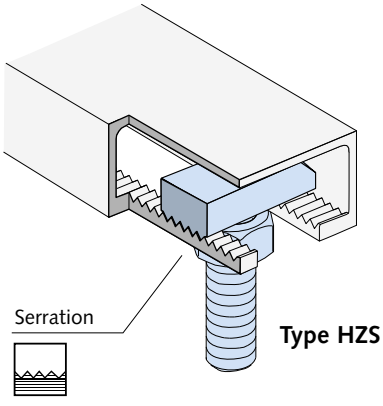
The manufacturing process for hot-rolled channels has allowed a more efficient design of the channel cross section. This results in thicker channel lips which are stronger than the channel backs or sides. This feature prevents lip deformation while providing reliable and efficient transfer of impact loads through the channel profile into the concrete structure. The hot-roll process also prevents deformation over the channel length caused during production and improving the connection of components. Dynamic loads can also be better transmitted as the hot-rolled material has low internal stresses.



Serrated channel lips

A hard-wearing inner serration is formed in the channel lip material during the rolling process. The serrated HALFEN Channel bolts engage with the matching 3.0 mm pitch of the channel serration allowing non-slip, reliable transfer of loads in the longitudinal direction of the channel.

The serrated anchor channels are very beneficial for application in seismic zones or other load cases applications; explosion collision loads or similar.
To achieve full load capacities in the longitudinal direction of the anchor channels the specified torque has to be observed (see installation instructions).



Type HZS

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HALFEN Cast-in Channels for Power Plants

The anchor foot
The anchor foot is welded on all four edges to the back of the channel. This ensures efficient and even transfer of static loads and critical dynamic loads from the channel into the anchor.

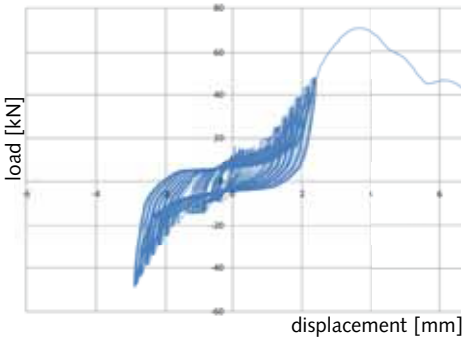
The extensive weld length is an additional safety feature. This is improved on with regular, selective ultimate load tests of welded anchors in our quality assurance programme.

HALFEN Channel bolts (serrated)
Without exception all HZS Channel bolts for the HZA-PS Systems are only available in high strength grade 8.8. This ensures reliable transfer of loads into the channel, even if an additional moment acts on the bolt.

A specified torque is applied to ensure a positive lock between the bolt and the serration in the channel. The specified torque is critical to ensure full load capacity in the longitudinal channel direction. It is important that the torques specified in the installation instructions are observed.

Seismic performance categories C1/C2 assessment report for HZA-PS 53/34
The seismic assessment and expert reports for the HALFEN anchor channel HZA-PS 53/34 cover the technical specifications of the AFCEN code RCC-CW, which corresponds to the demands of ETAG 001 Annex E (replaced by TR 049).
The report provides characteristic seismic resistance $R^0_{k,eq,steel}$ for each direction and for performance category C1 and C2.

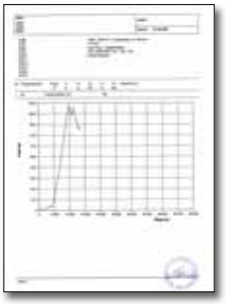
HALFEN Anchor Channels HZA-PS 53/34 fulfil the high requirements of seismic performance category C2 with excellent ductile behaviour, no anchor failure and low displacements.



Quality
Our production facilities are EN ISO 9001 certified. The certification requires regular maintenance of all machines and continual inspections of all processes at the facilities. The production facilities are certified for welding processes according to international standard EN ISO 3834-2 and EN 1090. All incoming material must be certified acc. to EN 10204.

Chemical, mechanical and geometric material properties are also checked. All products are subject to random quality testing during production which includes ultimate tensile testing. The zinc layer is regularly checked for thickness to ensure good quality corrosion protection.

HALFEN



Certification
According to DIN EN 10204 the following documents may be requested:
Acceptance certificates based on non-specific test (production 2.1 certificate and production 2.2 certificate [a more detailed description]) and acceptance certificates based on specific tests on the delivered product (inspection 3.1 certificate).
The customer **can** request a 3.1 certificate when placing an order.
A 3.1 certificate issued by a manufacturer confirms the test results of the delivered products fulfil the specified requirements.

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

With more than 90 years of experience we became a world leader in providing adjustable anchoring systems.

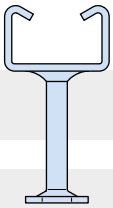
HALFEN Cold-rolled cast-in channels fulfil all basic requirements for an adjustable, user-friendly and reliable anchoring system. The product family includes hot-rolled channels with optimal characteristics for reliable transfer of dynamic loads. The hot-rolled serrated HALFEN Channels are also suitable for transfer of loads in its longitudinal direction.

A logical complement to the serrated hot rolled channel range, the HZA-PS product range allows application in safety relevant areas of nuclear power stations and facilities.

A dedicated test-programme carried out at the Technical University of Dortmund/Germany confirms suitability of HALFEN Channels HZA-PS 53/34, HZA-PS 38/23 and HZA-PS 29/20 for exceptional loads.

This additional research and the tests assume extreme interior and exterior load-effects caused by earthquakes, explosions and plane impacts.

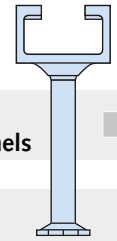
Cold-rolled channels



Main features:

- safety
- reliability
- efficiency
- adjustable bolt connection
- no damage to concrete or reinforcement
- suitable for cracked or non-cracked concrete
- approved for fire-resistant structural elements

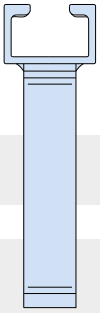
Hot-rolled channels and hot-rolled serrated channels



Additional features:

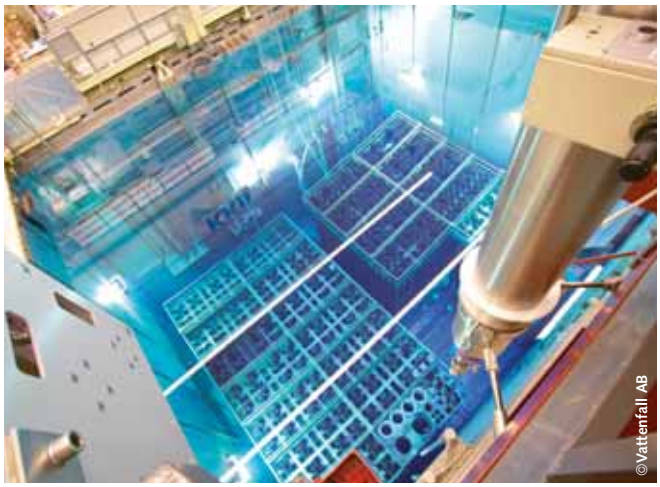
- suitable for dynamic loads
- flush with the concrete surface with non-deformed channel lips
- suitable for loads in all directions (serrated channels)
- certified for seismic loads (serrated channels)

Hot-rolled serrated channels HZA-PS



Additional features:

- suitable for safety relevant areas and extraordinary loads
- stringent quality management and inspections



Fuel element cooling

Turbine block in a nuclear power plant

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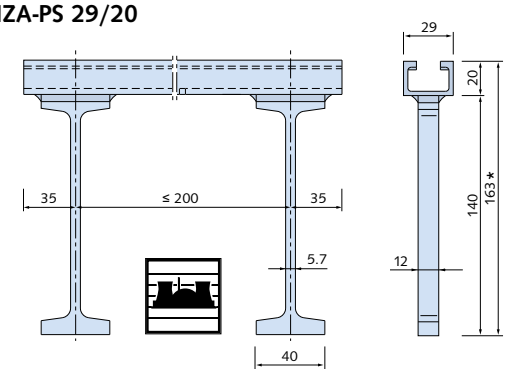
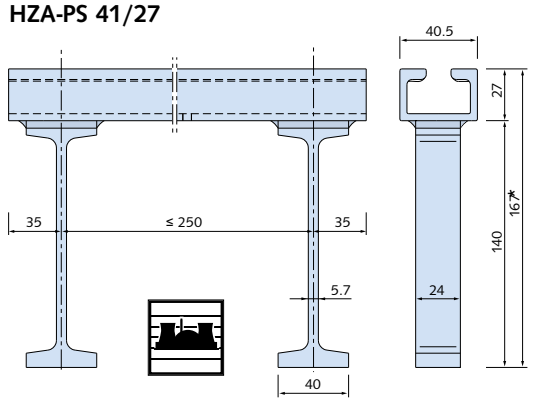
HALFEN Cast-in Channels for Power Plants

HZA-PS Cast-in channels

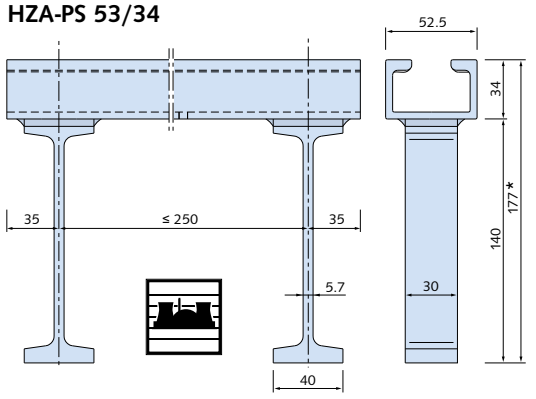
HZA-PS 29/20



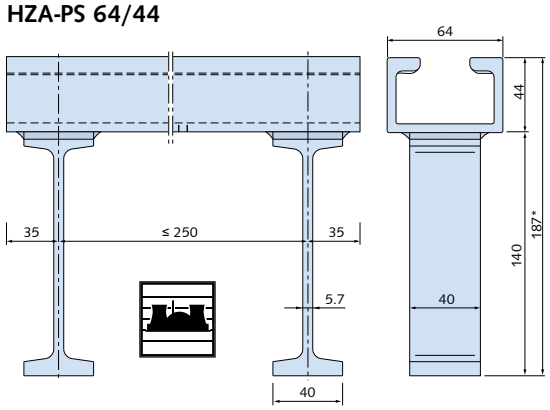
HZA-PS 41/27



HZA-PS 53/34

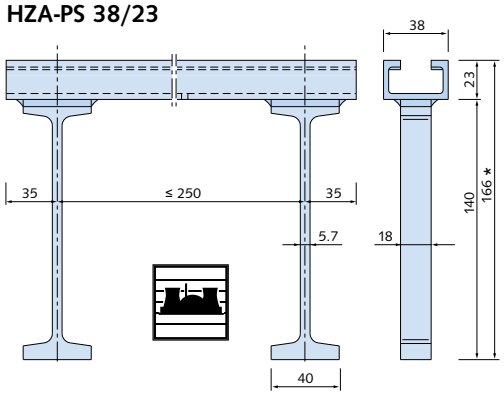


HZA-PS 64/44



*calculated with tolerance

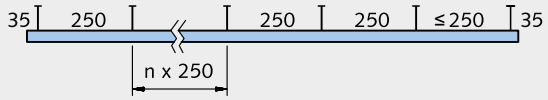
HZA-PS 38/23



Available lengths (made to order) and anchor spacing

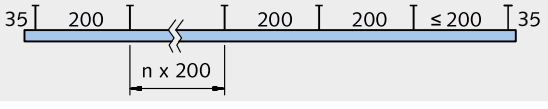
HZA-PS 38/23, 41/27, 53/34, 64/44 – Standard lengths			
Length [mm] / Number of anchors			
200 / 2	**350** / 3	**550** / 3	**800** / 4
1050 / 5	**3030** / 13	**6070** / 25	

HZA-PS 38/23, 41/27, 53/34, 64/44 – Fixed standard lengths			
Length [mm] / Number of anchors			
–	**1300** / 6	**1550** / 7	**1800**/ 8
2050 / 9	**2300**/ 10	**2550**/ 11	**2800**/ 12
–	**3300**/ 14	**3550**/ 15	**3800**/ 16
4050/ 17	**4300**/ 18	**4550**/ 19	**4800**/ 20
5050/ 21	**5300**/ 22	**5550**/ 23	**5800**/ 24



HZA-PS 29/20 – Standard lengths			
Length [mm] / Number of anchors			
200 / 2	**350** / 3	**550** / 4	**800** / 5
1050 / 6	**3030** / 16	**6070** / 31	

HZA-PS 29/20 – Fixed standard lengths			
Length [mm] / Number of anchors			
1250/ 7	**1450**/ 8	**1650**/ 9	**1850**/ 10
2050/ 11	**2250**/ 12	**2450**/ 13	**2650**/ 14
2850/ 15	-	**3250**/ 17	**3450**/ 18
3650/ 19	**3850**/ 20	**4050**/ 21	**4250**/ 22
4450/ 23	**4650**/ 24	**4850**/ 25	**5050**/ 26
5250/ 27	**5450**/ 28	**5650**/ 29	**5850**/ 30



HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Various specifications taken from different certifications and categories apply in nuclear power plants and nuclear facilities (see DIN 25449):

Category A3: Load cases which may occur only once during the lifetime of the facility:

- earthquake
- plane crash
- exterior explosion
- interior explosion
- differential pressure
- supporting forces etc.

Category A2: Load cases which are likely to occur less than ten times during the lifetime of the facility.

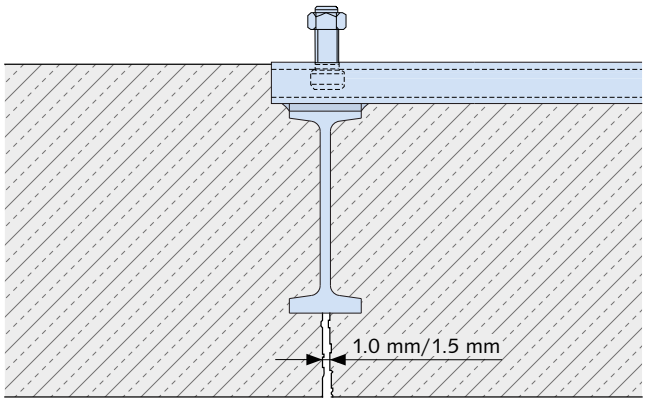
Category A1: Load cases which are likely to occur more than ten times during the lifetime of the facility.

As a result of the higher demands of category A3 and A2 wider concrete cracks must be considered. Therefore, the behaviour of the anchoring system is examined in additional suitability tests with larger crack widths.
The existing guidelines set by the (DIBt) German Institute of Building Technology for use of post installed anchors in nuclear power plants was the basis used for specification of the additional tests.

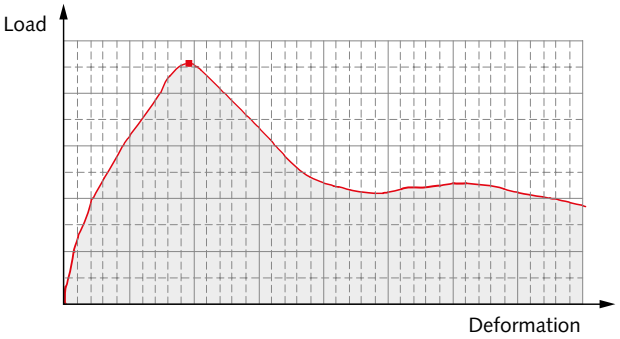
Examples of tests include:

1. Pull-out test;
the anchor was tested in a 1.0 mm wide concrete crack

2. Pull-out test;
the anchor was tested in a 1.5 mm wide concrete crack



1.0 and 1.5 mm concrete cracks in the location of the anchor

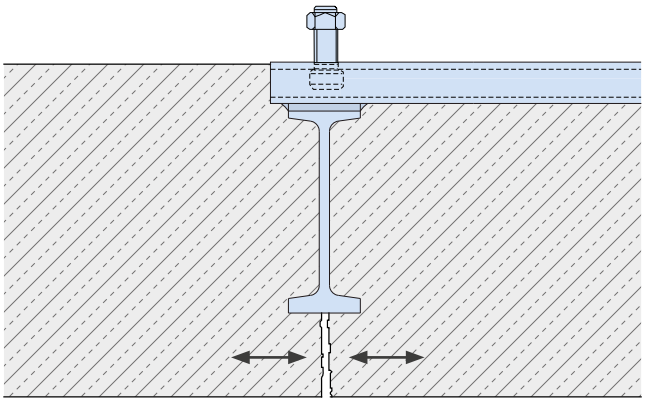


Load-deformation diagram of a pull-out test showing the constant load increase with low deformation until maximum load is achieved.

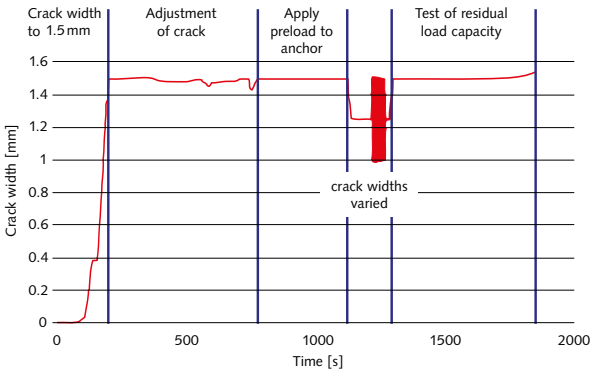
Test setup; pull-out test

3. Performance test in an opening and closing concrete crack

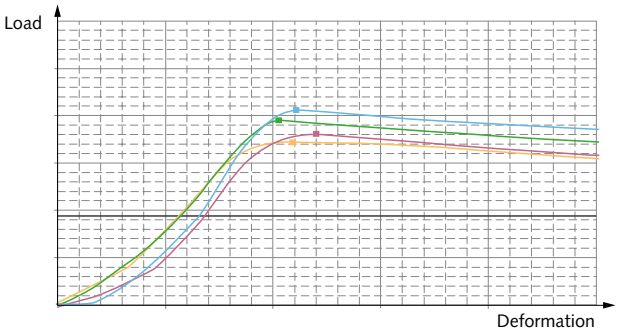
For this purpose, 10 oscillations were applied with a frequency of 0.2 Hz; the concrete crack varying between 1.0 and 1.5 mm, while the cast-in channel was subjected to a constant tension load. A pull-out test was subsequently carried out in the widest concrete crack of 1.5 mm.



Anchor position directly in an opening and closing concrete crack.



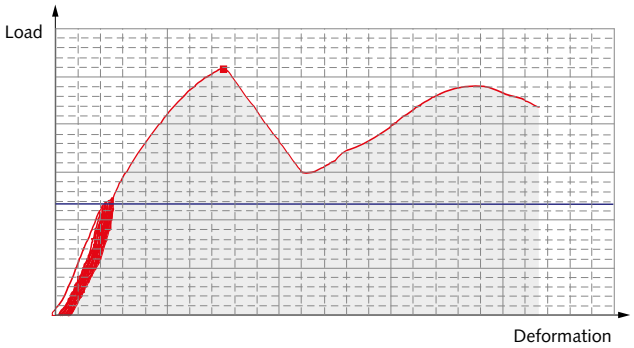
Chronological test procedure



Load-displacement diagram: shows ductile behaviour during the final pull-out test.

4. Cyclic load change in a wide concrete crack

In this test, cracks in the concrete were opened to 1.5 mm and a tension load applied to the cast-in channel.
The load was then completely removed from the cast-in channel. In this test 15 load cycles with a frequency F < 1 Hz were applied. A pull-out test was subsequently carried out in the widest (1.5 mm) concrete crack.



Load-displacement diagram - even after the cyclic load test the final pull-out test shows a steady increase with only low deformation.

Test setup for cyclic load test

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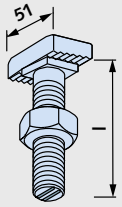
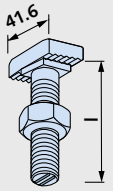
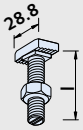
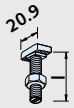
HALFEN Cast-in Channels for Power Plants

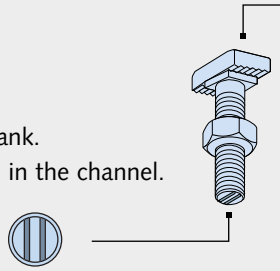
HZS bolts – available lengths

HALFEN HZS Bolts							
Bolt	**HZS 64/44**		**HZS 53/34**		**HZS 38/23**		**HZS 29/20**
Suitable for profile	64/44		53/34		41/27; 38/23		29/20
Bolts dimensions							
diameter ∅	**M24**	**M20**	**M20**	**M16**	**M16**	**M12**	**M12**
GVs8.8, bolt lengths [mm]	80	80	65	60	60	40	40
	80	80	65	60	80	60	60
	150	125	100	100	100	80	80

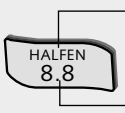
For bolts in other lengths and diameters please contact us (→ see page 27).

Product identification

Two notches on the tip of the shank.
Used to verify correct installation in the channel.



Nomenclature on bolt head:



Manufacturer

Strength grade 8.8
(electroplated with additional special coating ①)

① equivalent to HDG coating for interior applications

Example order for bolts:

HZS 53/34 M20x100 GV-S8.8

Bolt prefix
Channel profile
Bolt diameter
Length (mm)
Finish and grade (**GVs** 8.8)

(**GVs** = electroplated with additional special coating)

Example order for channels:

HZA-PS 53/34-FV-1050-KF

Channel prefix
Channel profile
Material/finish (FV)
Length (mm)
Combination strip filler

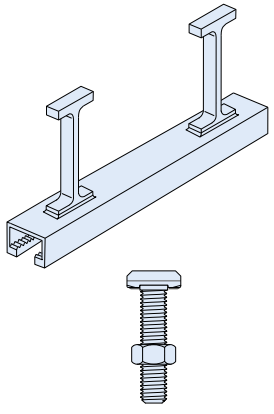
(**FV** = hot-dip galvanized)

Tender specifications – Examples

1. HALFEN Cast-in channels

1.1 HALFEN HZA-PS Channel type – Power Solution

HALFEN HZA-PS Cast-in channel_____, hot-dip galvanized (FV) with strip filler (KF), acc. to European Technical Assessment ETA-17/0728, suitable for adjustable connections to concrete in safety relevant areas of nuclear plants or other nuclear installations, channel length_____mm, delivery and installation according to the installation instructions.



2. HALFEN Bolts

2.1 HALFEN Bolts type HZS

HALFEN HZS serrated bolt _____ suitable for the corresponding HALFEN HZA-PS Cast-in channel, electroplated with special coating, including nut, delivery and installation according to the installation instructions.

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Load capacities, HZA-PS according to ETA-17/0728

The HZA-PS (ETA-17/0728) design is based on EN 1992-4 / EOTA TR 047.
Verification will account for specific boundary conditions and differentiates between steel and concrete failure modes.

Profile load capacity*

	HZA-PS 64/44	HZA-PS 53/34	HZA-PS 41/27	HZA-PS 38/23	HZA-PS 29/20
$N^0_{Rd,s,l}$ [kN]	58.9	45.8	29.8	21.8	12.7
$V^0_{Rd,s,l,y}$ [kN]	86.8	56.2	29.8	24.4	12.7
$V_{Rd,s,l,x}$ [kN]/γ_{inst}	39.7	27.3	12.6 (M12) 14.9 (M16)	11.8	7.0
$M_{Rd,s,flex}$ [Nm]	6246	3538	1990	1446	758

*Concrete load capacity has to be verified for each individual case (taking the geometric boundary conditions into account).

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

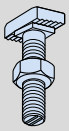
Seismic performance categories C1 and C2

HALFEN HZA-PS 53/34 Cast-in channels have been tested under simulated seismic tension and shear loads according to EOTA TR 049 for seismic performance categories C1 and C2. The assessment of the test results was done by the Technical University of Kaiserslautern and can be found in the test report. Available on request.

The Support team is available to help with planning. Contact Information can be found at the back of the catalogue or go to: www.halfen.com

HALFEN HZS Bolts – Load capacity and bending moment

Design resistance HZS with hot-rolled HZA-PS Cast-in channels



Strength class		M12	M16	M20	M24
8.8	$N_{Rd,s,s}$ [kN]	44.9	83.7	130.7	188.3
	$V_{Rd,s,s}$ [kN]	27.0	50.2	78.4	113.0
	$M^0_{Rd,s,s}$ [Nm]	84.0	212.8	415.2	718.4

HALFEN HZA-PS POWER SOLUTION
System Solutions/Application Examples

Planning with our products provides a wide range of possible design solutions: Nuclear power plants (EVA and EVI impact load requirements); sewage plants with larger pipe sizes; very long cable runs; pipe supply lines in utillity or other types of tunnels; various other fixings, even to curved or slanted surfaces.

More than 90 Years of experience is packed into our products. Contact our support team to design and effectively dimension a project.
See the back of the catalogue for contact addresses or go to www.halfen.com

Stacked cable trays fixed to vertical serrated channels

Cantilever fixed to a vertical serrated channel for pipe support

Pipe fixed to anchor channels cast into a ceiling slab

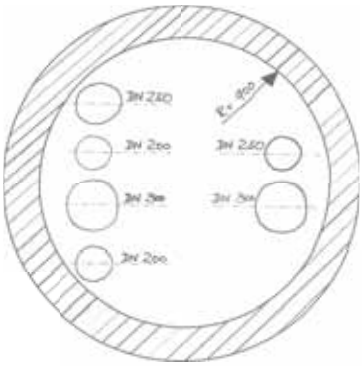
Pipe support fixed to vertical cast-in serrated channel

Cantilever fixed to vertical serrated channel for pipe support

Example: Designing with our Engineering Support Team

Our technical support team starts with outline drawings, which should include some basic information.

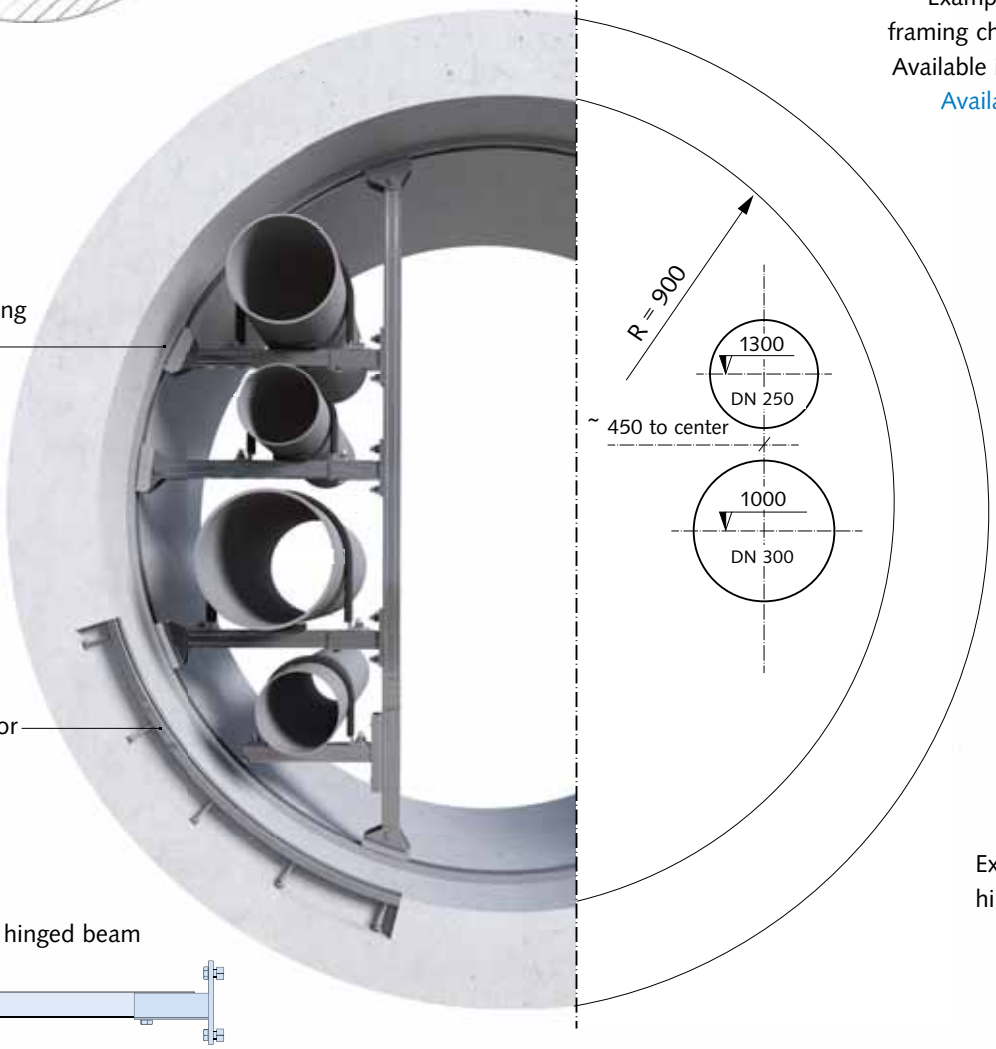
From your drawings...



Standard and custom elements are combined when designing a pipe support system; this ensures the best and most economical solution for a specific project.
Our Engineering Support Team always strive to achieve the best balance between safety and economy.
Always working in close cooperation with the customer throughout the design process to find the best connections for a project.
See the back of the catalogue for contact addresses or go to www.halfen.com

..to a detailed design and a successful project

Example of a medium duty framing channel ring HCS-SRI.
Available in hot-dip galvanized
Available in stainless steel

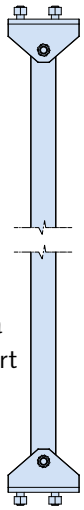


Serrated framing channel

Alternative: Serrated anchor channel

Example for a hinged beam

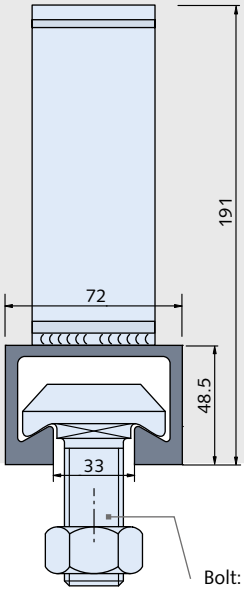
Example for a hinged support



HALFEN HZA-PS POWER SOLUTION
HALFEN HTA-CE/HZA Cast-in Channels

hot-rolled

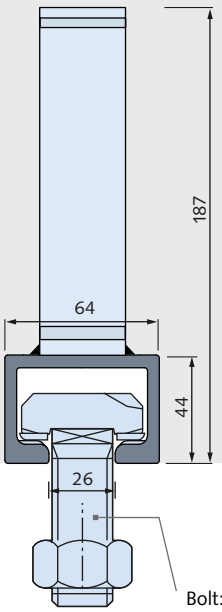
HTA-CE 72/48



Bolt:
HS 72/48
HSR 72/48

Material:

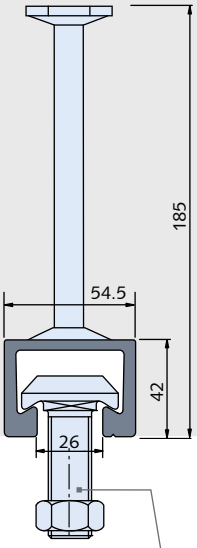
HZA 64/44



Bolt:
HZS 64/44

Material:

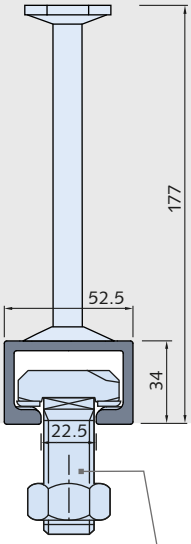
HTA-CE 55/42



Bolt:
HS 50/30

Material:

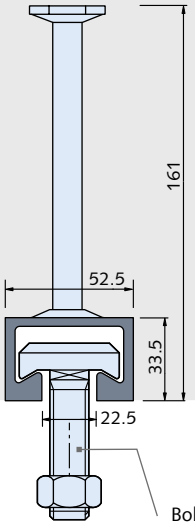
HZA 53/34



Bolt:
HZS 53/34

Material:

HTA-CE 52/34



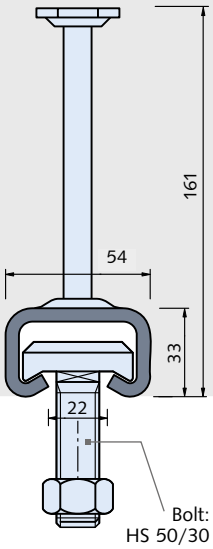
Bolt:
HS 50/30
HSR 50/30

Material:

cold-rolled

HALFEN Cast-in channels are available in cold-rolled or hot-rolled designs, with serrated or non-serrated channel lips. Other Information not included here; calculation notes, installation and further application examples can be found in the HALFEN Cast-in channels, Technical Product Information; free download at: **www.halfen.com**

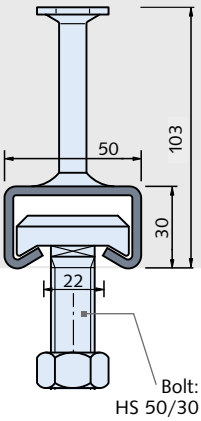
HTA-CE 54/33



Bolt:
HS 50/30

Material:

HTA-CE 49/30



Bolt:
HS 50/30

Material:

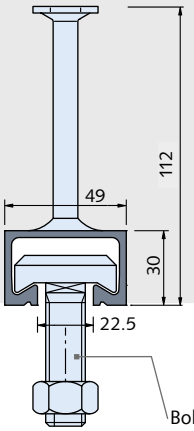
- **FV** = steel, hot-dip galvanized
- **A4** = stainless steel
- **HCR** = high corrosion resistant steel

suitable for dynamic loads

serrated channel

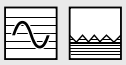
HALFEN HZA-PS POWER SOLUTION
HALFEN HTA-CE/HZA Cast-in Channels

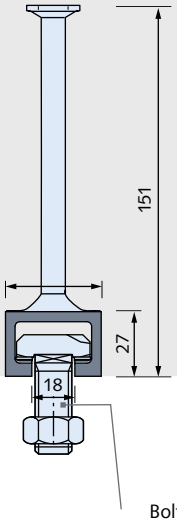
HTA-CE 50/30-P



Material:

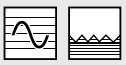
HZA 41/27

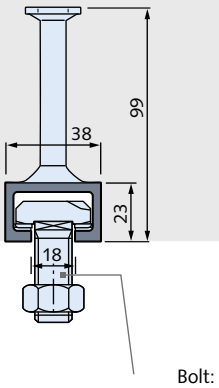




Material:

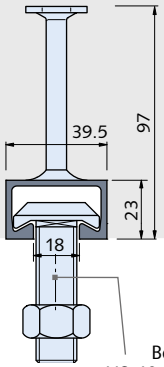
HZA 38/23





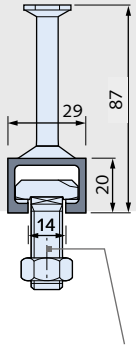
Material:

HTA-CE 40/22-P



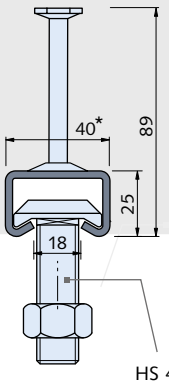
Material:

HZA 29/20



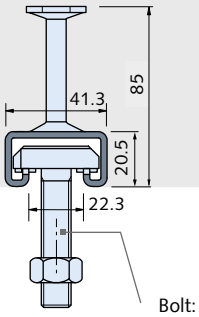
Material:

HTA-CE 40/25



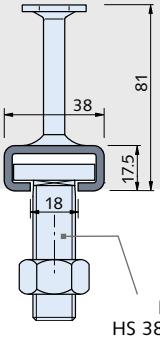
Material:
- *40
- *39.5

HZA 41/22



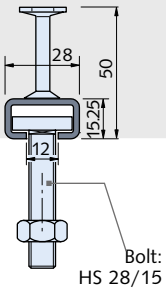
Material:

HTA-CE 38/17



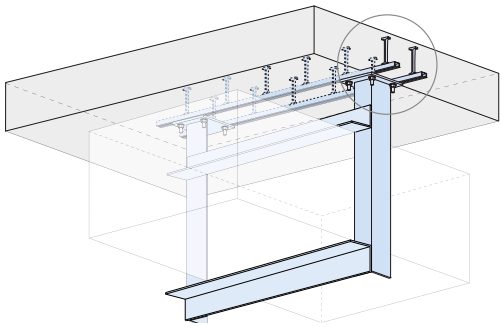
Material:

HTA-CE 28/15

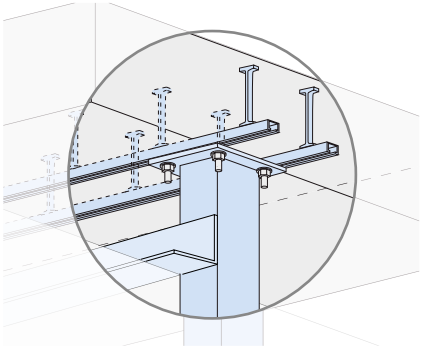


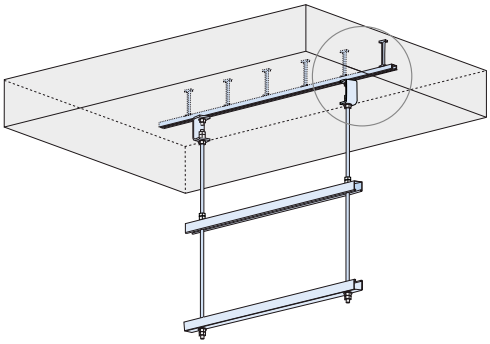
Material:

HALFEN HZA-PS POWER SOLUTION
System Solutions/Application Examples

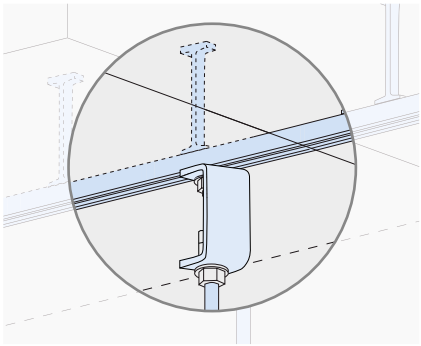


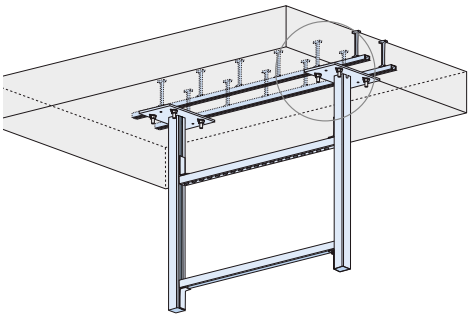
Air ventilation duct
supported with a welded steel frame anchored to a concrete slab with a pair of serrated channels



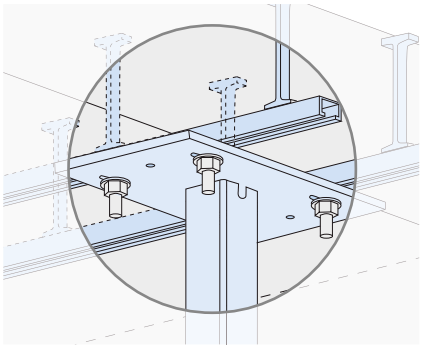


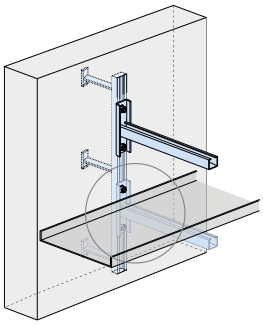
Air ventilation duct support
suspended as a light weight system bolted to a concrete slab using a serrated channel



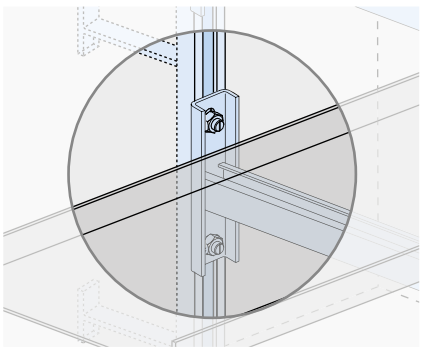


Air ventilation duct support
a HALFEN Framing system suspended from a concrete slab with a pair of serrated channels



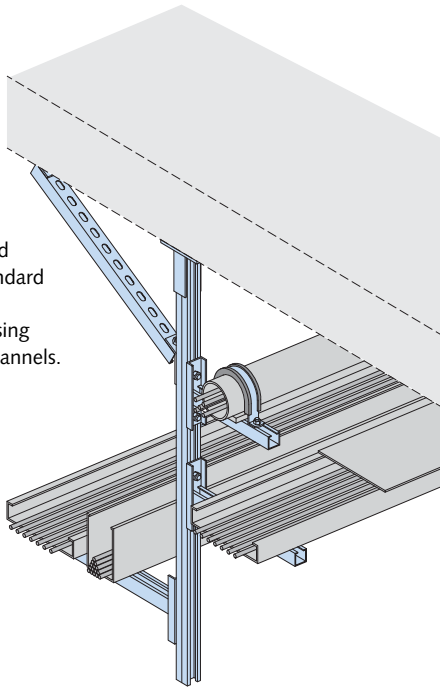


Cable tray support
cantilever brackets fixed to a vertical serrated channel



HALFEN HZA-PS POWER SOLUTION
System Solutions/Application Examples

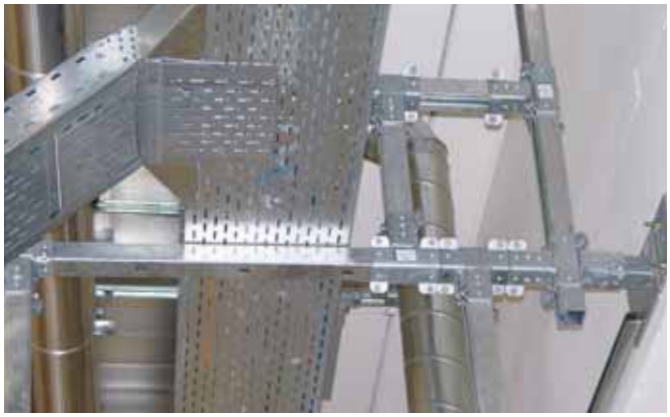
A revolution in pipe support in tunnels! The HALFEN Adjustable cantilever combines the acclaimed high load bearing capacity of the medium duty system with a much faster installation. Specially designed for use in tunnels or other applications with curved or slanted surfaces. It is not necessary to know the cantilever angles at planning. **One part for all fixings, dramatically reduces complexity. No custom cantilevers required – no angles to measure.**



Suspended pipes and cable trays with standard cantilever brackets. Height adjustable using HALFEN Framing channels.

HALFEN Adjustable cantilever
Angle and height adjustable

HALFEN Cantilever
height adjustable



Typical application of the HALFEN System:
Anchor and framing channels with POWERCLICK and framing fittings

The HALFEN Framing system product range can be found in the following catalogues:
HALFEN Flexible bolt connections
HALFEN Flexible framing connections
HALFEN POWERCLICK System

MT-FBC

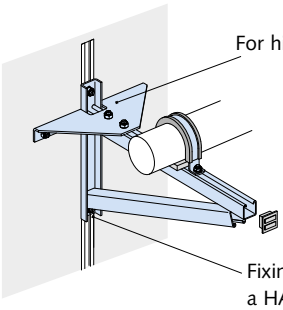
PC63

MT-FFC

HALFEN HZA-PS POWER SOLUTION
System solutions / Application Examples

Example for standard cantilever with loads

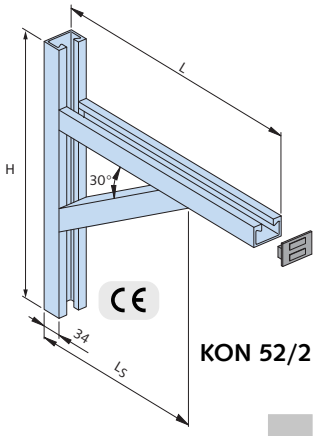
We can supply standard cantilevers with European Technical Approval from stock.
This brief extract from the main catalogue illustrates just some of the available KON 52/2 cantilevers and the corresponding working loads (allow. load) i.e. the design resistances acc. to Eurocode 3 (F_{Rd}). For more information please see the MT-FFC Flexible Framing Construction catalogue.



For higher loads with support bracket

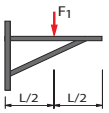
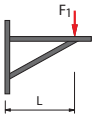
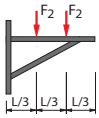
Example:
HALFEN KON 42/2 cantilever with bracing

Fixing to wall with T-head bolts to a HALFEN Channel or with dowels



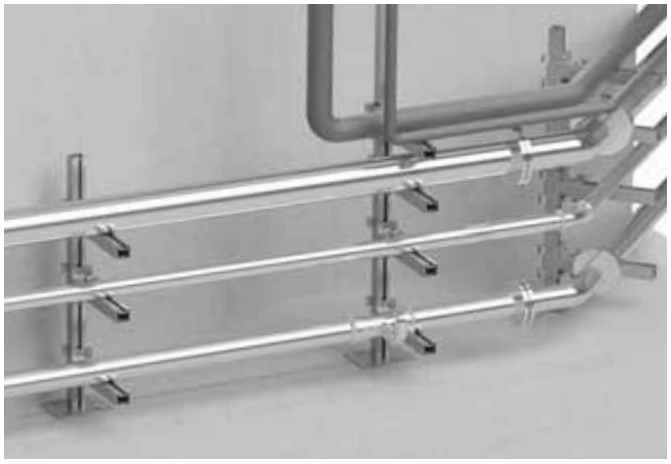
KON 52/2

KON 52/2 Extract with sizes and load bearing capacities

Dimensions			hot-dip galvanized FV	stainless steel A4				
Length L [mm]	Height H [mm]	Length L_S [mm]	Order no. 0310.080-	Order no. 0310.080-	F [kN]	 **F_1**	 **F_1**	 **F_2**
500	450	330	00001	00008	allow. load	9.0	15.0	7.5
					F_{Rd}	*12.6*	*21.0*	*10.5*
600	475	380	00002	00009	allow. load	8.0	15.0	7.5
					F_{Rd}	*11.2*	*21.0*	*10.5*
700	500	430	00003	00010	allow. load	7.0	15.0	6.5
					F_{Rd}	*9.8*	*21.0*	*9.1*
800	550	480	00004	00011	allow. load	6.0	15.0	6.0
					F_{Rd}	*8.4*	*21.0*	*8.4*

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Examples for modular supports

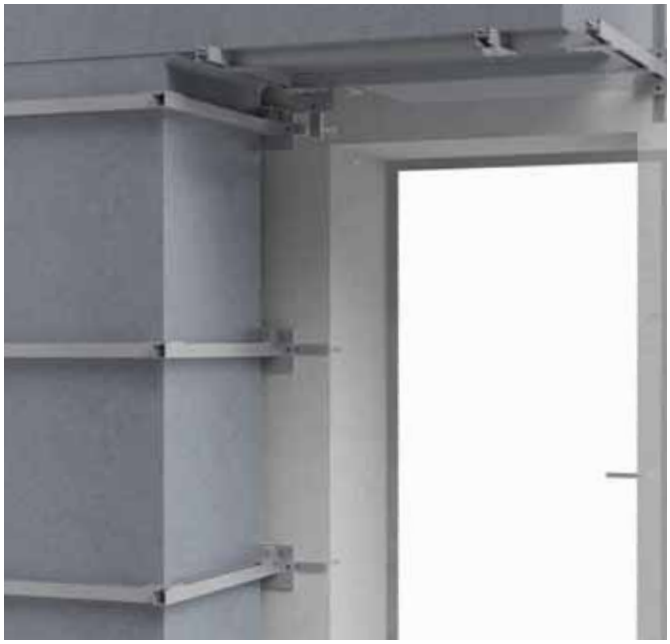


Simple, safe and economical
HALFEN POWERCLICK Systems are modular support systems. Our design tools and BIM-experts support your projects to minimize your design time.

For example Modular pipe-support
HALFEN POWERCLICK Systems suspend medium and heavy-duty applications even under seismic conditions. HALFEN Cantilever brackets fixed to vertically installed HZA-PS channels in concrete walls.

For example Cable and cable tray support
HALFEN POWERCLICK Systems fixed to horizontally installed HZA-PS channels in the concrete floor for medium and heavy-duty applications even under seismic conditions.

Examples for modular supports



Example: Air ventilation duct support
Combination of HALFEN POWERCLICK supporting fire protection ducts

HALFEN POWERCLICK Cantilever brackets fixed to vertically installed HZA-PS channels in concrete walls.

Example: Fire protection duct support and seismic design
Combination of HALFEN POWERCLICK supporting fire protection ducts POWERCLICK system mounted on the floor or clamped on structural steel beams.

POWERCLICK qualification and design guidelines:

- EU Guidelines for pressure equipment 2014 /68 /EU issued by the European Parliament are mandatory.
- At present EN 13480 "Metallic industrial piping“ is the only harmonized standard relating to the elementary guidelines for pipe systems and their supporting structures.

HALFEN HZA-PS POWER SOLUTION
HALFEN Cast-in Channels for Power Plants

Examples for modular supports

Modeling of the frame geometry and loads (dead load, loads of the pipelines)

Calculation of natural vibrations / natural modes with DYNAM Pro for RSTAB

Determination of static substitute loads from given response spectra

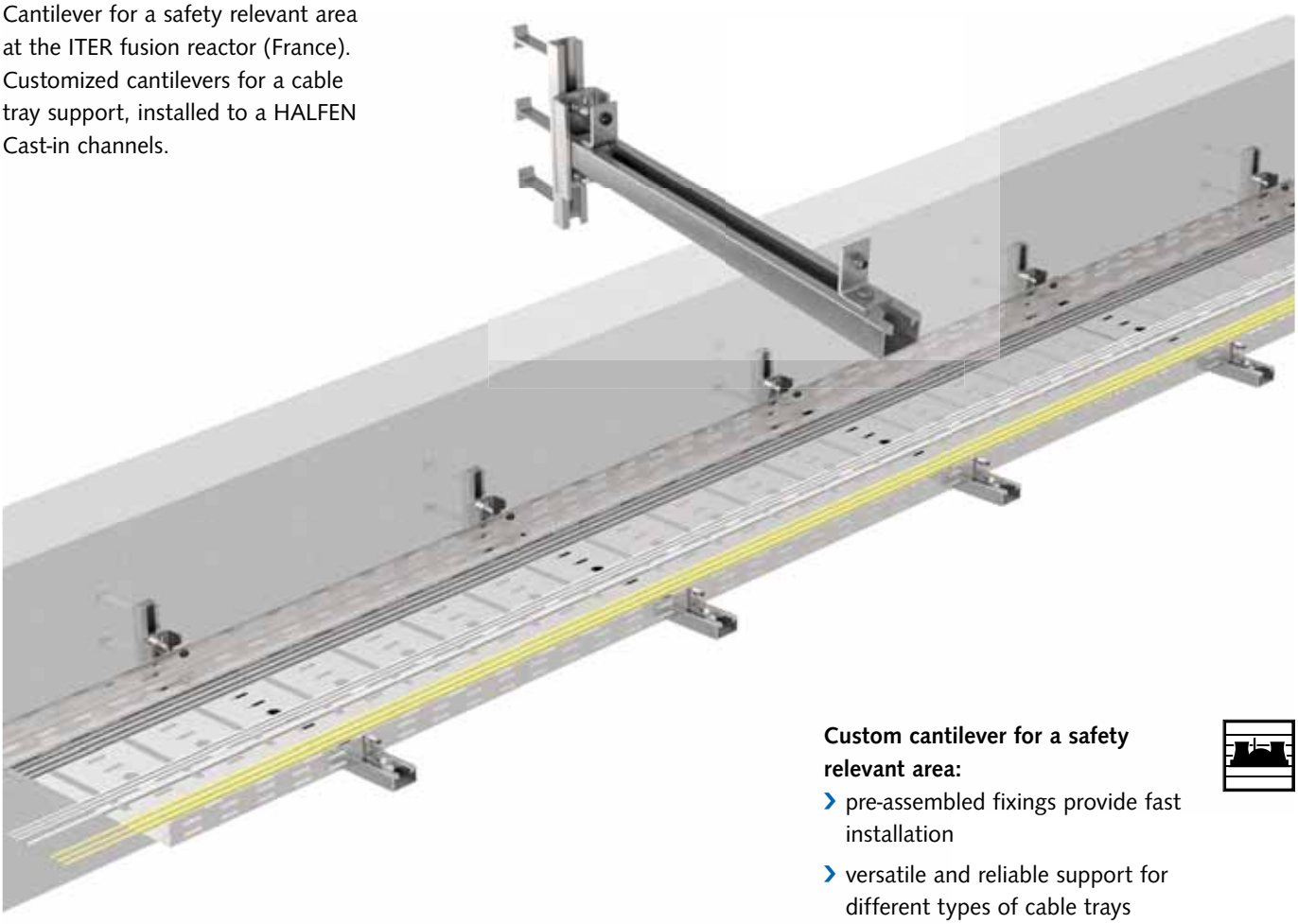
Determination of the decisive result combinations (100/30/30) and design of the frame for static and dynamic load cases

Modular pipe support systems
The HALFEN POWERCLICK System has become proven technology for pipe supports in large scale industrial plant projects.

The system is efficient and permanently adjustable. Therefore, It meets the high demands for a simple, versatile, time and cost-effective solution in modern plant construction and mechanical engineering projects.

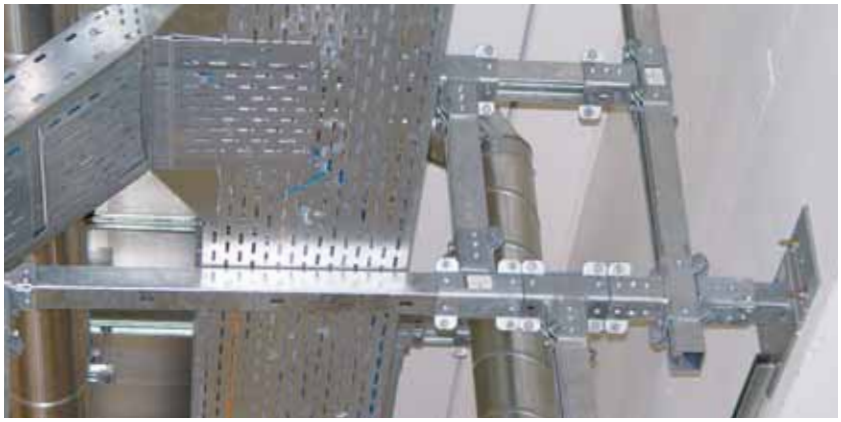
Example for a custom cantilever solution

Cantilever for a safety relevant area at the ITER fusion reactor (France). Customized cantilevers for a cable tray support, installed to a HALFEN Cast-in channels.



Custom cantilever for a safety relevant area:

- pre-assembled fixings provide fast installation
- versatile and reliable support for different types of cable trays



The HALFEN Framing system product range can be found in the following catalogues:
HALFEN Flexible bolt connections,
HALFEN Flexible framing connections
HALFEN POWERCLICK System.

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