

HALFEN HZA-PS POWER SOLUTION

Technical Product Information



NEW

Seismic C1/ C2 assessment
report and ETA-17/0728
for HZA-PS 53/34



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

Under the Leviat brand, we are uniting 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.

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HALFEN HZA-PS POWER SOLUTION

HALFEN Cast-in Channels for Power Plants

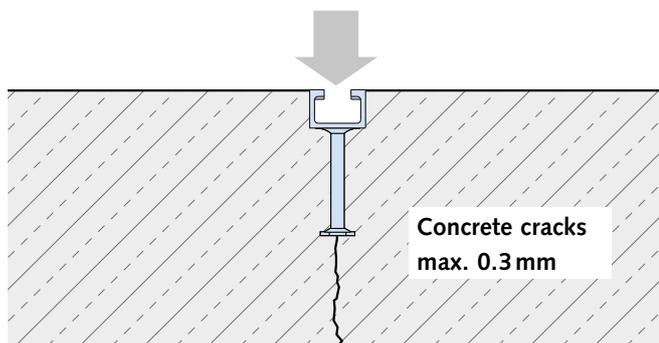
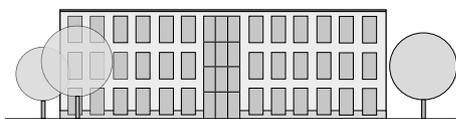
Standard application

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

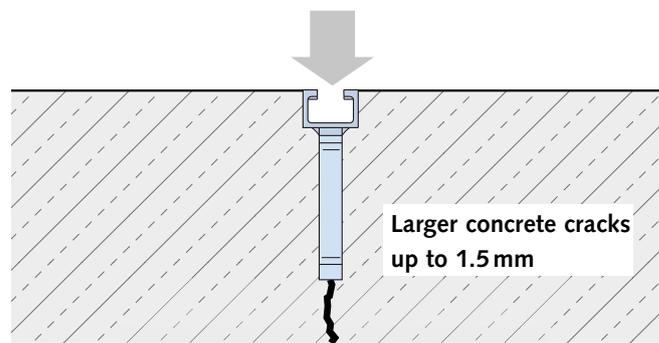
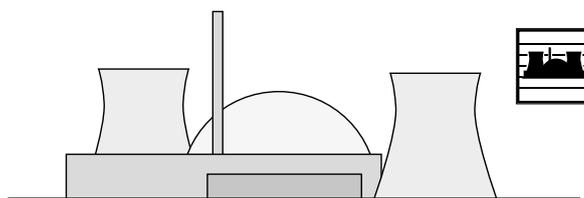


HALFEN HTA-CE and HZA Cast-in channels



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).



HALFEN HZA-PS Cast-in channel



Nuclear power plant under construction

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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 41/22: App. no. Z-21.4-145
 HZA Dynagrip: App. no. Z-21.4-1691



HZA-PS 53/34: ETA-17/0728 

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:



Faculty for Architecture and Building Engineering
 Concrete structures – Connection technology

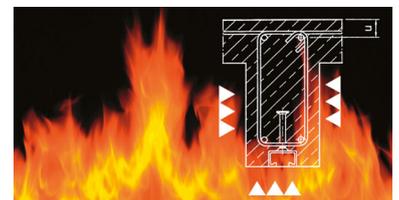
HZA-PS 53/34; HZA-PS 38/23;
 HZA-PS 29/20
 Evaluation Report
 Technical University
 of Dortmund 09.05.18-E 

HZA-PS 53/34
 Seismic C1/C2 assessment
 report, Technical University
 of Kaiserslautern, see page 5 

Fire Protection

HALFEN HTA and HZA 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.

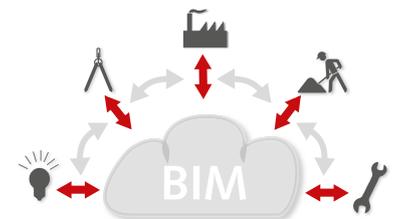
The new HPD (Health Product Declaration) for hot-dip galvanized HALFEN Cast-in channels helps to achieve additional points in the Leed-v4-system.



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/BIMreferences.



Quality

Our subsidiaries are Quality Management certified according to ISO 9001:2015, Certificate no. 202384-2016-AQ-GER-DAKKS.



Cert.-no. QS-281 HH



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

HALFEN HZA-PS POWER SOLUTION

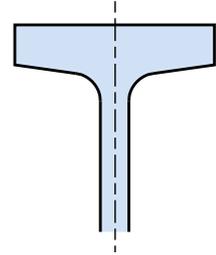
HALFEN Cast-in Channels for Power Plants



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

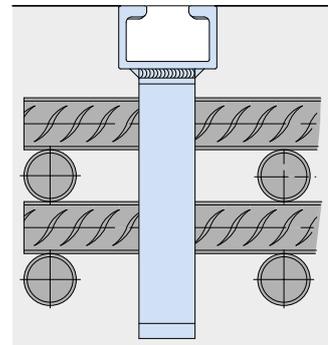
when used in concrete designed for possible wide cracks. With the minor movement of the anchorage system during opening and closing of cracks, a reliable fixing with low deformation can be guaranteed.



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

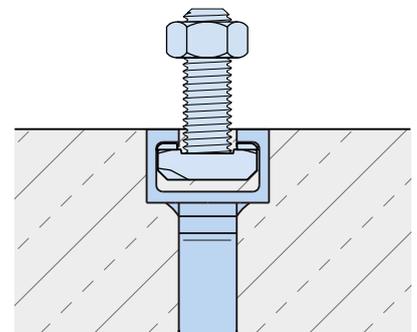
ideal load distribution into the reinforcement. Simultaneously the channels (maximum height is 44 mm) are easily installed in the standard concrete cover which is about 45–60 mm.



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

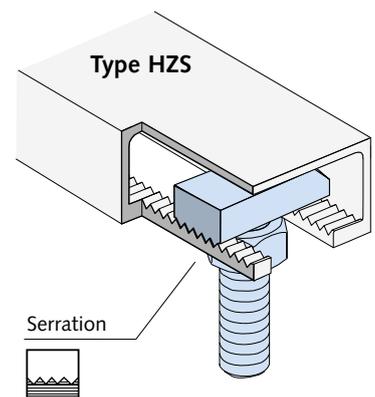
profile into the concrete structure. The hot-roll process also prevents deformation over the channel length caused during production and improving the connection of components. Dynamic loads can also be better transmitted as the hot-rolled material has low internal stresses.



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).



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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.

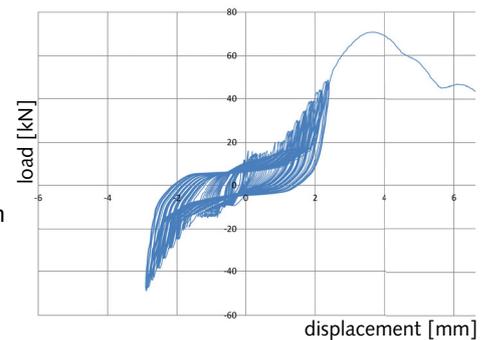


Seismic performance categories C1/C2 assessment report for HZA-PS 53/34

The seismic assessment and expert reports for the HALFEN anchor channel HZA-PS 53/34 cover the technical specifications of the AFCEM code RCC-CW, which corresponds to the demands of ETAG 001 Annex E (replaced by TR 049). The report provides characteristic seismic resistance

$R_{k,eq,steel}^0$ for each direction and for performance category C1 and C2.

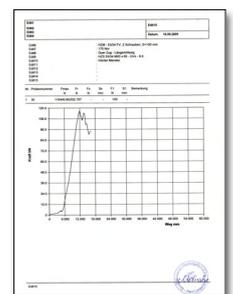
HALFEN Anchor Channels HZA-PS 53/34 fulfil the high requirements of seismic performance category C2 with excellent ductile behaviour, no anchor failure and low displacements.



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.



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

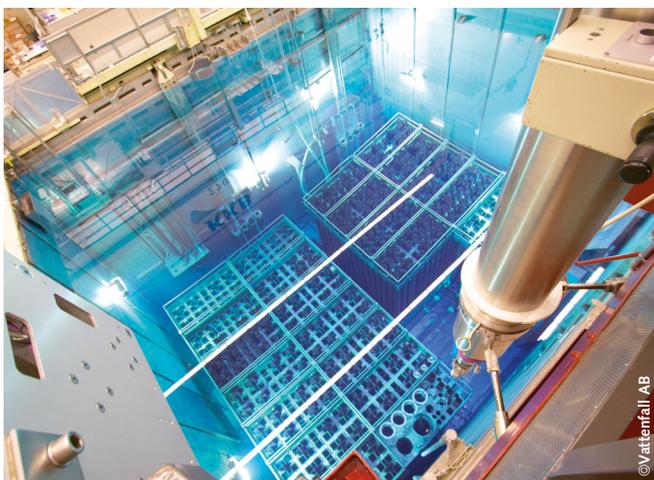
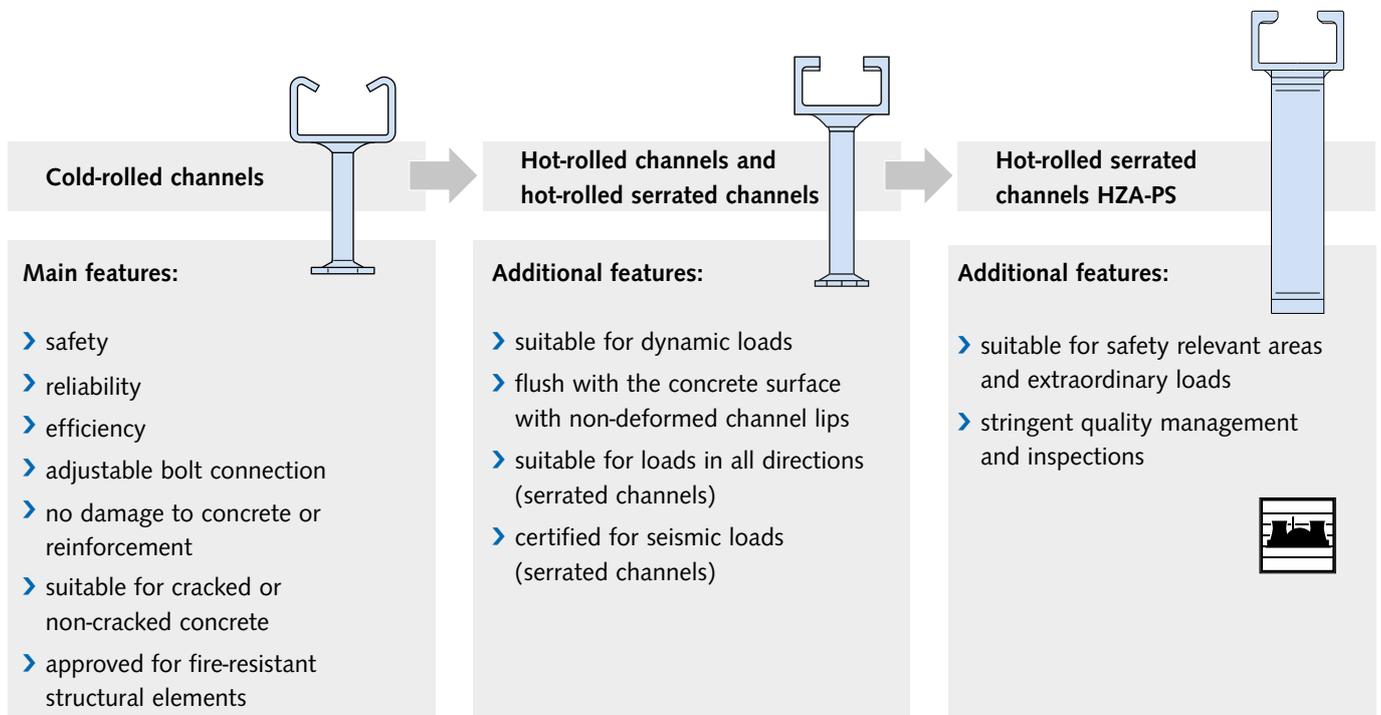
With more than 90 years of experience we became a world leader in providing adjustable anchoring systems.

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.



Fuel element cooling



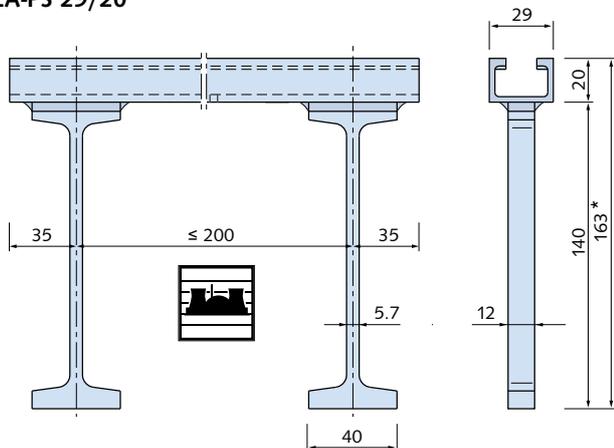
Turbine block in a nuclear power plant

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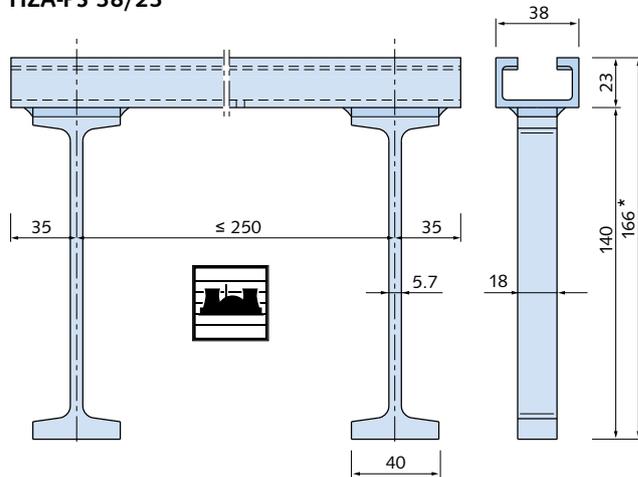
HALFEN Cast-in Channels for Power Plants

HZA-PS Cast-in channels

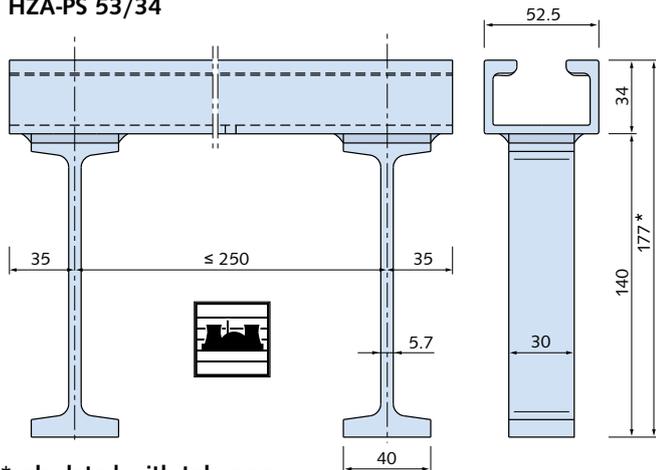
HZA-PS 29/20



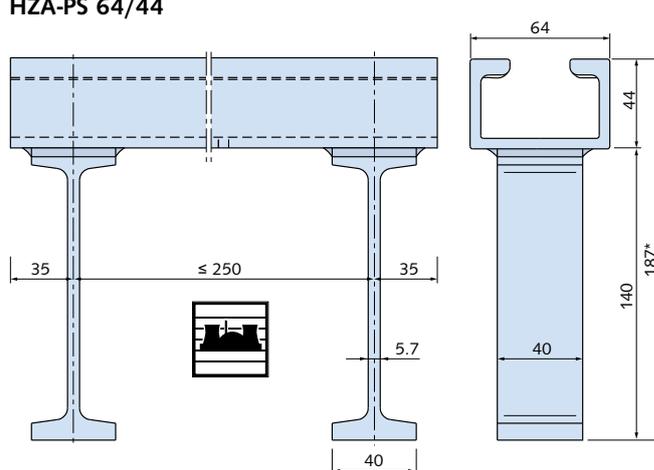
HZA-PS 38/23



HZA-PS 53/34



HZA-PS 64/44



*calculated with tolerance

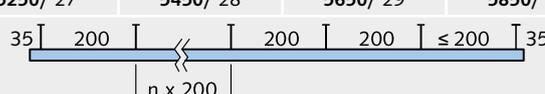
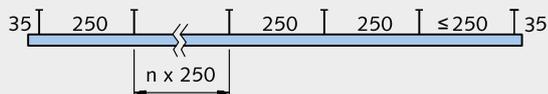
Available lengths (made to order) and anchor spacing

HZA-PS 38/23, 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 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 38/23, 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 – 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



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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.

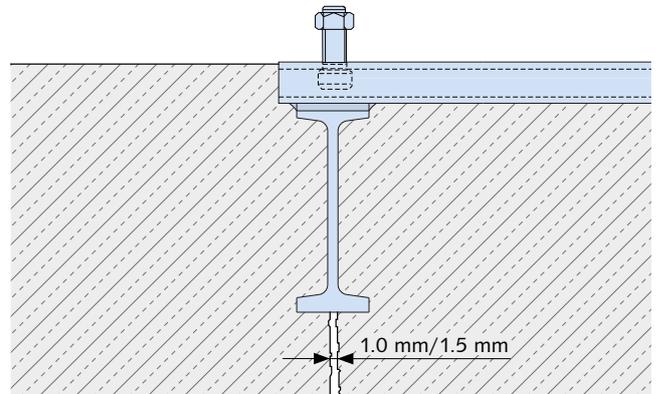
As a result of the higher demands of category A3 and A2 wider concrete cracks must be considered. Therefore, the behaviour of the anchoring system is examined in additional suitability tests with larger crack widths.

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.

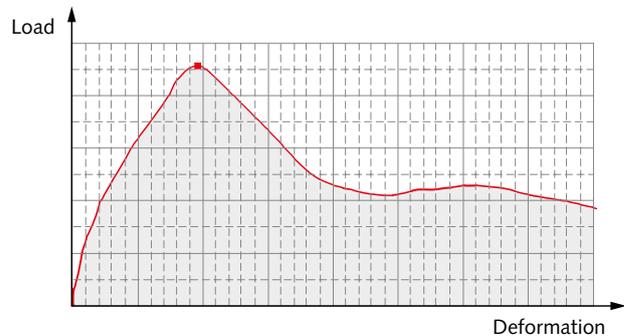
Examples of tests include:

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.

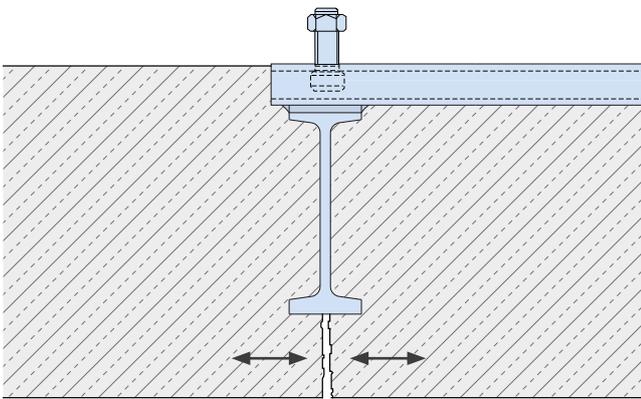


Test setup; pull-out test

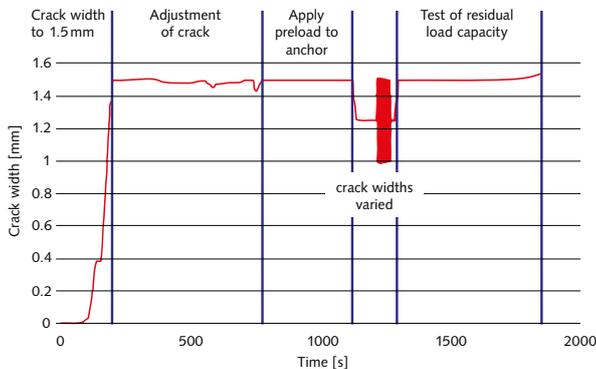
HALFEN HZA-PS POWER SOLUTION HALFEN Cast-in Channels for Power Plants

3. Performance test in an opening and closing concrete crack

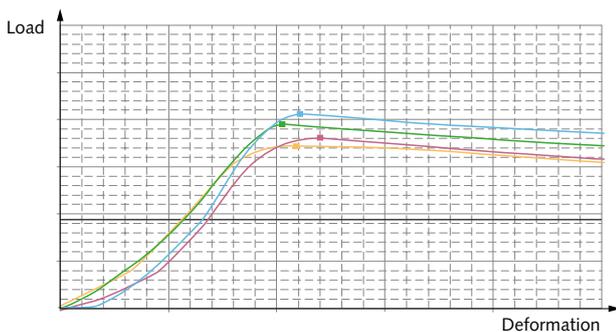
For this purpose, 10 oscillations were applied with a frequency of 0.2 Hz; the concrete crack varying between 1.0 and 1.5 mm, while the cast-in channel was subjected to a constant tension load. A pull-out test was subsequently carried out in the widest concrete crack of 1.5 mm.



Anchor position directly in an opening and closing concrete crack.



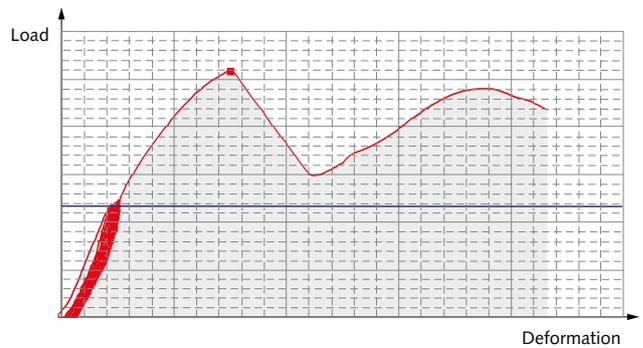
Chronological test procedure



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.



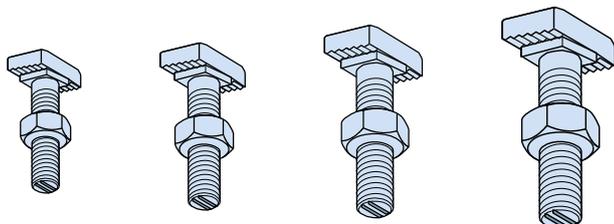
Test setup for cyclic load test

HALFEN HZA-PS POWER SOLUTION

HALFEN Cast-in Channels for Power Plants

HZS bolts — available lengths

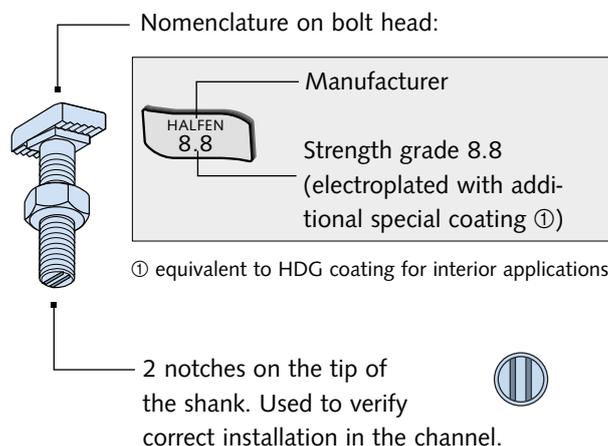
HZS 29/20 M12 HZS 38/23 M16 HZS 53/34 M20 HZS 64/44 M24



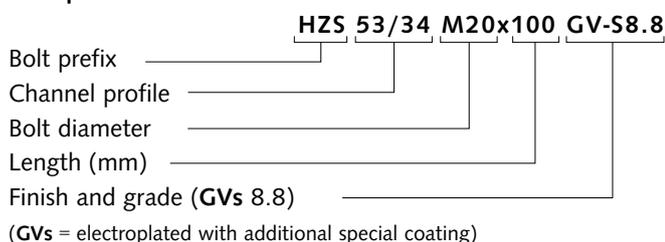
HZS T-Bolt lengths		
Bolt type/ channel profile	Bolt diameter (mm)	Grade 8.8 Bolt length (mm)
HZS 64/44	M24	80, 150
HZS 53/34	M20	65, 100
HZS 38/23	M16	40, 60, 80
HZS 29/20	M12	60, 80

For bolts in other lengths and diameters please contact us (→ see page 19).

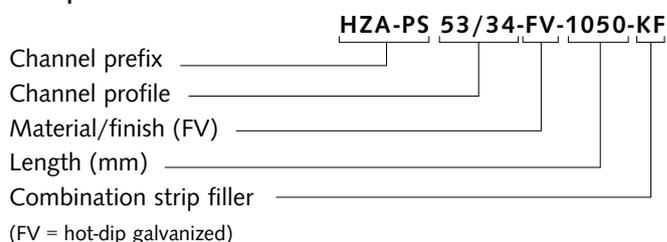
Product identification



Example order for bolts:



Example order for channels:

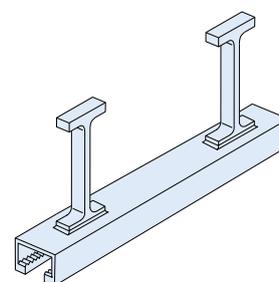


Tender specifications- Examples

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), suitable for adjustable connections to concrete in safety relevant areas of nuclear plants or other nuclear installations, channel length _____ mm, design resistance $F_{Rd} =$ _____ kN in all directions, up to _____ kN dynamic loading, 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 53/34 acc. to ETA-17/0728



The HZA-PS 53/34 (ETA-17/0728) design is based on EOTA TR 047 (EN 1992-4).

Verification will account for specific boundary conditions and differentiates between steel and concrete failure modes.

Profile load capacity* HZA-PS 53/34		
HZA-PS 53/34 acc. to ETA-17/0728		
$N_{Rd,s,l}^0$ [kN]	43.7	* Concrete load capacity has to be verified for each individual case (taking the geometric boundary conditions into account).
$V_{Rd,s,l,y}^0$ [kN]	43.7	
$V_{Rd,s,l,x}$ [kN]/ γ_{inst}	27.3	$N_{Rd,s,l}^0$ = channel lip load capacity (tension)
$M_{Rd,s,flex}$ [Nm]	3538	$V_{Rd,s,l,y}^0$ = 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

Load capacities of HZA-PS according to Z-21.4-1691



Loads

All the values shown are design resistance capacities and should therefore be compared against fully factored loads.

e.g. $F_{Ed} = \gamma_G G_k + \gamma_Q Q_k$

where:

- γ_G = partial factor for permanent loads
- G_k = characteristic value of permanent loads (dead load)
- γ_Q = partial factor for variable loads
- Q_k = characteristic value of variable loads (imposed or live load)

Design steel resistance F_{Rd}		s = anchor spacing see page 7						
F_{Rd} with simultaneous loading in all directions	<div style="border: 1px solid black; padding: 5px;"> To check: ① (A) $F_{Ed} = \sqrt{N_{Ed}^2 + V_{xEd}^2 + V_{yEd}^2} \leq F_{Rd}$ (B) $V_{x,Ed} \leq 0.8 \times F_{Rd}$ (single load) </div>	Single loads		Load pairs				
		F_{Rd} [kN]		F_{Rd} [kN] ②				
		$b_1 \geq 250$		$p_i = 50$	$p_i = 100$	$p_i = 150$	$p_i = 200$	$p_i = 250$
HZA-PS profile ①	64/44	37.8	-	23.6	27.0	31.5	37.8	
	53/34	30.8	-	19.25	22.0	25.7	30.8	
	38/23	16.8	9.4	10.5	12.0	14.0	16.8	
	29/20	11.2	6.3	7.5	9.0	11.2	11.2	

① Check B is only necessary if there are 2 or more bolts connecting **one** component.

② Intermediate values may be linearly interpolated.

Sufficient concrete resistances are provided if the boundary conditions are in accordance with the approval Z-21.4-1691 and the Technical Product Information for HALFEN Cast-in channels.

Extraordinary impact loads from external (EVA) or internal (EVI) forces are given in the Evaluation Report TU Dortmund.

Available on request. Also see page 3.

HALFEN HZA-PS POWER SOLUTION System Solutions/Application Examples

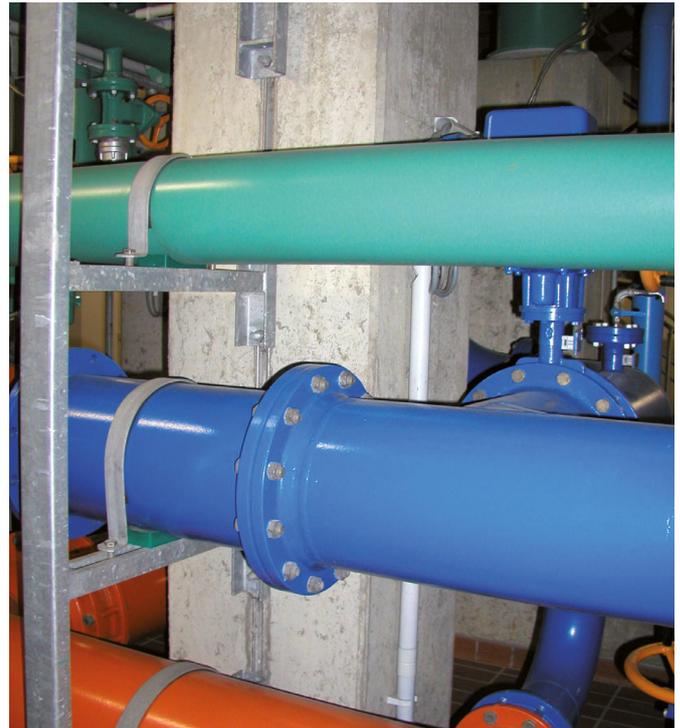
Planning with our products provides a wide range of possible design solutions: Nuclear power plants (EVA and EVI impact load requirements); sewage plants with larger pipe sizes; very long cable runs; pipe supply lines in utility or other types of tunnels; various other fixings, even to curved or slanted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

More than 90 Years of experience is packed into our products. Contact the 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



Pipe support fixed to vertical cast-in serrated channel



Cantilever fixed to a vertical serrated channel for pipe support



Pipe fixed to anchor channels cast into a ceiling slab



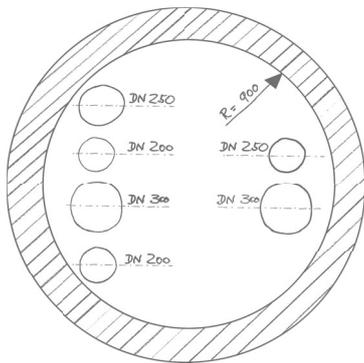
Cantilever fixed to vertical serrated channel for pipe support

HALFEN HZA-PS POWER SOLUTION HALFEN System Solutions/Channel ring

Example: designing with the our Engineering Support Team

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

From your drawings...



..to a detailed design and a successful project

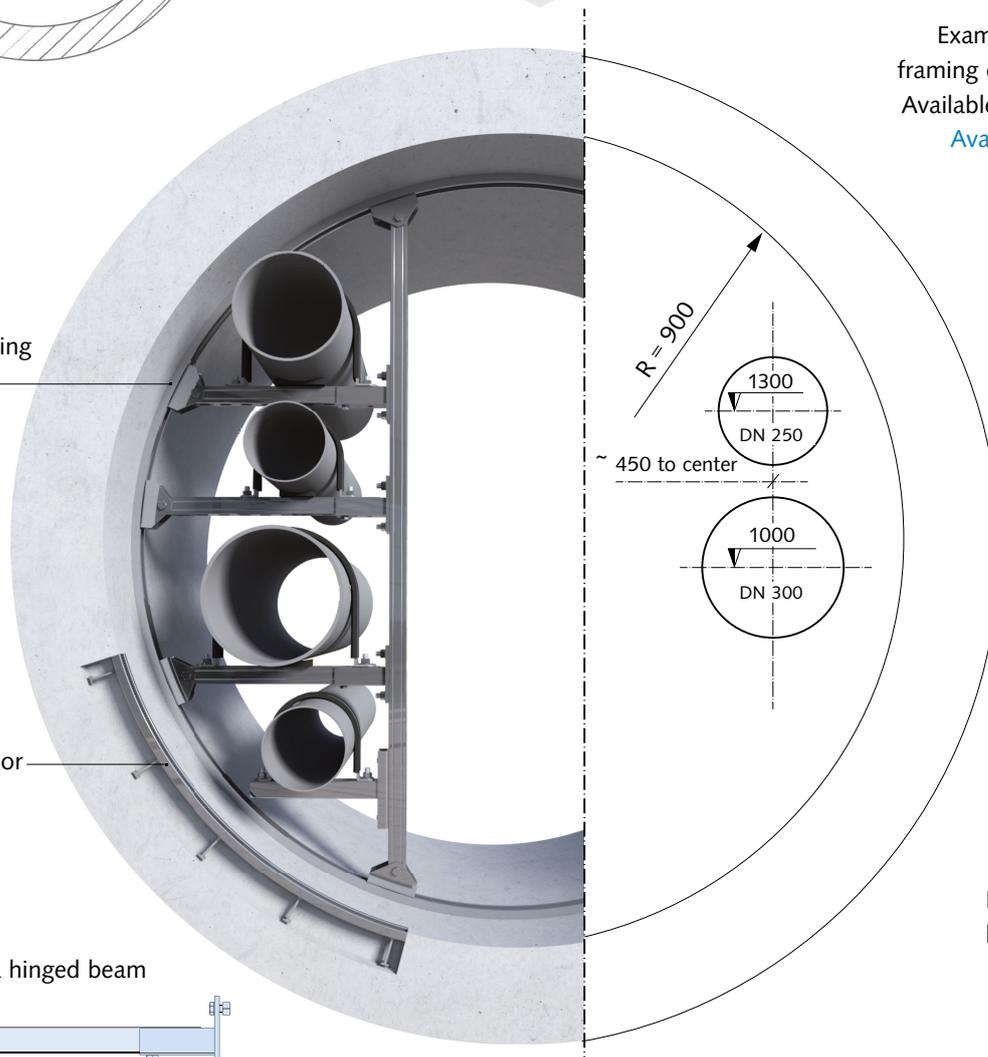
Standard and custom elements are combined when designing a pipe support system; this ensures the best and most economical solution for a specific project.

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

Serrated framing channel

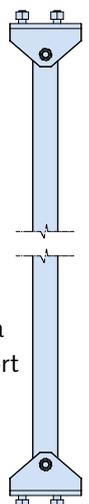
Alternative: Serrated anchor channel

Example for a hinged beam



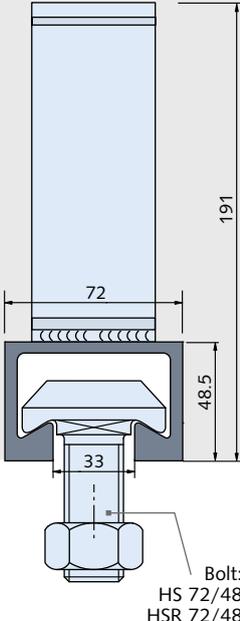
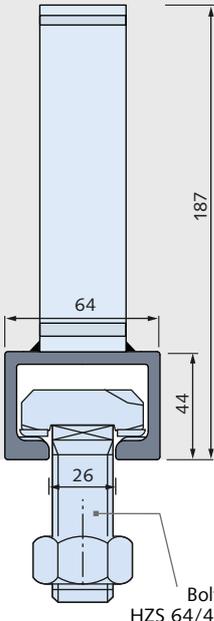
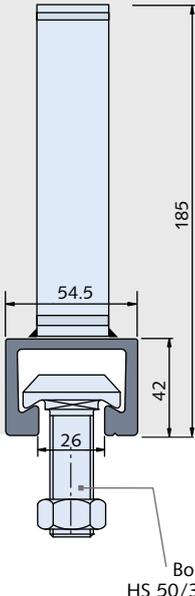
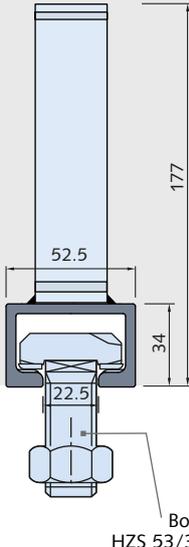
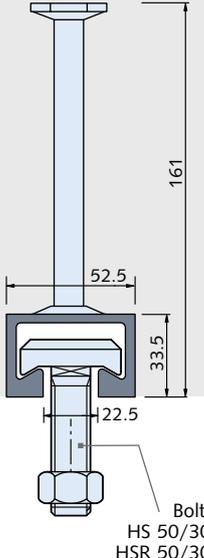
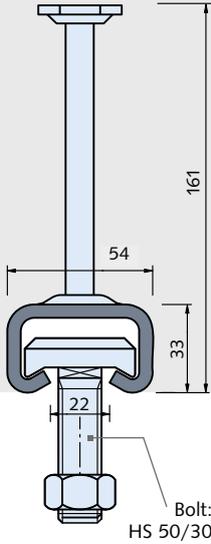
Example of a medium duty framing channel ring HCS-SRI. Available in hot-dip galvanized
Available in stainless steel

Example for a hinged support



HALFEN HZA-PS POWER SOLUTION

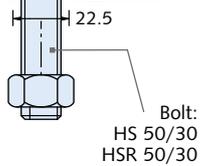
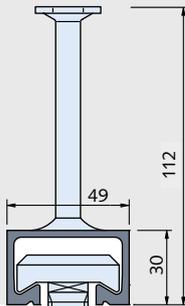
HALFEN HTA-CE/HZA Cast-in Channels

hot-rolled	HTA-CE 72/48   Bolt: HS 72/48 HSR 72/48 Material: <input type="checkbox"/> FV <input type="checkbox"/> A4	HZA 64/44   Bolt: HZS 64/44 Material: <input type="checkbox"/> FV <input type="checkbox"/> A4	HTA-CE 55/42   Bolt: HS 50/30 Material: <input type="checkbox"/> FV	HZA 53/34   Bolt: HZS 53/34 Material: <input type="checkbox"/> FV <input type="checkbox"/> A4	HTA-CE 52/34   Bolt: HS 50/30 HSR 50/30 Material: <input type="checkbox"/> FV <input type="checkbox"/> A4		
	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						
							
	cold-rolled						HTA-CE 54/33   Bolt: HS 50/30 Material: <input type="checkbox"/> FV <input type="checkbox"/> A4
<input type="checkbox"/> FV = steel, hot-dip galvanized <input type="checkbox"/> A4 = stainless steel <input checked="" type="checkbox"/> HCR = high corrosion resistant steel		suitable for dynamic loads  serrated channel 					

HALFEN HZA-PS POWER SOLUTION

HALFEN HTA-CE/HZA Cast-in Channels

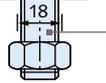
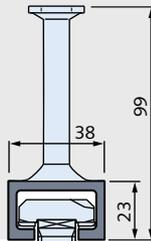
HTA-CE 50/30-P



Bolt:
HS 50/30
HSR 50/30

Material:
■
■

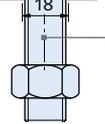
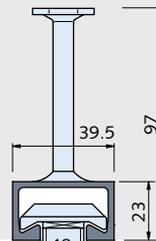
HZA 38/23



Bolt:
HZS 38/23

Material:
■
■

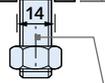
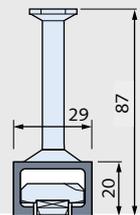
HTA-CE 40/22-P



Bolt:
HS 40/22
HSR 40/22

Material:
■
■

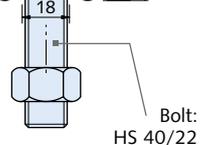
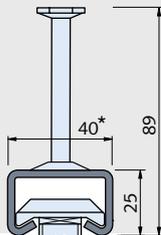
HZA 29/20



Bolt:
HZS 29/20

Material:
■

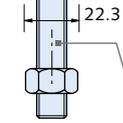
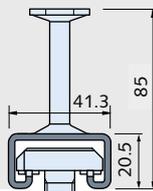
HTA-CE 40/25



Bolt:
HS 40/22

Material:
■ *40
■ *39.5

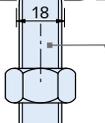
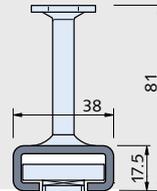
HZA 41/22



Bolt:
HZS 41/22

Material:
■
■

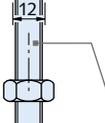
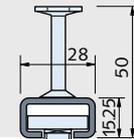
HTA-CE 38/17



Bolt:
HS 38/17

Material:
■
■
⊗

HTA-CE 28/15

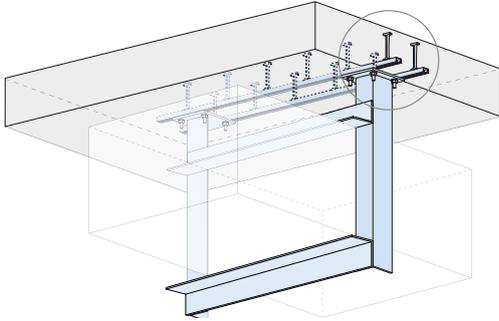


Bolt:
HS 28/15

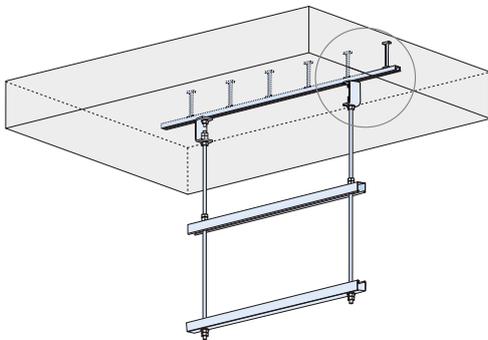
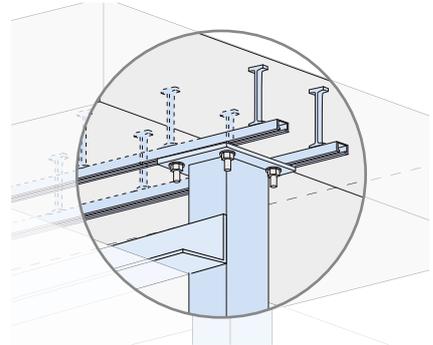
Material:
■
■
⊗

HALFEN HZA-PS POWER SOLUTION

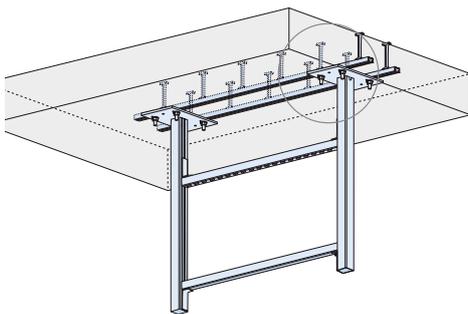
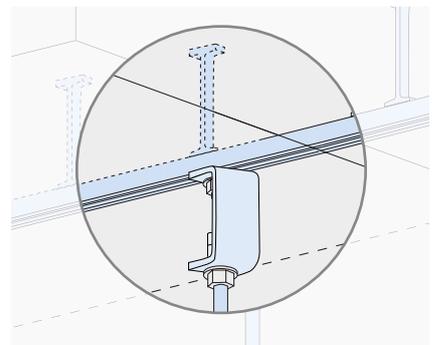
System Solutions/Application Examples



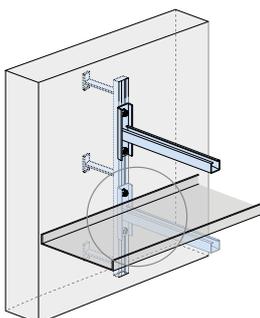
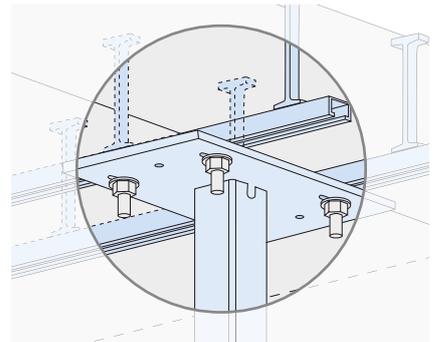
Air ventilation duct
supported with a welded
steel frame anchored to
a concrete slab with a
pair of serrated channels



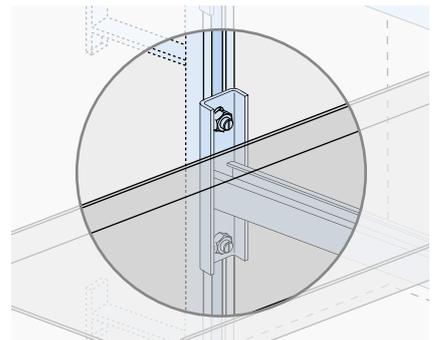
**Air ventilation duct
support**
suspended as a light
weight system
bolted to a concrete slab
using a serrated channel



**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

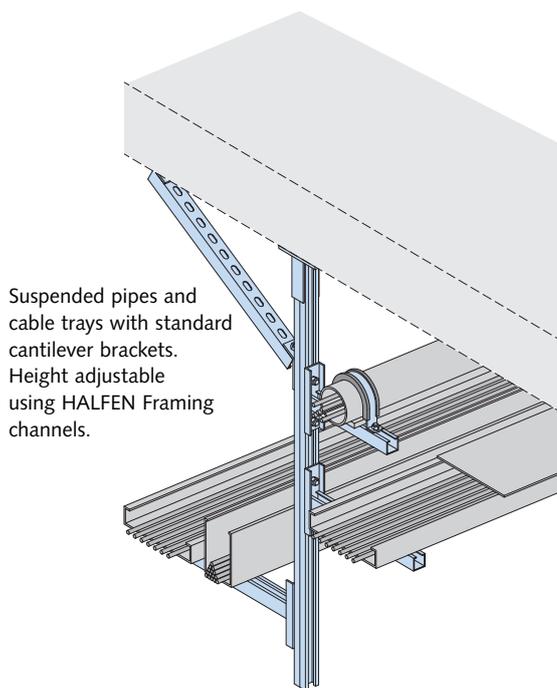
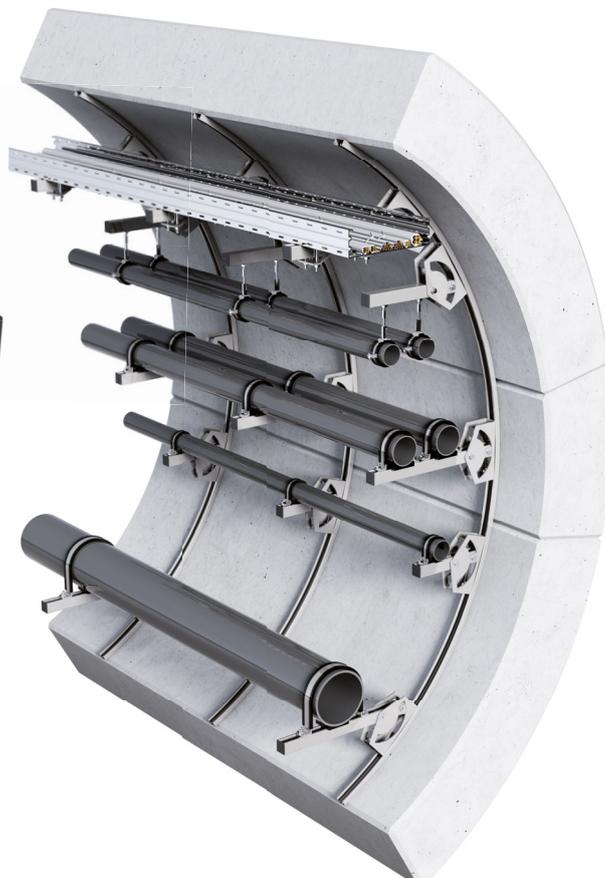
A revolution in pipe support in tunnels! The HALFEN Adjustable cantilever combines the acclaimed high load bearing capacity of the medium duty system with a much faster installation. Specially designed for use in tunnels or other applications with curved or slanted surfaces. It is not necessary to know the cantilever angles at planning.

One part for all fixings, dramatically reduces complexity.

No custom cantilevers required, no angles to measure.

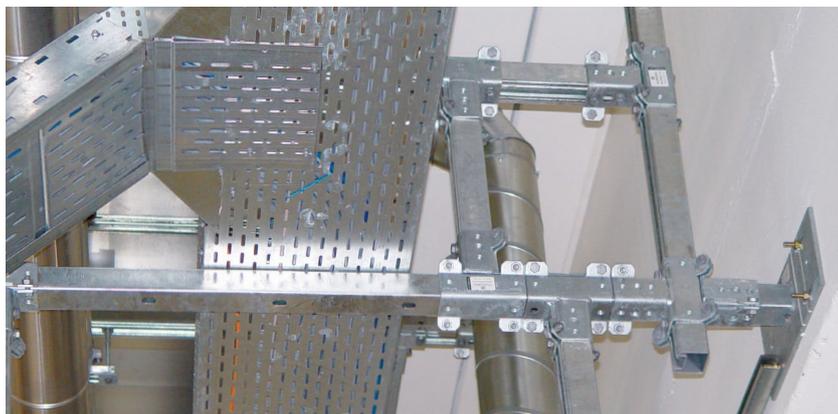


HALFEN Adjustable cantilever
Angle and height adjustable



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

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.

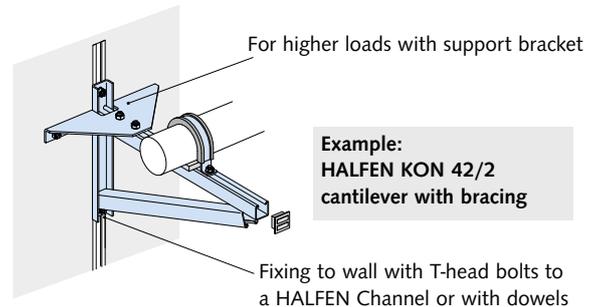


HALFEN HZA-PS POWER SOLUTION

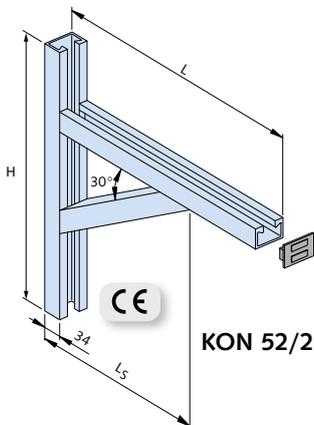
System solutions/Application Examples

Example for standard cantilever with loads

HALFEN 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.



Example:
HALFEN KON 42/2
cantilever with bracing

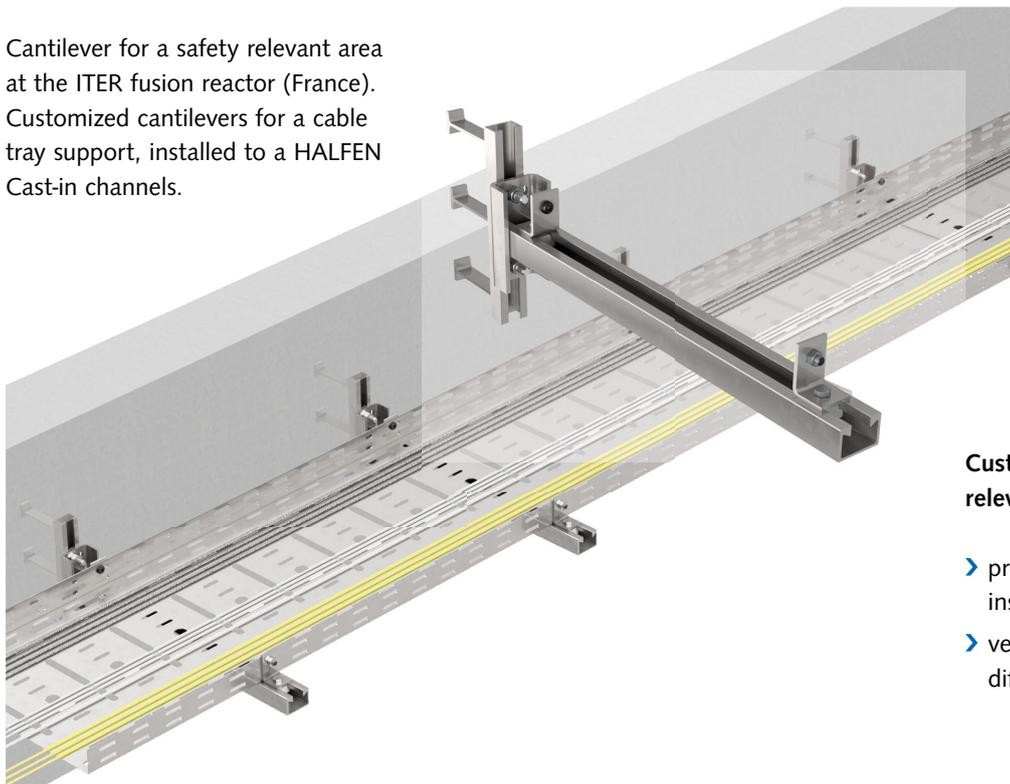


KON 52/2 Extract with sizes and load bearing capacities

Dimensions			hot-dip galvanized FV	stainless steel A4	F [kN]			
Length L [mm]	Height H [mm]	Length Ls [mm]	Order no. 0310.080-	Order no. 0310.080-				
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

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:

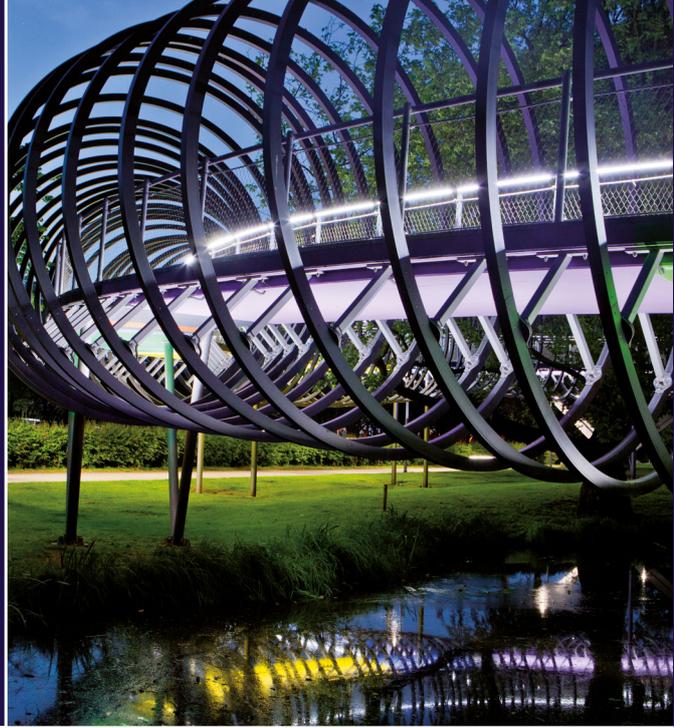
- pre-assembled fixings provide fast installation
- versatile and reliable support for different types of cable trays





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Innovative engineered products and construction solutions that allow the industry to build safer, stronger and faster.



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