HALFEN HZA ANCHOR CHANNELS
TECHNICAL PRODUCT INFORMATION

HALFEN ANCHOR CHANNELS

CONCRETE

HZA_US 18-E

ICC-ES Approved

HALFEN

YOUR BEST CONNECTIONS

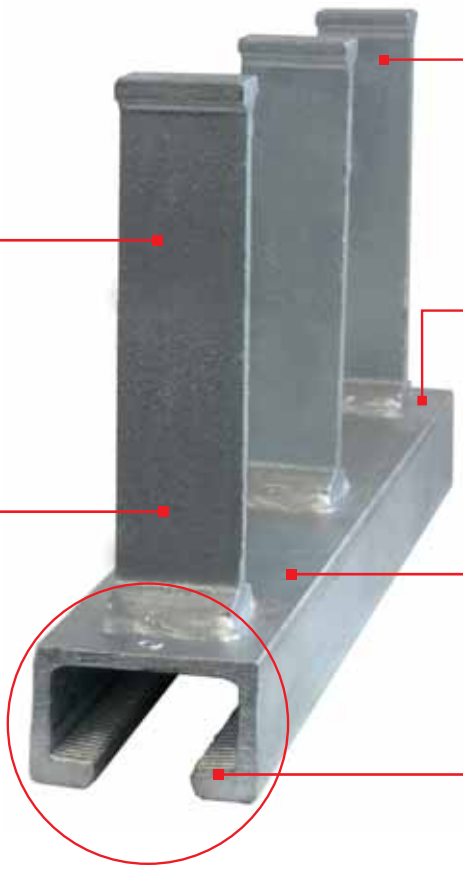
HALFEN HZA DYNAGRIP® Anchor Channels

The serrated solution for seismic loading

HALFEN Anchor Channels are used by designers across North America. A new dimension is now available in this established and well accepted anchoring method.

Reduced construction time
Connections to HALFEN Anchor Channels are quick and simple to install using only a torque wrench. Complex and time consuming installation and inspection processes as required for on-site welding and drilling are not required.

Resolves tolerance issues
Allows for large tolerances as common with connections to concrete structures.



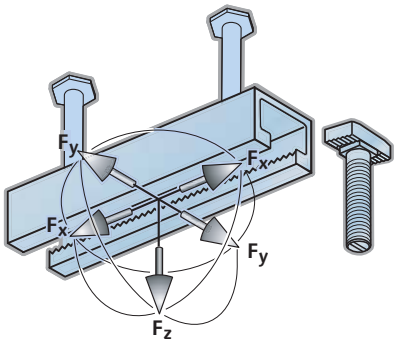
Maximum safety and reliability
HALFEN HZA DYNAGRIP® Serrated Anchor Channels do not damage reinforcement or concrete. They can be safely used in the tension zone of concrete, and will not work loose over time.

Covers all conditions
With a wide range of channel profiles and T-Bolts sizes the HALFEN HZA DYNAGRIP® Anchor Channel range can meet any designer's requirements.

Reduced design risk
ICC Approval ensures quality and reliability for designers and engineers.

Mechanical load transfer
Interlocking connection between channel and T-bolt serration provides positive transmission of loads in all three planes including the longitudinal direction.

HALFEN HZA DYNAGRIP® Serrated Anchor Channels with serrated HALFEN T-bolts provide safe three-dimensional load capacity with superior seismic performance.



ICC-ESR 4016

Many advantages with one result: HALFEN provides safety, reliability and efficiency for you and your customers.

HALFEN HZA DYNAGRIP® Serrated Anchor Channels are high performance, hot-rolled, serrated profiles with matching serrated T-bolts. This system permits adjustment of the connection combined with particularly high longitudinal load capacity.

HALFEN
YOUR BEST CONNECTIONS

HALFEN HZA ANCHOR CHANNELS

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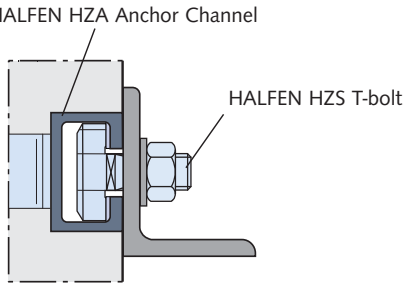
HALFEN HZA ANCHOR CHANNELS

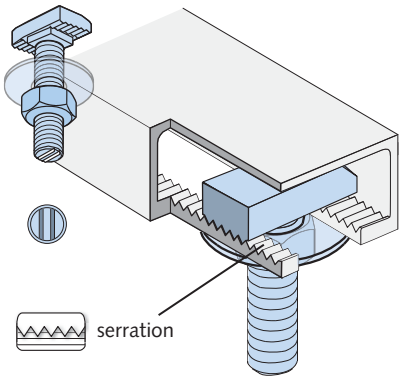
Main Features / Advantages at a Glance

Main Features

HALFEN HZA Anchor Channels and HZS T-bolts work in tandem to provide a reliable, durable and adjustable connection to concrete. HALFEN Anchor Channels are cast into concrete, eliminating the need for post-installed anchors and field welding. This minimizes the potential to damage the concrete or reinforcement during installation.

HALFEN Anchor Channels and T-bolts are available in a wide range of profile sizes/diameters and lengths allowing them to be utilized for a wide variety of applications in construction and industrial projects. The system is available in hot-dip galvanized and stainless steel to ensure long lasting performance. Engineered to the highest American standards, HALFEN HZA Anchor Channel system is a proven safe, simple and cost effective method of anchorage to concrete.





The notches on the T-bolt provide visual confirmation of T-bolt orientation; the final notch position must be at 90° to the channel's longitudinal axis.

Advantages at a Glance

HALFEN Anchor Channels offer the following advantages compared to traditional anchoring methods:

- Extremely short installation time
- Easily adjustable connections
- No welding needed on site
- Allows for construction tolerances
- No specialized workers needed for installation
- Single tool installation (torque wrench)
- No electrical power required during installation
- No on-site corrosion protection needed
- High quality materials and quality galvanization protect components from corrosion
- Visual check is sufficient to confirm correct installation
- Noise, vibration and dust free installation

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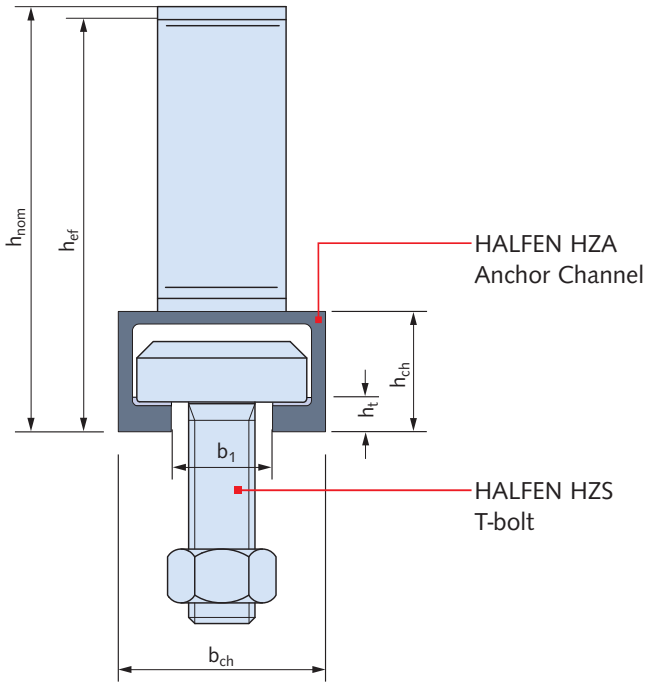
HALFEN HZA Anchor Channel Dimensions

HALFEN HZA Anchor Channel



h_{nom} = Installation height
h_{ef} = Effective embedment depth
h_{ch} = Channel height
b_{ch} = Channel width
b_1 = Channel opening
h_t = Height of the channel lips

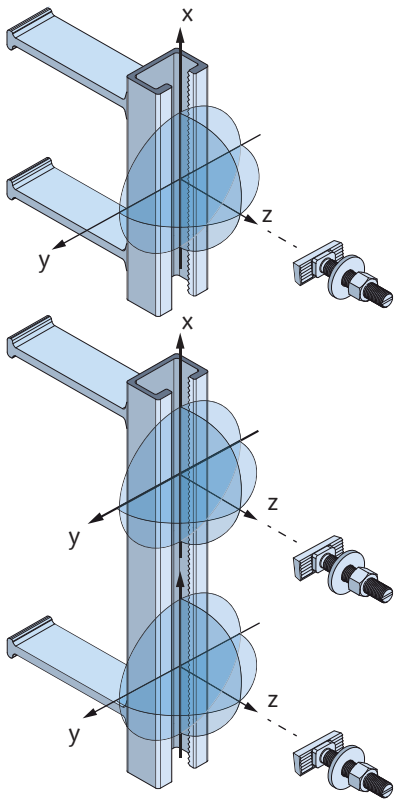
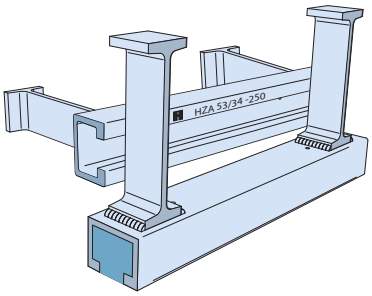


Illustration of loading directions		
tension load	z-direction	in direction of anchor
shear load	y-direction	perpendicular to longitudinal channel axis
	x-direction	longitudinal channel axis

Identification



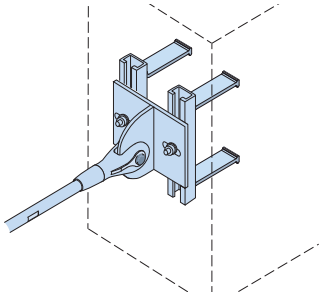
Channel material	Type identification
HDG - Hot-dip galvanized carbon steel	**HZA (Profile)-(length in mm) e.g. HZA 53/34-250**
A4 - Stainless steel	**HZA (Profile)-A4-(length in mm) e.g. HZA 53/34-A4**

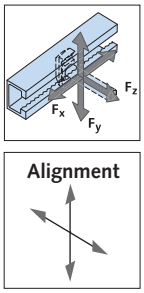
Type identification:
The Anchor Channel description is on the anchor channel lip. This ensures the product can be clearly identified before and after installation.

Applications

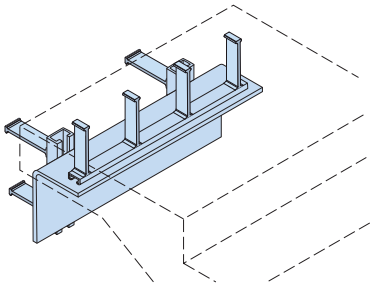
Applications

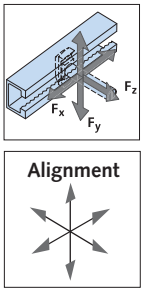
HALFEN Tension rod connection



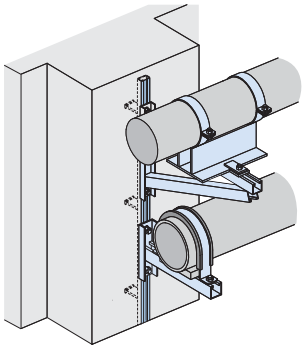


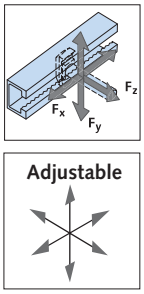
Precast staircase to wall connection



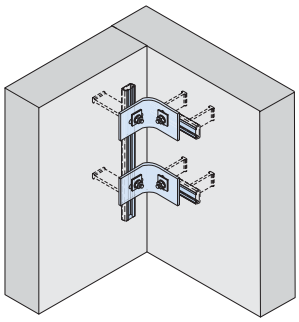


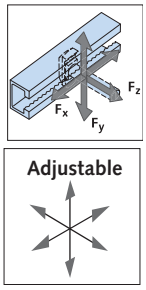
Support for mechanical services



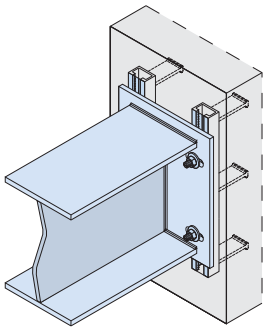


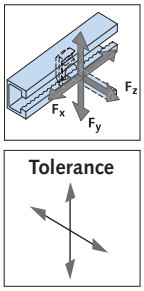
Precast panel to panel connection



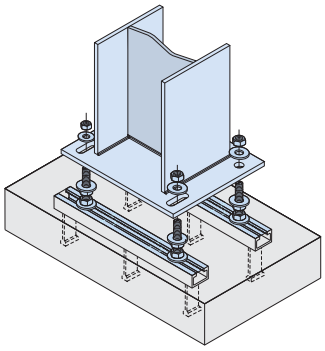


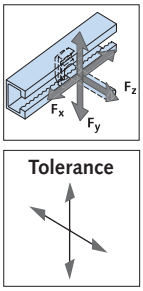
Beam to wall or column connection



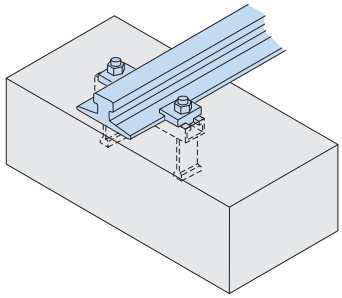


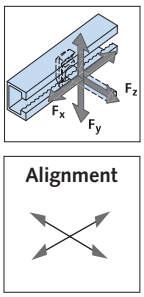
Column/slab connection



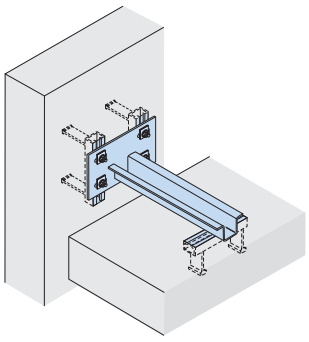


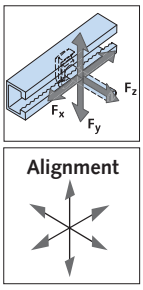
Crane/elevator rail connection





Precast panel to structure connection





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Application Examples

CURTAIN WALL LA Live, Los Angeles/CA

UTILITIES CONNECTIONS 432 Park Avenue, NYC/NY

MASONRY CONNECTIONS Appalachian State University, Boone/NC

FAÇADE ELEMENTS Broad museum, Los Angeles/CA

ELEVATOR CONNECTIONS Guide rail connection

BRIDGES Connection of a drainage system

INDUSTRIAL Vertical pipe support in columns

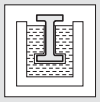
PETRO-CHEMICAL Vertical pipe support in columns

Materials / Corrosion Protection

Materials

Hot-dip galvanized (HDG)

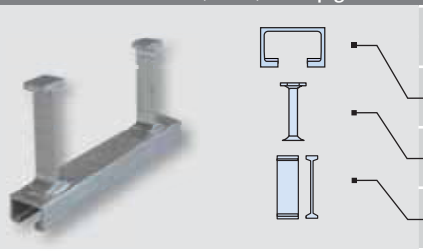
Dipped in a galvanizing bath at a temperature of approx. 860°F (460°C), a method used primarily for open-profile channels.



Electro plated (EP)

HALFEN T-bolts are electrogalvanized and coated with a Cr^{VI}-free thick layer passivation.

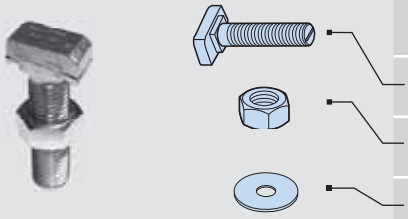
HALFEN Anchor Channels, steel, hot-dip galvanized



	Steel		
	Material	Standard	Zinc coat
Channel profile	Carbon steel ■	EN 10 025-2 ①	HDG: ≥ 55 µm
Bolt anchor B6	Carbon steel ■	EN 10 263 or EN 10 269	HDG: ≥ 55 µm
Weld-on anchor	Carbon steel ■	EN 10 025-2	HDG: ≥ 55 µm

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

HALFEN T-bolts, galvanized steel



	Steel		
	Material/Grade	Standard	Zinc coat
T-bolt	Grade 8.8 ■ ☒	ISO 898-1 and ISO 4034 (similar to ASTM F68M)	HDG ≥ 50 µm EP: ≥ 12 µm
Hexagonal nut	Property class 5 or 8 ■ ☒	ISO 898-2 and ISO 4032 (similar to ASTM F63M)	HDG: ≥ 50 µm EP: ≥ 12 µm
Washer	Production class A, 200 HV ■ ☒	ASTM F844	HDG: ≥ 40 µm EP: ≥ 12 µm

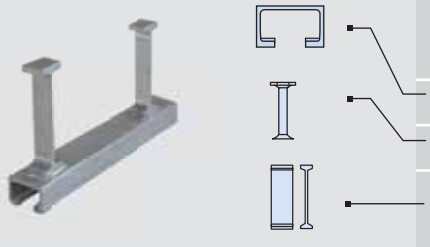
Stainless steel A4

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:

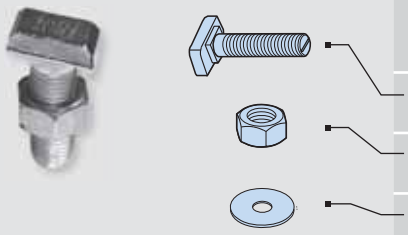
- □ **MF** = Steel mill finished
- ■ **HDG** = Steel hot-dip galvanized
- ☒ **EP** = Steel zinc plated (with special coating)
- ■ **A4** = Steel stainless

HALFEN Anchor Channels, stainless steel



	Stainless steel	
	Material/Grade	Standard
Channel profile	Stainless steel A4 (similar to 316Ti) ■	EN10 088 (similar to ASTM A276/A276M)
Bolt anchor B6	Stainless steel A4 (similar to 316Ti) ■	EN10 088 (similar to ASTM A276/A276M)
Weld-on anchor	Stainless steel A4 (similar to 316Ti) ■	EN10 088 (similar to ASTM A276/A276M)
	Steel ② □	EN10 025-2

HALFEN T-bolts, stainless steel



	Stainless steel	
	Material/Grade	Standard
T-bolt	Stainless steel A4 (similar to 316Ti) ■	ISO 3506-1 (similar to ASTM A276/A276M)
Hexagonal nut	Stainless steel A4 (similar to 316Ti) ■	ISO 3506-2 (similar to ASTM A276/A276M)
Washer	Stainless steel A4 (similar to 316Ti) ■	ISO 7089 and ISO 7093-1

② Corrosion protection of mill finished anchor → page 9

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Corrosion Protection

To ensure that connections perform to their full potential throughout their service life it is critical to chose the appropiate corrosion protection.
The corrosion process is complex and can be attributed to many factors.
HALFEN Anchor Channels are available in either hot-dip galvanized (≥ 55 µm) or stainless steel depending on the level of corrosion resistance required.
The corrosion resistance of zinc coatings is primarily dependent on the thickness of the coating relative to the environmental conditions.

Zinc corrosion rates can be obtained from the American Galvanizers Association and ASTM B 633. A table of mean corrosion rates for various environments is provided to the right. It should be noted that these values are for general reference only and are provided only to give a better estimate of the expected service life of the zinc coating. Stainless steel is recommended for moderately to highly corrosive environments (industrial and coastal environments) or where an extended lifetime of the connection is warranted.

Atmosphere	Mean Corrosion Rate
Industrial	5.6 µm/year
Urban non-industrial	1.5 µm/year
Marine	1.5 µm/year
Suburban	1.3 µm/year
Rural	0.8 µm/year
Indoors	< 0.5 µm/year

- Table obtained from ASTM B 633 Appendix X1.
- The mean corrosion rates apply only to zinc and do not include a corrosion rate when zinc is passivated or in contact with other materials.
- All components are hot-dip galvanized in accordance with ASTM A153

Contact Corrosion

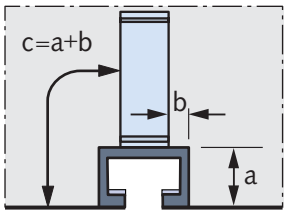
Dissimilar metals and alloys have different electrode potentials.
Corrosion can occur between dissimilar metals or alloys when they come in contact and are in the presence of an electrolyte (e.g. water).The electro potential between the dissimilar metals is the cause of an accelerated corrosion of the anode member of the galvanic couple. This type of corrosion is referred to as Galvanic Corrosion or Bi-metal Corrosion.

Interior connections located in dry environments are typically not susceptible to this type of corrosion.

To prevent galvanic corrosion from occurring all T-bolts, nuts, washers and channels are recommended to be of the same material, i.e. stainless steel bolts, nuts and washers shall be used with stainless steel channels.

Corrosion Protection Requirements

HALFEN HZA 64/44 Stainless Steel Anchor Channels utilize mill finished carbon steel I-anchors welded on the back of the profile.
The corrosion protection of the anchors is guaranteed due to a concrete cover of c=a+b=2 3/16" (56 mm) as illustrated.



Concrete cover c

The minimum concrete cover is based on local environmental conditions and bid specifications.

HALFEN HZA Stainless Steel Anchor Channels are also delivered with stainless steel, round bolted anchors. The corrosive resistance of these anchors is not restricted to any minimum concrete cover due to the higher corrosion protection of the material used.

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

Calculation Method according to AC232

Calculation Method according to AC232

Bolts and Channel Lips

ϕN_{ss} ($\phi N_{ss,seis}$), ϕN_{sl} ($\phi N_{sl,seis}$) ≥ N^b_{ua}

ϕV_{ss} ($\phi V_{ss,seis}$), $\phi V_{sl,y}$ ($\phi V_{sl,y,seis}$) ≥ $V^b_{ua,y}$

ϕV_{ss} ($\phi V_{ss,seis}$), $\phi V_{sl,x}$ ($\phi V_{sl,x,seis}$) ≥ $V^b_{ua,x}$

Channel, Anchors and Concrete

ϕN_{nc} ($\phi N_{nc,seis}$), $\phi N_{ns,a}$ ($\phi N_{ns,a,seis}$) ≥ N^a_{ua}

ϕV_{nc} ($\phi V_{nc,seis}$), $\phi V_{ns,a}$ ($\phi V_{ns,a,seis}$) ≥ $V^a_{ua,y}$

ϕV_{nc} ($\phi V_{nc,seis}$), $\phi V_{ns,a}$ ($\phi V_{ns,a,seis}$) ≥ $V^a_{ua,x}$

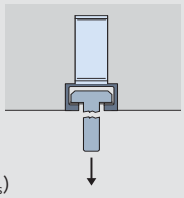
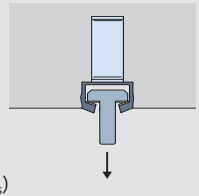
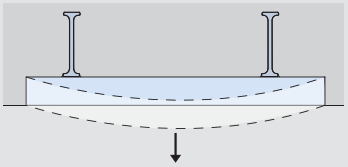
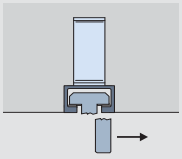
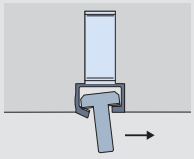
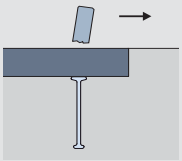
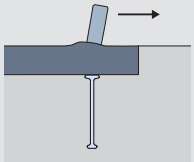
Channel Flexure

$\phi M_{s,flex}$ ($\phi M_{s,flex,seis}$) ≥ $M_{u,flex}$

Load types

Load	Description
N^b_{ua}, $V^b_{ua,y}$ and $V^b_{ua,x}$	Loads acting on the T-bolt(s).
N^a_{ua}, $V^a_{ua,y}$ and $V^a_{ua,x}$	Loads acting on the anchors. These loads are determined using the factored tension and shear loads calculated in accordance with ACI 318-14 Sec. 5.3 or ASCE 7-10 Sec. 2.3.
$N_{ns,a}$ and $V_{ns,a}$ ($N_{ns,a,seis}$ and $V_{ns,a,seis}$)	Minimum tension and shear capacities (under seismic loading) for steel failure of an anchor or the connection between the anchor and channel (N_{sa}, N_{sc}, $V_{sa,y}$, $V_{sa,x}$, $V_{sc,y}$, $V_{sc,x}$ or $N_{sa,seis}$, $N_{sc,seis}$, $V_{sa,y,seis}$, $V_{sa,x,seis}$, $V_{sc,y,seis}$, $V_{sc,x,seis}$).
N_{nc} and V_{nc} ($N_{nc,seis}$ and $V_{nc,seis}$)	Nominal tension and shear capacities (under seismic loading) of one anchor from all concrete failure modes (N_{pn}, N_{cb}, $V_{cb,y}$, $V_{cb,x}$, $V_{cp,y}$, $V_{cp,x}$ or $N_{pn,seis}$, $N_{cb,seis}$, $V_{cb,y,seis}$, $V_{cb,x,seis}$, $V_{cp,y,seis}$, $V_{cp,x,seis}$) see table below.
$M_{u,flex}$	Bending moment on the channel due to the factored tension load(s) N^b_{ua}.

Failure modes

	Steel failure modes		
	T-bolt failure	Local flexure of channel lip	Channel flexure
Tension loading (N)	 N_{ss} ($N_{ss,seis}$) ϕ = 0.65 (Grade 8.8)	 N_{sl} ($N_{sl,seis}$) ϕ = 0.75	 $M_{s,flex}$ ($M_{s,flex,seis}$) ϕ = 0.85
Loading in perpendicular shear (V_y)	 V_{ss} ($V_{ss,seis}$) ϕ = 0.60 (Grade 8.8)	 $V_{sl,y}$ ($V_{sl,y,seis}$) ϕ = 0.75	
Loading in longitudinal shear (V_x)	 V_{ss} ($V_{ss,seis}$) ϕ = 0.60 (Grade 8.8)	 $V_{sl,x}$ ($V_{sl,x,seis}$) ϕ = 0.65 Periodic inspection ϕ = 0.75 Continous inspection	

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Calculation Method according to AC232

Allowable stress design

For connections designed using Allowable Stress Design (ASD) allowable loads shall be determined as follows:

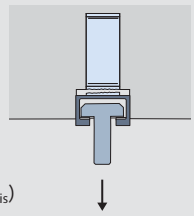
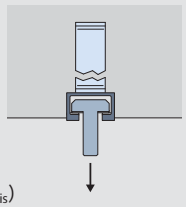
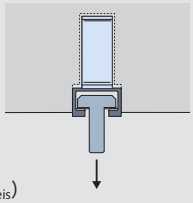
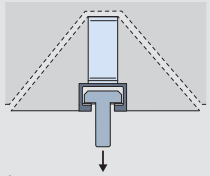
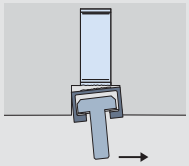
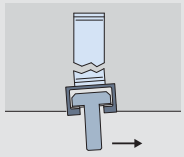
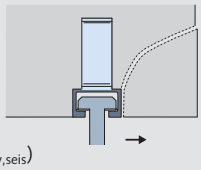
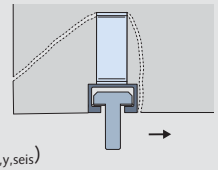
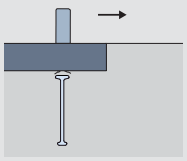
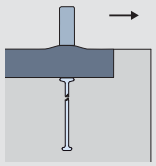
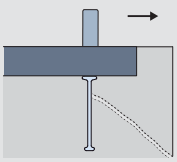
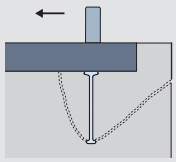
$$T_{allowable,ASD} = \frac{\phi N_n}{\alpha_{ASD}}$$

$$V_{allowable,ASD} = \frac{\phi V_n}{\alpha_{ASD}}$$

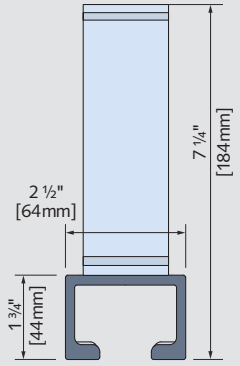
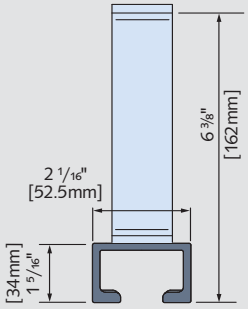
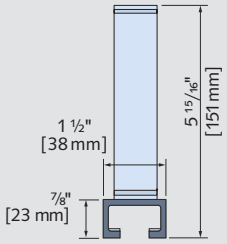
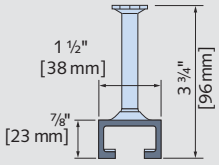
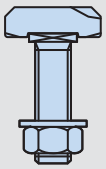
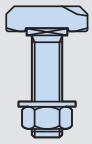
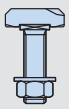
α_{ASD} = Conversion factor calculated as a weighted average of the load factors for the controlling load combination.

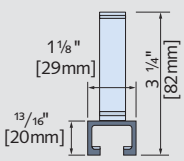
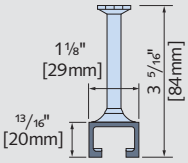
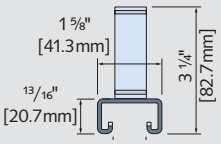
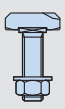
All relevant strength reduction factors ϕ are provided in the table below. If the load combinations referenced in ACI 318-11 Appendix C are used, the appropriate strength reduction factor should be used in accordance with AC232.

The capacity of HALFEN HZA Anchor Channels is calculated according to ICC-ESR 4016 Evaluation Report by the International Code Council Evaluation Service (ICC-ES). The Evaluation Report refers to the Acceptance Criteria for Anchor Channels in Concrete Elements AC232 by ICC-ES. The design requirements are primarily based on the principles as in ACI 318-14, chapter 17 (previously ACI 318-11, Appendix D) with amendments as applicable to the strength design of anchor channels.

Steel failure modes		Concrete failure modes	
Connection between anchor and channel	Anchor failure	Pull-out failure	Concrete cone failure
 N_{sc} ($N_{sc,seis}$) ϕ = 0.75	 N_{sa} ($N_{sa,seis}$) ϕ = 0.75	 N_{pn} ($N_{pn,seis}$) ϕ = 0.70	 N_{cb} ($N_{cb,seis}$) ϕ = 0.70
 $V_{sc,y}$ ($V_{sc,y,seis}$) ϕ = 0.75	 $V_{sa,y}$ ($V_{sa,y,seis}$) ϕ = 0.75	Concrete edge failure  $V_{cb,y}$ ($V_{cb,y,seis}$) ϕ = 0.70	Concrete pry-out failure  $V_{cp,y}$ ($V_{cp,y,seis}$) ϕ = 0.70
 $V_{sc,x}$ ($V_{sc,x,seis}$) ϕ = 0.75	 $V_{sa,x}$ ($V_{sa,x,seis}$) ϕ = 0.75	 $V_{cb,x}$ ($V_{cb,x,seis}$) ϕ = 0.70	 $V_{cp,x}$ ($V_{cp,x,seis}$) ϕ = 0.70

HALFEN HZA Anchor Channels and HZS T-bolts — Product overview

HALFEN HZA Anchor Channel	HZA 64/44	HZA 53/34	HZA 38/23	
				
Material ① ②	■ ■	■ ■	■	■
Type	hot rolled	hot rolled	hot rolled	hot rolled
Page	13	14	15	15
Available HALFEN HZS T-bolts (see also tables on page 20 – 21 for order numbers)	**HZS 64/44** M20 and M24 (≈ ¾" and ≈ 1¼") 	**HZS 53/34** M16 and M20 (≈ ⅝" and ≈ ¾") 	**HZS 38/23** M12 and M16 (≈ ½" and ≈ ⅝") 	

HALFEN HZA Anchor Channel	HZA 29/20	HZA 41/22
	 	
Material ① ②	■	■	■
Type	hot rolled	hot rolled	cold formed
Page	16	16	17
Available HALFEN HZS T-bolts (see also tables on page 20 – 21 for order numbers)	**HZS 29/20** M12 (≈ ½") 		**HZS 41/22** M12 and M16 (≈ ½" and ≈ ⅝") 

① HDG = Hot-dip galvanized carbon steel ② A4 = Stainless steel

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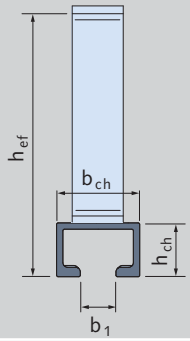
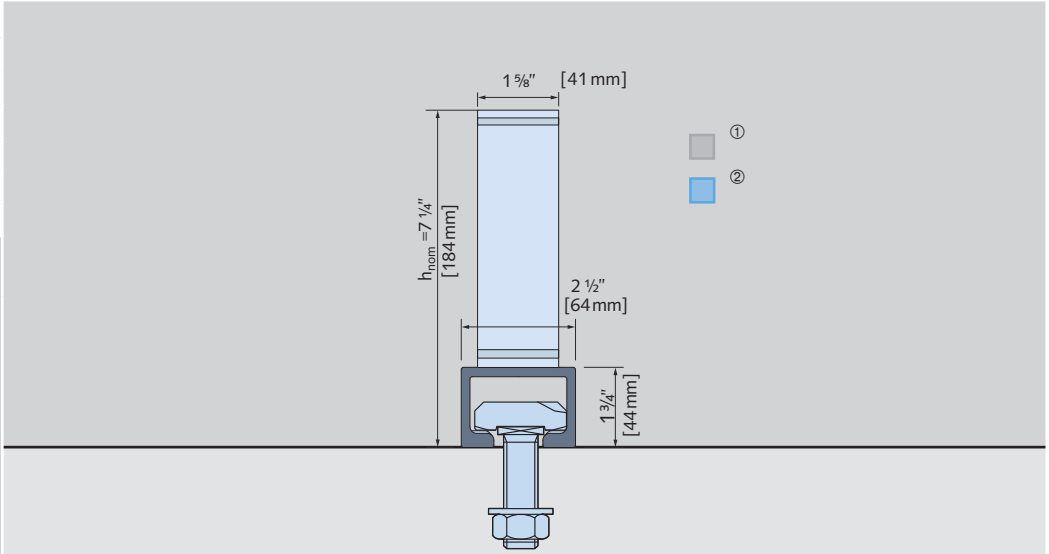
Load Capacities and Ordering Information

HALFEN HZA 64/44 Anchor Channels, hot rolled

HZA 64/44	
b_{ch}	2½" [64 mm]
h_{ch}	1 ¾" [44 mm]
h_t	⅜" [10 mm]
b_1	1" [26 mm]
h_{ef}	7" [178 mm]
$c_{a,min}$	3 15/16" [100 mm]





Material	Hot-dip galvanized carbon steel①			A4 Stainless steel ②		
T-bolt size /available thread	HZS 64/44 / M20 and M24					
N_{sl}	22,480 lbf	[100.0 kN]		22,480 lbf	[100.0 kN]	
$V_{sl,y}$	22,480 lbf	[100.0 kN]		22,480 lbf	[100.0 kN]	
$V_{sl,x}$	15,297 lbf	[67.5 kN]		15,297 lbf	[67.5 kN]	
$M_{s,flex}$	65,756 lbf-in	[7,430 Nm]		65,756 lbf-in	[7,430 Nm]	
I_y	0.5773 in⁴	[240,300 mm⁴]		0.5773 in⁴	[240,300 mm⁴]	
$N_{ns,a}$ = min [N_{sc}, N_{sa}]	22,480 lbf	[100.0 kN]		22,480 lbf	[100.0 kN]	
$V_{ns,a,y}$ = min [$V_{sc,y}$, $V_{sa,y}$]	22,480 lbf	[100.0 kN]		22,480 lbf	[100.0 kN]	
$V_{ns,a,x}$ = min [$V_{sc,x}$, $V_{sa,x}$]	13,480 lbf	[60.0 kN]		13,480 lbf	[60.0 kN]	

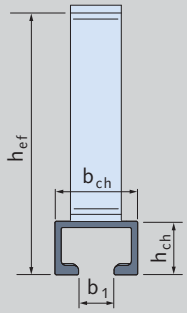
Available lengths		Parts number	Description	Number of anchors	Parts number	Description	Number of anchors
6"	[150 mm]	0002.060-00501	HZA 64/44-HDG-150	2	Please contact your local account manager or HALFEN directly at info@halfenusa.com for ordering information for these items		2
8"	[200 mm]	0002.060-00502	HZA 64/44-HDG-200	2			2
10"	[250 mm]	0002.060-00503	HZA 64/44-HDG-250	2			2
12"	[300 mm]	0002.060-00504	HZA 64/44-HDG-300	2			2
14"	[350 mm]	0002.060-00505	HZA 64/44-HDG-350	3			3
16"	[400 mm]	0002.060-00506	HZA 64/44-HDG-400	3			3
21½"	[550 mm]	0002.060-00507	HZA 64/44-HDG-550	3			3
3'-5"	[1,050 mm]	0002.060-00508	HZA 64/44-HDG-1050	5			5
9'-11"	[3,030 mm]	0002.060-00517	HZA 64/44-HDG-3030	13			-
19'-11"	[6,070 mm]	0002.060-00510	HZA 64/44-HDG-6070	25			25

① Welded I-Anchor in HDG finish
② Stainless steel (A4) Channel profile with welded carbon steel I anchor (see page 9 for information on corrosion protection).

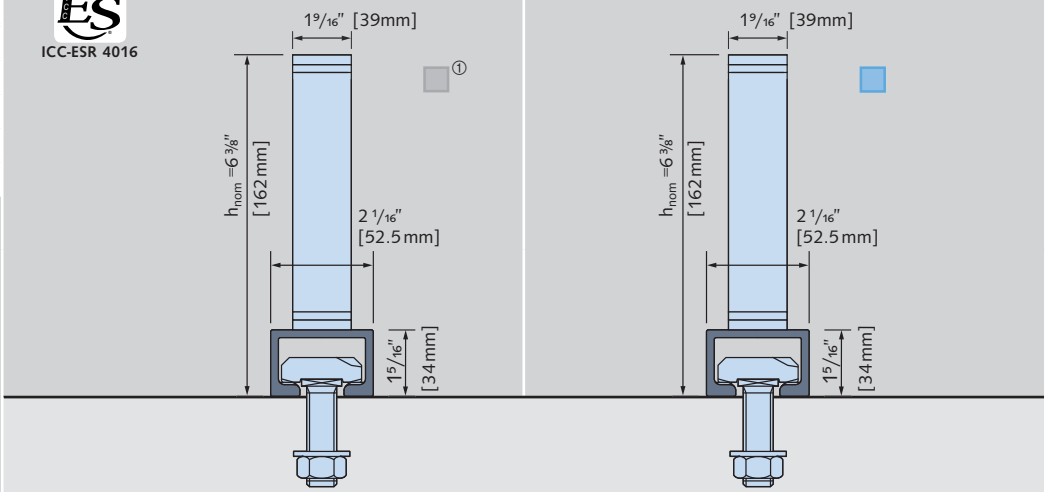
Load Capacities and Ordering Information

HALFEN HZA 53/34 Anchor Channels, hot rolled

HZA 53/34	
b_{ch}	2 1/16" [52.5 mm]
h_{ch}	1 5/16" [34 mm]
h_t	5/16" [7.5 mm]
b_1	7/8" [22.5 mm]
h_{ef}	6 3/16" [157 mm]
$c_{a,min}$	3 15/16" [100 mm]



ICC-ESR 4016



Material	Hot-dip galvanized carbon steel ①				A4 Stainless steel		
T-bolt size /available thread	HZS 53/34 / M16 and M20						
N_{sl} ($N_{sl,seis}$)	17,682 lbf	[78.7 kN]			17,682 lbf	[78.7 kN]	
$V_{sl,y}$ ($V_{sl,y,seis}$)	17,682 lbf	[78.7 kN]			17,682 lbf	[78.7 kN]	
$V_{sl,x}$ ($V_{sl,x,seis}$)	13,256 lbf	[59.0 kN]			13,256 lbf	[59.0 kN]	
$M_{s,flex}$ ($M_{s,flex,seis}$)	36,241 lbf-in	[4,095 Nm]			36,241 lbf-in	[4,095 Nm]	
I_y	0.2225 in^4	[92,600 mm^4]			0.2225 in^4	[92,600 mm^4]	
$N_{ns,a}$ = min [N_{sc}, N_{sa}] ($N_{ns,a,seis}$)	17,682 lbf	[78.7 kN]			17,682 lbf	[78.7 kN]	
$V_{ns,a,y}$ = min [$V_{sc,y}$, $V_{sa,y}$] ($V_{ns,a,y,seis}$)	17,682 lbf	[78.7 kN]			17,682 lbf	[78.7 kN]	
$V_{ns,a,x}$ = min [$V_{sc,x}$, $V_{sa,x}$] ($V_{ns,a,x,seis}$)	10,609 lbf	[47.2 kN]			10,609 lbf	[47.2 kN]	

Available lengths		Parts number	Description	Number of anchors	Parts number	Description	Number of anchors
6"	[150 mm]	0002.050-00501	HZA 53/34-HDG-150	2	Please contact your local account manager or HALFEN directly at info@halfenusa.com for ordering information for these items		2
8"	[200 mm]	0002.050-00502	HZA 53/34-HDG-200	2			2
10"	[250 mm]	0002.050-00503	HZA 53/34-HDG-250	2			2
12"	[300 mm]	0002.050-00504	HZA 53/34-HDG-300	2			2
14"	[350 mm]	0002.050-00505	HZA 53/34-HDG-350	3			3
16"	[400 mm]	0002.050-00506	HZA 53/34-HDG-400	3			3
21½"	[550 mm]	0002.050-00507	HZA 53/34-HDG-550	3			3
31½"	[800 mm]	0002.050-00508	HZA 53/34-HDG-800	4			–
3'-5"	[1,050 mm]	0002.050-00509	HZA 53/34-HDG-1050	5			5
9'-11"	[3,030 mm]	0002.050-00511	HZA 53/34-HDG-3030	13			–
19'-11"	[6,070 mm]	0002.050-00512	HZA 53/34-HDG-6070	25			25

① Welded I-Anchor in HDG finish is included in ICC-ESR 4016, seismic capacities are valid for these items only.

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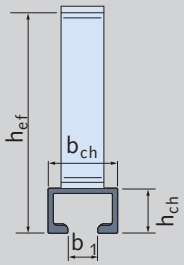
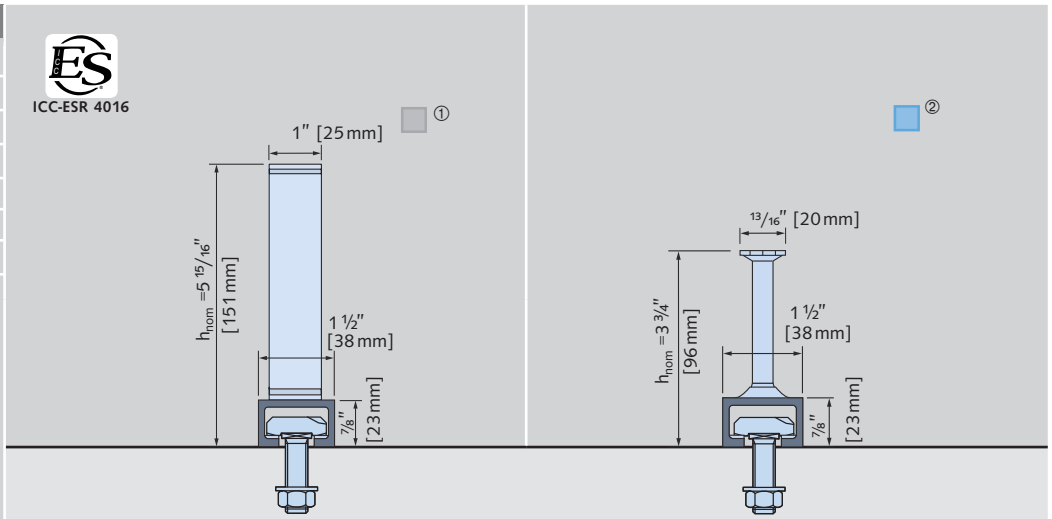
Load Capacities and Ordering Information

HALFEN HZA 38/23 Anchor Channels, hot rolled

HZA 38/23	
b_{ch}	1 ½" [38 mm]
h_{ch}	⅞" [23 mm]
h_t	3/16" [5.5 mm]
b_1	11/16" [18 mm]
h_{ef}	5 ¾" [146 mm]
h_{ef}	3 11/16" [93.8 mm]
$c_{a,min}$	2 15/16" [75 mm]





Material	Hot-dip galvanized carbon steel①				A4 Stainless steel ②		
T-bolt size /available thread	HZS 38/23 / M12 and M16, HS 38/17 / M16						
N_{sl} ($N_{sl,seis}$)	8,840 lbf	[39.3 kN]			6,790 lbf	[30.0 kN]	
$V_{sl,y}$ ($V_{sl,y,seis}$)	8,840 lbf	[39.3 kN]			6,790 lbf	[30.0 kN]	
$V_{sl,x}$ ($V_{sl,x,seis}$)	4,406 lbf	[19.6 kN]			4,406 lbf	[19.6 kN]	
$M_{s,flex}$ ($M_{s,flex,seis}$)	14,721 lbf-in	[1,663 Nm]			14,721 lbf-in	[1,663 Nm]	
I_y	0.0507 in⁴	[21,100 mm⁴]			0.0507 in⁴	[21,100 mm⁴]	
$N_{ns,a}$ = min [N_{sc}, N_{sa}] ($N_{ns,a,seis}$)	8,840 lbf	[39.3 kN]			6,790 lbf	[30.0 kN]	
$V_{ns,a,y}$ = min [$V_{sc,y}$, $V_{sa,y}$] ($V_{ns,a,y,seis}$)	8,840 lbf	[39.3 kN]			6,790 lbf	[30.0 kN]	
$V_{ns,a,x}$ = min [$V_{sc,x}$, $V_{sa,x}$] ($V_{ns,a,x,seis}$)	5,304 lbf	[23.6 kN]			5,304 lbf	[18.0 kN]	

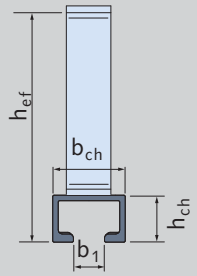
Available lengths		Parts number	Description	Number of anchors	Parts number	Description	Number of anchors
6"	[150 mm]	0002.020-00501	HZA 38/23-HDG-150	2	0002.020-00851	HZA 38/23-A4-150-B6	2
8"	[200 mm]	0002.020-00502	HZA 38/23-HDG-200	2	0002.020-00852	HZA 38/23-A4-200-B6	2
10"	[250 mm]	0002.020-00503	HZA 38/23-HDG-250	2	0002.020-00853	HZA 38/23-A4-250-B6	2
12"	[300 mm]	0002.020-00504	HZA 38/23-HDG-300	2	0002.020-00854	HZA 38/23-A4-300-B6	2
14"	[350 mm]	0002.020-00505	HZA 38/23-HDG-350	3	0002.020-00855	HZA 38/23-A4-350-B6	3
16"	[400 mm]	0002.020-00506	HZA 38/23-HDG-400	3	0002.020-00856	HZA 38/23-A4-400-B6	3
21½"	[550 mm]	0002.020-00507	HZA 38/23-HDG-550	3	0002.020-00857	HZA 38/23-A4-550-B6	3
31½"	[800 mm]	0002.020-00508	HZA 38/23-HDG-800	4	0002.020-00858	HZA 38/23-A4-800-B6	4
3'-5"	[1,050 mm]	0002.020-00509	HZA 38/23-HDG-1050	5	0002.020-00859	HZA 38/23-A4-1050-B6	5
9'-11"	[3,030 mm]	0002.020-00511	HZA 38/23-HDG-3030	13	0002.020-00860	HZA 38/23-A4-3030-B6	13
19'-11"	[6,070 mm]	0002.020-00510	HZA 38/23-HDG-6070	25	–	–	–

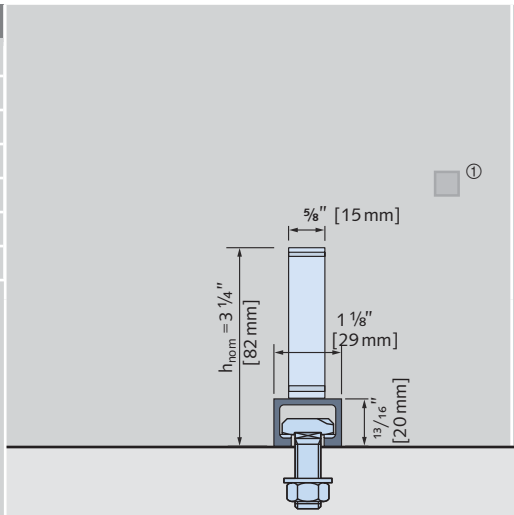
① Welded I-Anchor in HDG finish is included in ICC-ESR 4016, seismic capacities are valid for these items only.
② Bolt anchor channel is available in A4 stainless steel on request

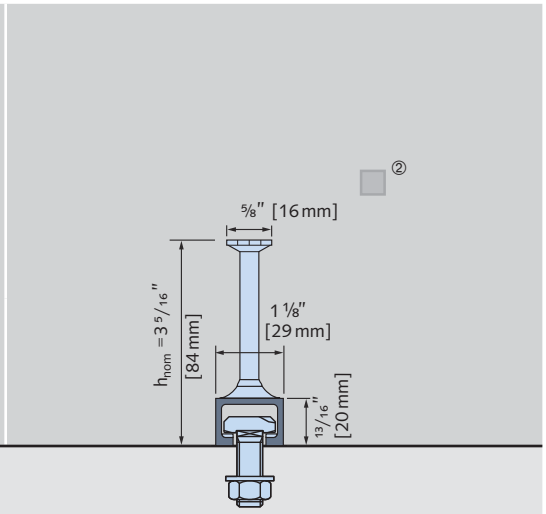
Load Capacities and Ordering Information

HALFEN HZA 29/20 Anchor Channels, hot rolled

HZA 29/20	
b_{ch}	1 1/8" [29 mm]
h_{ch}	13/16" [20 mm]
h_t	3/16" [5 mm]
b_1	9/16" [14 mm]
h_{ef} ①	3 1/8" [78.7 mm]
h_{ef} ②	3 1/4" [82.1 mm]
$c_{a,min}$	2 15/16" [75 mm]







Material		Hot-dip galvanized carbon steel①					
T-bolt size /available thread		HZS 29/20 / M12, HS 28/15 /M12					
N_{sl}		4,496 lbf	[20.0 kN]		4,496 lbf	[20.0 kN]	
$V_{sl,y}$		4,496 lbf	[20.0 kN]		4,496 lbf	[20.0 kN]	
$V_{sl,x}$		4,496 lbf	[20.0 kN]		4,496 lbf	[20.0 kN]	
$M_{s,flex}$		8,346 lbf-in	[943 Nm]		8,346 lbf-in	[943 Nm]	
I_y		0.0245 in^4	[10,200 mm^4]		0.0245 in^4	[10,200 mm^4]	
$N_{ns,a}$ = min [N_{sc}, N_{sa}]		4,496 lbf	[20.0 kN]		4,496 lbf	[20.0 kN]	
$V_{ns,a,y}$ = min [$V_{sc,y}$, $V_{sa,y}$]		4,496 lbf	[20.0 kN]		4,496 lbf	[20.0 kN]	
$V_{ns,a,x}$ = min [$V_{sc,x}$, $V_{sa,x}$]		2,698 lbf	[12.0 kN]		2,698 lbf	[12.0 kN]	
Available lengths		Parts number	Description	Number of anchors	Parts number	Description	Number of anchors
6"	[150 mm]	0002.010-00501	HZA 29/20-HDG-150	2	0002.010-00801	HZA 29/20-HDG-150-B6	2
8"	[200 mm]	0002.010-00502	HZA 29/20-HDG-200	2	0002.010-00802	HZA 29/20-HDG-200-B6	2
10"	[250 mm]	0002.010-00503	HZA 29/20-HDG-250	2	0002.010-00803	HZA 29/20-HDG-250-B6	2
12"	[300 mm]	0002.010-00504	HZA 29/20-HDG-300	3	0002.010-00804	HZA 29/20-HDG-300-B6	3
14"	[350 mm]	0002.010-00505	HZA 29/20-HDG-350	3	0002.010-00808	HZA 29/20-HDG-350-B6	3
16"	[400 mm]	0002.010-00506	HZA 29/20-HDG-400	3	0002.010-00806	HZA 29/20-HDG-400-B6	3
21½"	[550 mm]	0002.010-00507	HZA 29/20-HDG-550	4	0002.010-00807	HZA 29/20-HDG-550-B6	4
31½"	[800 mm]	0002.010-00508	HZA 29/20-HDG-800	5	–	–	–
3'-5"	[1,050 mm]	0002.010-00509	HZA 29/20-HDG-1050	6	0002.010-00809	HZA 29/20-HDG-1050-B6	6
9'-11"	[3,030 mm]	0002.010-00511	HZA 29/20-HDG-3030	16	0002.010-00815	HZA 29/20-HDG-3030-B6	16
19'-11"	[6,070 mm]	0002.010-00510	HZA 29/20-HDG-6070	31	0002.010-00008	HZA 29/20-HDG-6070-B6	31

① Welded I-Anchor in HDG finish
② Bolt anchor channel is available in hot dip galvanized steel on request

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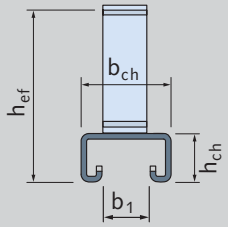
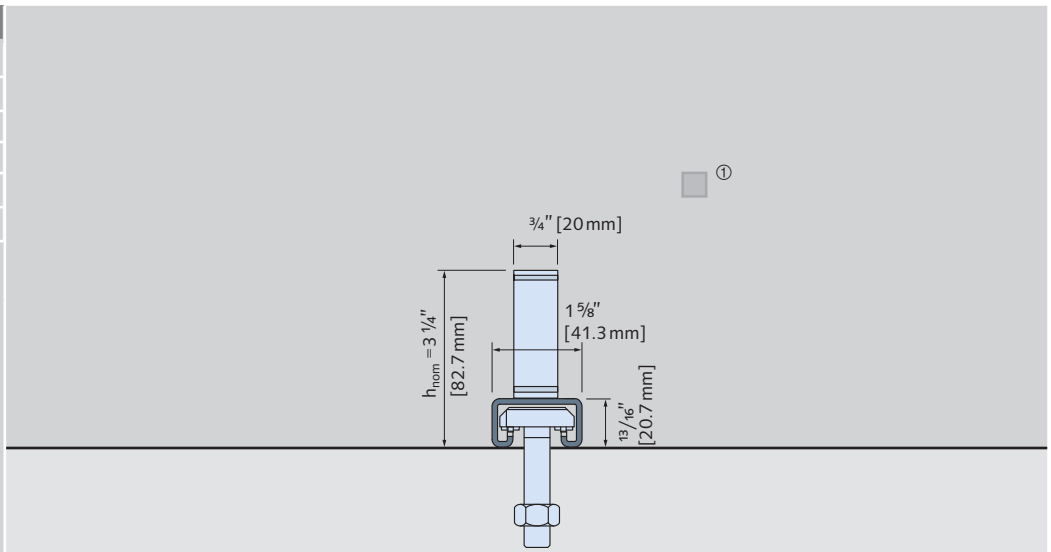
Load Capacities and Ordering Information

HALFEN HZA 41/22 Anchor Channels, cold formed

HZA 41/22	
b_{ch}	1 5/8" [41.3 mm]
h_{ch}	13/16" [20.7 mm]
h_t	5/16" [7.4 mm]
b_1	7/8" [22.3 mm]
h_{ef}	3 1/8" [79.4 mm]
$c_{a,min}$	2 15/16" [75 mm]





Material	Hot-dip galvanized carbon steel ①	
T-bolt size /available thread	HZS 41/22 / M12 and M16	
N_{sl}	2,810 lbf	[12.5 kN]
$V_{sl,y}$	3,552 lbf	[15.8 kN]
$V_{sl,x}$	2,810 lbf	[12.5 kN]
$M_{s,flex}$	6,487 lbf-in	[733 Nm]
I_y	0.0303 in^4	[12,500 mm^4]
$N_{ns,a}$ = min [N_{sc}, N_{sa}]	2,810 lbf	[12.5 kN]
$V_{ns,a,y}$ = min [$V_{sc,y}$, $V_{sa,y}$]	3,552 lbf	[15.8 kN]
$V_{ns,a,x}$ = min [$V_{sc,x}$, $V_{sa,x}$]	1,686 lbf	[7.5 kN]

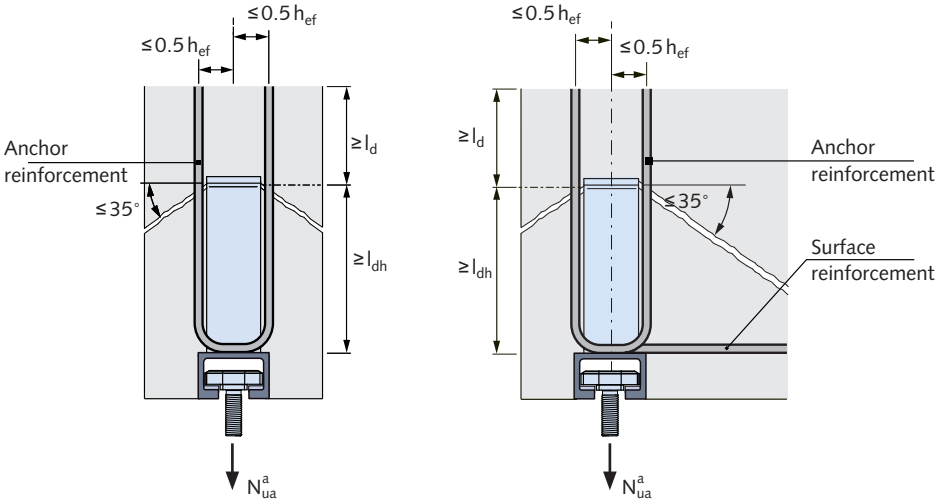
Available lengths	Parts number	Description	Number of anchors
4" [102 mm]	0002.038-00502	HZ 41/22 - HDG - 4"	2
6" [152mm]	0002.038-00503	HZ 41/22 - HDG - 6"	2
8" [203 mm]	0002.038-00504	HZ 41/22 - HDG - 8"	2
10" [254 mm]	0002.038-00505	HZ 41/22 - HDG - 10"	2
12" [305 mm]	0002.038-00507	HZ 41/22 - HDG - 12"	2
14" [356 mm]	0002.038-00509	HZ 41/22 - HDG - 14"	3
16" [406 mm]	0002.038-00510	HZ 41/22 - HDG - 16"	3
18" [457 mm]	0002.038-00511	HZ 41/22 - HDG - 18"	3

① Welded I-Anchor in HDG finish

Supplementary Reinforcement according to ACI 318-14

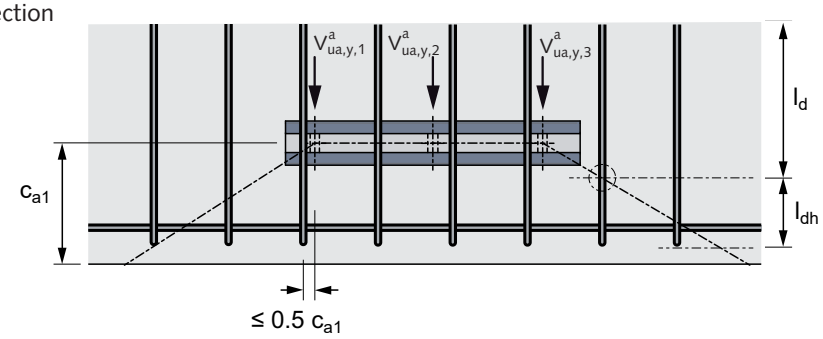
Tensile Anchor Reinforcement

z-direction

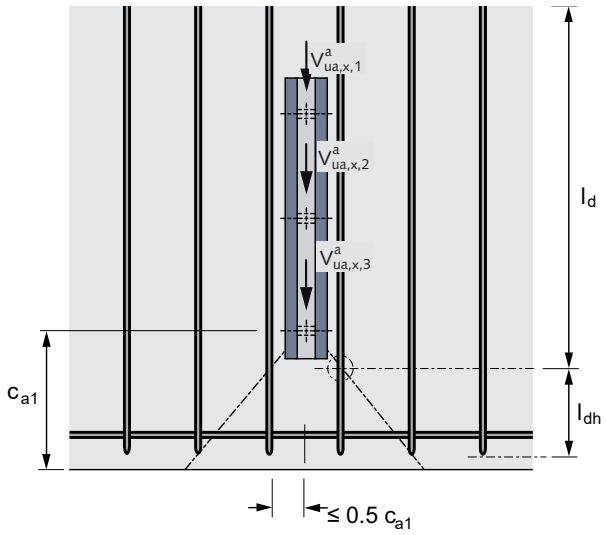


Shear Anchor Reinforcement

y-direction



x-direction



For conditions where the factored tensile and shear force exceed the concrete breakout strength of the HALFEN Anchor Channel or where the breakout strength is not evaluated, it is permitted within AC232 that the nominal strength can be that of anchor reinforcement properly placed as shown in the figures to the left.

Anchor reinforcement should consist of stirrups, ties or hairpins comprised of deformed reinforcing bars with a maximum diameter of ⅝ inch (16 mm). Rebars shall be placed as close as possible to the anchor and anchor channel. The anchor reinforcement shall be developed in accordance with the latest edition of ACI 318 on both sides of the breakout surface of an anchor or anchor channel.

l_d = Development length in tension of deformed rebar

l_{dh} = Development length in tension of deformed rebar with a standard hook

c_{a1} = Edge distance of anchor channel

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HALFEN HZS T-bolts

Product Overview

HALFEN HZA Anchor Channels and HZS T-bolts are designed to work as a system. The loads provided in ICC-ESR 4016 and in this catalog are only valid when the appropriate HZS T-bolt is used together with the appropriate HZA Anchor Channel profile. HALFEN HZS T-bolts are available in carbon steel (8.8) and in stainless steel (A4-70).

Carbon steel T-bolts are available; hot-dipped galvanized (HDG) or electro-plated (EP) with thick layer passivation.

HALFEN HZS T-bolts are available in a wide range of diameters and lengths. The following pages show a selection of our available HZS T-bolts sorted by T-bolt type.

Ordering example HALFEN HZS T-bolts:

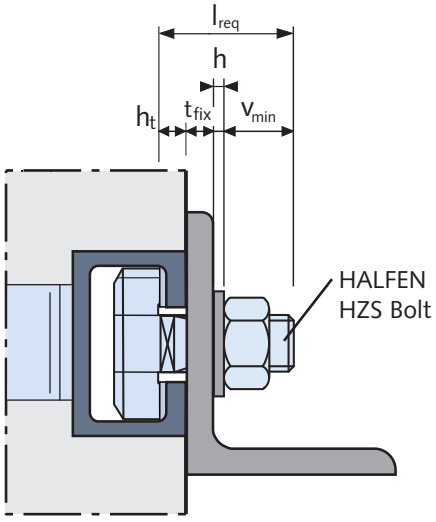
HALFEN HZS	53/34	M16	× 60	EP	8.8
HALFEN HZS	38/23	M16	× 60	A4	- 70

- HALFEN T-bolt and nut
- Type
- Diameter / Thread [mm]
- Length [mm]
- Finish
- Strength class

HALFEN T-bolts can be ordered by referencing the corresponding article description or the 12 digit parts number (see tables on page 20 and 21).

Required T-bolt Length

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



l_{req} = Required T-bolt length
t_{fix} = Thickness of clamped component
h_t = Channel lip height
h = Washer thickness

An additional overhang should be considered for the following bolt sizes.

Additional overhang

Bolt size	additional overhang	
	inch	mm
M10 to M16	3/16"	5.0
≥ M20	1/4"	7.0

The overhang is included in the listed values of v_{min}.

Dimension

T-bolt size	v_{min}	
	inch	mm
M10	9/16"	14.5
M12	11/16"	17.0
M16	13/16"	20.5
M20	1"	26.0
M24	1 1/8"	29.0

Channel lip height

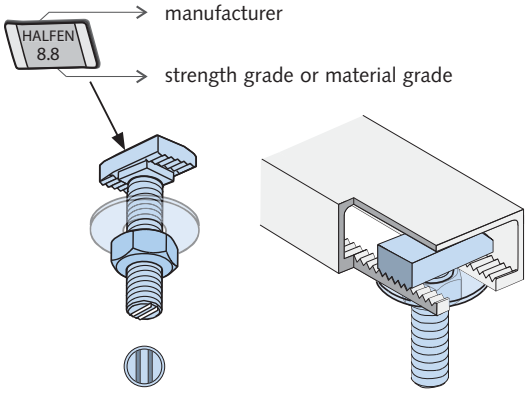
Channel profile	h_t	
	inch	mm
41/22	5/16"	7.4
29/20	3/16"	5.0
38/23	3/16"	5.5
53/34	5/16"	7.5
64/44	3/8"	10.0

HALFEN HZS T-bolts

Load Resistance Values

The tables below show the nominal strength for HALFEN HZS T-bolts.

N_{ss} ($N_{ss,seis}$) is the nominal tensile strength, V_{ss} ($V_{ss,seis}$) the nominal shear strength and M^0_{ss} ($M^0_{ss,seis}$) is the nominal bending strength for T-bolts. Strength reduction factors for steel failure are provided in the tables below.



HZS Bolts – Nominal strength values

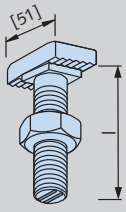
T-bolt size	Grade 8.8		
	N_{ss} ($N_{ss,seis}$)	V_{ss} ($V_{ss,seis}$)	M^0_{ss} ($M^0_{ss,seis}$)
	lbf [kN]	lbf [kN]	lbf-in [Nm]
M12	15,161 [67.4]	9,097 [40.5]	938 [106.0]
M16	28,236 [125.6]	16,942 [75.4]	2,363 [267.0]
M20	44,063 [196.0]	26,438 [117.6]	4,587 [518.2]
M24	63,486 [282.4]	38,085 [169.4]	7,945 [898.0]
Strength reduction factors ϕ			
	0.65	0.60	0.60

HZS Bolts – Nominal strength values

T-bolt size	A4-70		
	N_{ss}	V_{ss}	M^0_{ss}
	lbf [kN]	lbf [kN]	lbf-in [Nm]
M16	24,708 [109.9]	14,816 [65.9]	2,063 [233.1]
M20	38,557 [171.5]	23,134 [102.9]	4,021 [454.4]
M24	55,553 [247.1]	33,341 [148.3]	6,954 [785.8]
Strength reduction factors ϕ			
	0.65	0.60	0.60

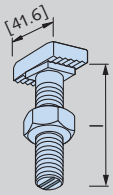
Selection of available T-bolts

HALFEN HZS 64/44 T-bolts



Length (l) inch [mm]	Thread M20 (¾")	Thread M24 (15/16")
3 1/8" [80]	... M20 × 80 EP 8.8 0352.090-00001	... M24 × 80 EP 8.8 0352.090-00003
3 1/8" [80]	... M20 x 80 A4-70 0352.090-00011	... M24 x 80 A4-70 0352.090-00013
4 15/16" [125]	... M20 x 125 EP 8.8 0352.100-00002	–
4 15/16" [125]	... M20 x 125 A4-70 0352.090-00012	–
5 7/8" [150]	–	... M24 × 150 EP 8.8 0352.09-00004
5 7/8" [150]	–	... M24 x 150 A4-70 0352.090-00014

HALFEN HZS 53/34 T-bolts



Length (l) inch [mm]	Thread M16 (5/8")	Thread M20 (¾")
2 3/8" [60]	... M16 × 60 HDG 8.8 0352.080-00021	–
2 3/8" [60]	... M16 × 60 EP 8.8 0352.080-00001	–
2 9/16" [65]	–	... M20 × 65 HDG 8.8 0352.080-00024
2 9/16" [65]	–	... M20 × 65 EP 8.8 0352.080-00003
2 9/16" [65]	–	... M20 x 65 A4-70 0352.080-0013
3 1/8" [80]	... M16 × 80 EP 8.8 0352.080-00022	... M20 × 80 EP 8.8 0352.080-00025
3 15/16" [100]	... M16 × 100 EP 8.8 0352.080-00002	... M20 × 100 EP 8.8 0352.080-00004

ICC-ESR 4016

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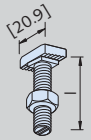
HALFEN HZS T-bolts

Selection of available T-bolts – continued

HALFEN HZS 38/23 T-bolts



Length (l) inch [mm]	Thread M12 (½")	Thread M16 (⅝")
1 9/16" [40]	...M12 x 40 EP 8.8 0352.060-00002	–
1 15/16" [50]	...M12 x 50 EP 8.8 0352.060-00003	... M16 x 50 EP 8.8 0352.060-00013
1 15/16" [50]	...M12 x 50 HDG 8.8 0352.060-00026	–
2 3/8" [60]	–	... M16 x 60 A4-70 0352.060-00021
3 1/8" [80]	...M12 x 80 EP 8.8 0352.060-00005	–
3 1/8" [80]	–	... M16 x 80 HDG 8.8 0352.060-00027
3 15/16" [100]	...M12 x 100 EP 8.8 0352.060-00006	... M16 x 100 EP 8.8 0352.060-00016
7 7/8" [200]	–	... M16 x 200 EP 8.8 0352.060-00019

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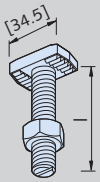
HALFEN HZS 29/20 T-bolts

Length (l) inch [mm]	Thread M12 (½")
2 15/16" [50]	... M12 x 50 EP 8.8 0352.040-00003
3 1/8" [80]	... M12x 80 EP 8.8 0352.040-00005

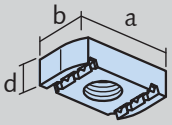
HALFEN HZS 41/22 T-bolts



Length (l) inch [mm]	Thread M12 (½")	Thread M16 (⅝")
1 3/8" [35]	... M12 x 35 HDG 8.8 0352.070-00001	–
1 15/16" [50]	... M12 x 50 HDG 8.8 0352.070-00002	... M27 x 50 HDG 8.8 0352.070-00003
3 15/16" [100]	–	... M16 × 100 HDG 8.8 0352.070-00004

GWP 41/41 Locking plates

GWP 41/41
Locking plate for
41/22 channels



EP	inch [mm] d	b	a
M10 (⅜")	3/8" [9]	13/16" [21]	1 3/8" [35]
M12 (½")			
M16 (⅝")			

Locking plates (channels nuts) allow for bolts or threaded rods to be utilized for connections to the HZA 41/22 anchor channel.
For more technical information contact engineering@halfenusa.com.

HALFEN HZA Software

The HALFEN calculation software for HALFEN HZA Anchor Channels with calculation according to ICC-ESR 4016 provides the user with a convenient and very powerful calculation tool.

Although HALFEN Anchor Channels could previously be selected from tables according to their load bearing capacity, AC232 requires a wider range of verifications for Anchor Channels and specified concrete. These verifications are processed by the user-friendly HALFEN software. In just a few seconds the user is presented with a list of suitable HALFEN HZA Anchor Channels for the relevant load situation.

Boundary conditions
The calculation takes into account all required loading parameters, e.g.:

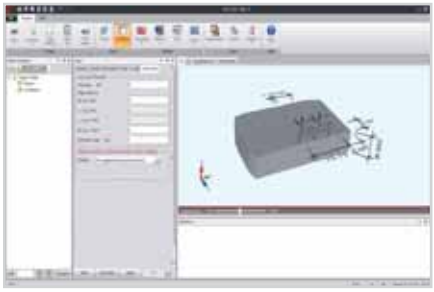
- Cracked or non-cracked concrete.
- The geometry of the concrete component, in particular the distances of the channel to the component edges.
- Consideration of all service loads and applicable factored load combinations.
- Positioning of the loads with a definable adjustment range, and the option of shifting the defined bolt pattern along the complete channel length.

Input
The geometry and loads are entered interactively. Input values are displayed promptly in a 3D graphic and can also be edited directly in the graphic. Click on the load, specific dimension or component line to make the required modification.

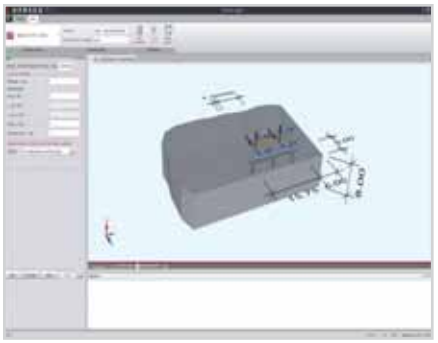
Results
After calculation, the software output provides either the results for a pre-selected profile, or – in the case of automatic selection – a list of all suitable profiles. Profiles and T-bolts with incomplete verifications are highlighted in red.

The software can be downloaded from the HALFEN website www.halfenusa.com

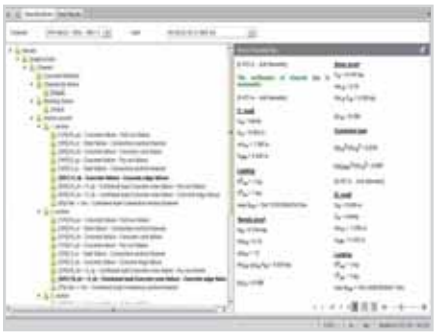
Screenshot 1: The HALFEN HZA Software start screen



Screenshot 2: Input GUI (Graphic User Interface), HALFEN HZA Software



Screenshot 3: Inter-active 3D-display



Screenshot 4: Results list

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HALFEN HZA Software

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 problem areas.

For further visual control a progress-bar on the right indicates the status of the verification process. Red bars indicate that a load has been exceeded while green bars indicate that the verifications meet the criteria.

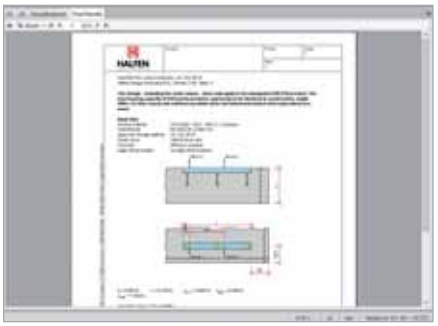
Detailed calculation information (e.g. load positions, section sizes and utilization ratios) can also be selected within the tree structure.

After selecting a HALFEN Anchor channel and suitable T-bolts, the dimension results can be imported into the data list and saved.

Print-outs
Calculation reports are available in a brief summary form or a detailed version that can be placed into a calculation package. The detailed version provides all required verifications and individual capacities as well as a 2D graphical representation including applied loads.

The latest version of the dimensioning program is available for download on the internet at: www.halfenusa.com.

System requirements:
- Vista, Windows 7, Windows 8.x, Windows 10 with installed .NET Framework 4.6.1

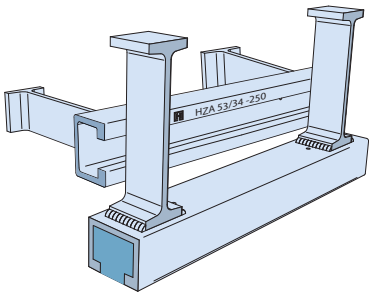


Screenshot 5: Print preview

Screenshot 6: Print GUI

Installation of HZA Anchor Channels

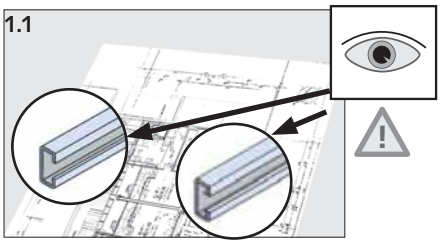
HALFEN Anchor Channels type HZA, ready for installation



HALFEN Anchor Channels are supplied with pre-punched nail holes and a foam or strip filler. Any excess strip filler should be trimmed flush to the channel ends. Before fixing a HALFEN Anchor Channel to formwork, ensure that the profile, material, length, and the selected position is as specified in the plans. Fix the channels securely so that they remain flush with the surface of the formwork and will not be displaced when pouring the concrete. If the selected formwork is not suitable for nails use an alternative method for fixing. In top-of-slab applications make sure the top of the channel is flush with the final concrete surface.

⚠ Remove all steel packing straps from stainless steel HALFEN Anchor Channels immediately after delivery to prevent rust forming. Store the channels separately, with sufficient distance from dissimilar metals. Avoid damage to surface and contact corrosion caused by carbon steel. Store the channels in a dry, protected and well ventilated environment. Only use stainless steel fixing material (e.g. nails, screws etc.) with stainless steel anchor channels.

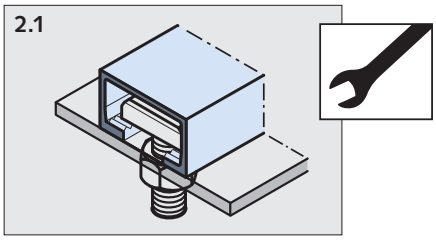
1. Preparations



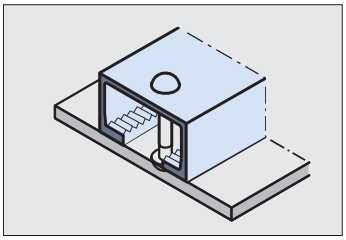
1.1 Select the HALFEN Anchor Channel according to the design plans.

2. Installation alternatives

Steel formwork

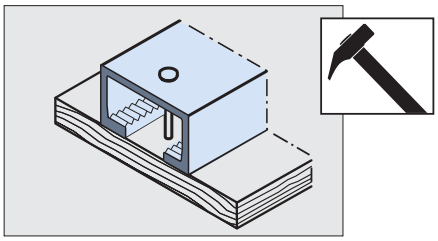


2.1 Secure with a HALFEN T-bolt through the formwork.



2.2 Using rivets or screws (supplied by the contractor) through the prepunched nail holes in the HALFEN Anchor Channel.

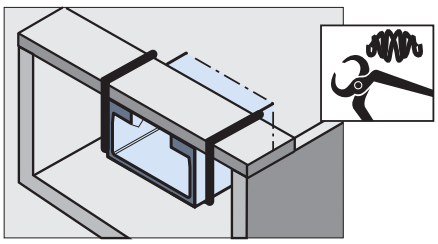
Timber formwork



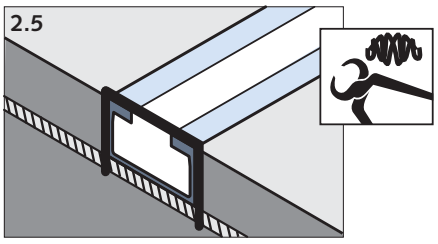
2.3 Fix to timber formwork with nails through the pre-punched holes in the back of the channel.

⚠ **Anchor Channels must be securely fixed** to ensure the lips are flush with the finished concrete surface. Incorrectly positioned channels will not achieve their full load capacity!

Top of slab installation



2.4 With a fixing bracket: Meticulous concrete compaction is essential to prevent air bubbles forming underneath the auxiliary work.



2.5 Fixing directly to the reinforcement: Attach the HALFEN Anchor Channel with reinforcement tie-wire.

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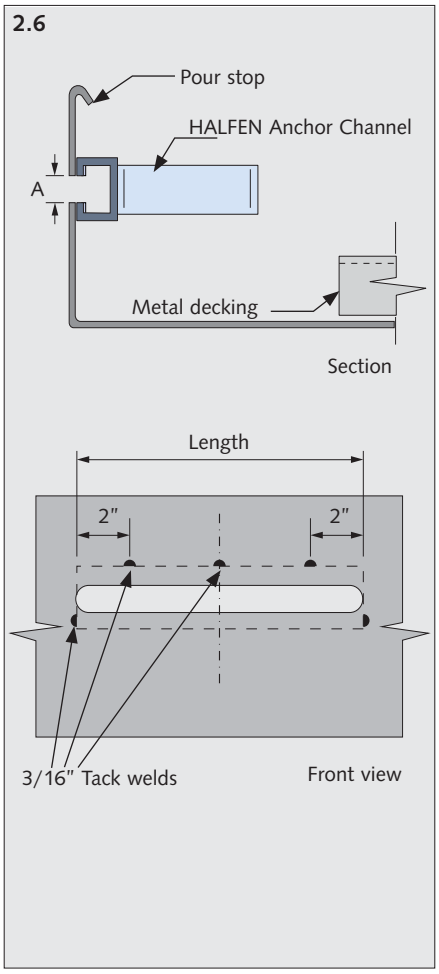
Metal pour stop



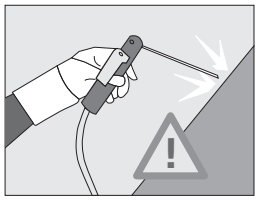
2.6 Securing HALFEN Anchor Channels to metal pour stops

1. Slotted pour stop: Pour stops at HALFEN Anchor Channel locations must be slotted. Slots should be pre-punched by the pour stop supplier. On-site cutting with a welding torch is not recommended. The slot width (dimension A) should be sized and cut to match the distance between the channel lips in the HALFEN Anchor Channel. Oversizing dimension A should be avoided.

2. Welding: Prior to welding, tightly clamp the HALFEN Anchor Channel in position over the slot in the pour stop (Figure 2.6). Care should be taken to ensure the channel is properly aligned with the slot.

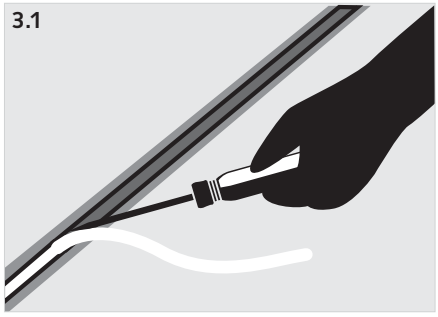
To connect a HALFEN Anchor Channel up to 24" [610 mm] long to the pour stop, three $^{3}/_{16}$"[5 mm] tack welds should be used along the top edge of the channel. A $^{3}/_{16}$"[5 mm] tack weld should be used at the bottom lip at each end of the channel (refer to figure 2.6). American Welding Society Standard Specification ANSI/AWS provides guidelines for welding to 10-18 gauge galvanized steel (commonly used for pour stops).

After welding, the HALFEN Anchor Channel should be inspected to check it is firmly attached to the pour stop. Large welds or repeated welding should be avoided as this may damage the foam filler in the Anchor Channel. The pour stop should also be inspected after welding to ensure it has not been deformed.



⚠ Welding of galvanized steel components produces hazardous fumes. Appropriate precautions should be taken to ensure safe working conditions for those in the vicinity of the welding operation.

3. After concreting and striking the formwork

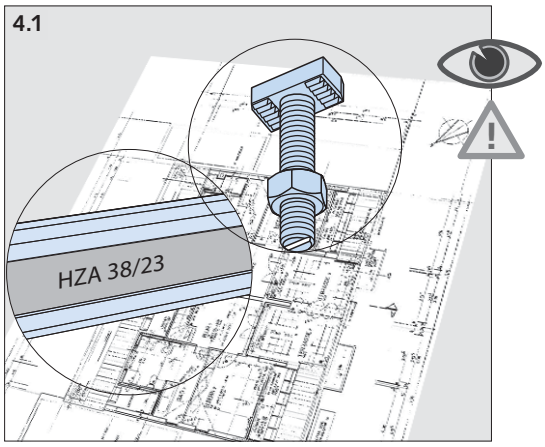


3.1 Remove filler using an appropriate tool, e.g. screwdriver.

⚠ **For correct use of HALFEN T-bolts see the installation instructions for HALFEN T-bolts**.

4. Assembly sequence

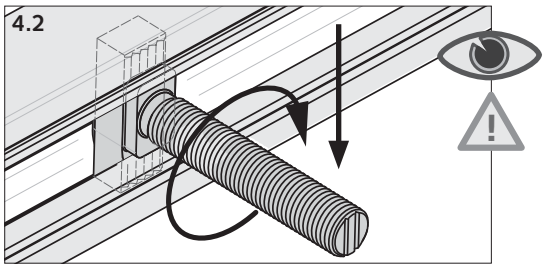
4.1



4.1 Select HALFEN T-bolt according to the planning documentation.

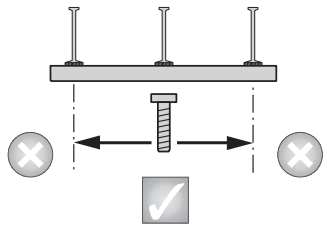
The installation torques provided in these assembly instructions apply only in conjunction with HALFEN HZA Anchor Channels.

4.2



4.2 Insert the HALFEN T-bolt into the channel slot. After a 90° turn clockwise the HALFEN T-Bolt locks into position. (Check whether the notch is perpendicular to the longitudinal channel axis)

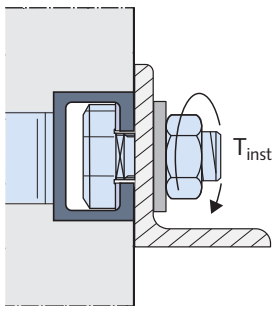
4.3



4.3 Alignment of the HALFEN T-bolt: It is not allowed to install HALFEN T-bolts beyond the center line of the end anchors.

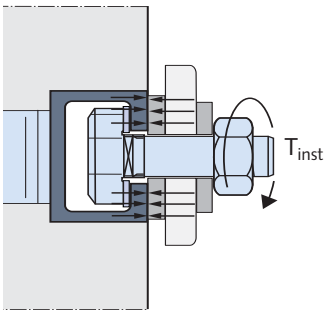
5. Installation torques

5.1



Tighten the nut with the installation torque T_{inst} according to the table on page 27. Exceeding the given

5.2



installation torque T_{inst} according to this table may damage the connections and reduce the capacity.

5.3

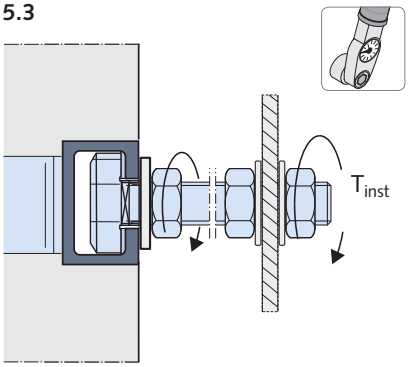


Figure 5.1 shows the general case; Figure 5.2 and 5.3 show the steel – steel contact case (explanation see next page).

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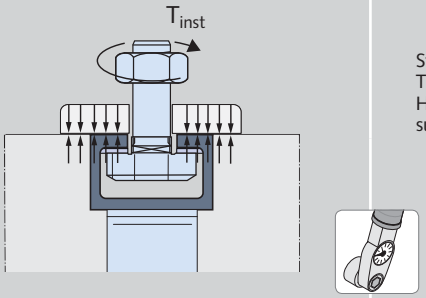
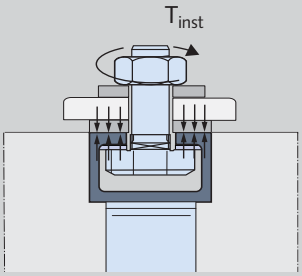
Installation of HZS T-bolts

Position of structural attachment:

General:
The fixture presses directly against concrete and/or to the HALFEN Anchor Channel.



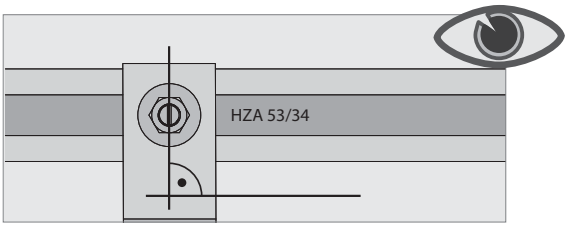
Steel – steel contact:
The fixture presses against the HALFEN Anchor Channel via a suitable shim.



Installation torques: HALFEN HZS T-bolts in combination with HALFEN HZA Anchor Channels

Type of fixture	Strength class	HALFEN Anchor Channel	T_{inst} lbf-ft [Nm]							
			M12		M16		M20		M24	
General	Steel 8.8	41/22	–	–	–	–	–	–	–	–
		29/20	–	–	–	–	–	–	–	–
		38/23	52	[70]	69	[94]	–	–	–	–
		53/34	–	–	136	[185]	173	[235]	–	–
		64/44	–	–	–	–	–	–	–	–
Steel-steel contact	Steel 8.8	41/22	37	[50]	89	[120]	–	–	–	–
		29/20	52	[70]	–	–	–	–	–	–
		38/23	52	[70]	136	[185]	–	–	–	–
		53/34	–	–	136	[185]	266	[360]	–	–
		64/44	–	–	–	–	258	[350]	332	[450]
	A4-70	38/23	–	–	89	[120]	–	–	–	–
		53/34	–	–	148	[200]	258	[350]	–	–
		64/44	–	–	–	–	258	[350]	332	[450]

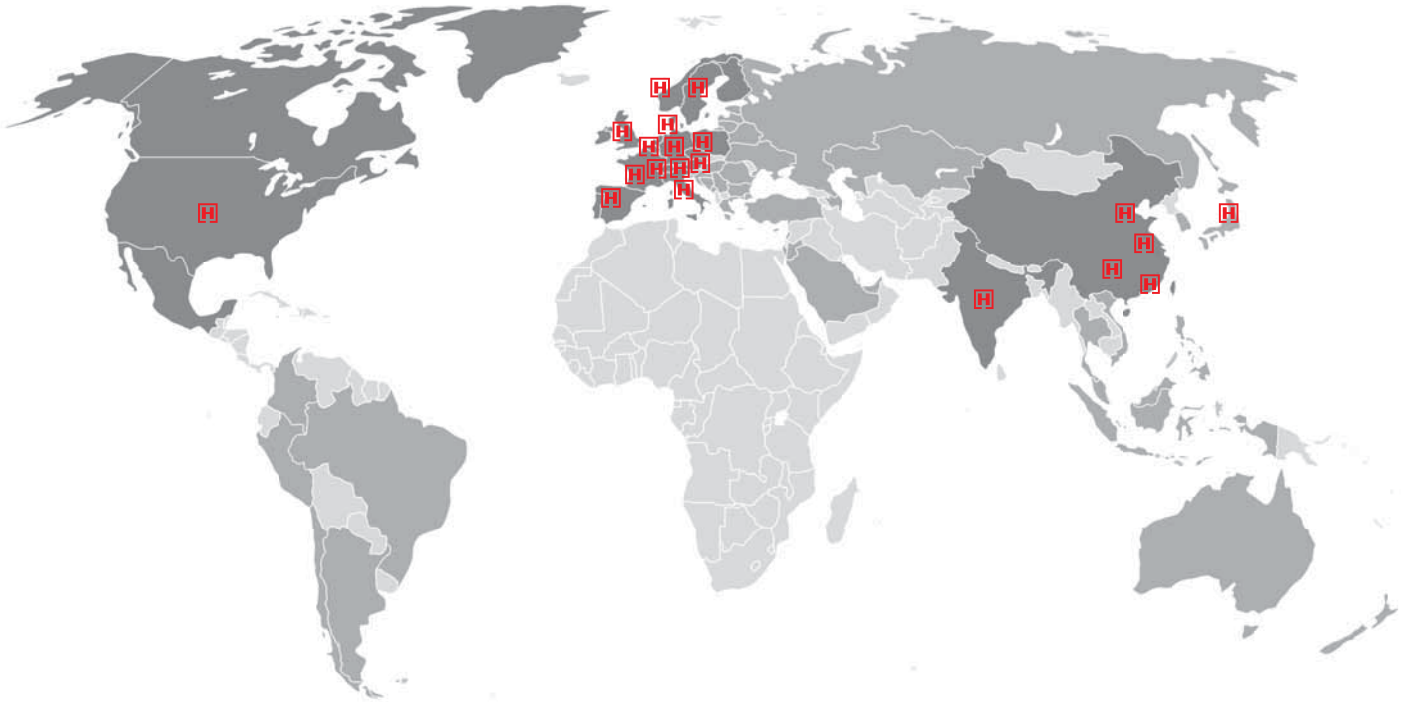
6. Final installation check of assembly



6. After tightening the nut, check whether the T-bolt is properly installed. If the notch is not perpendicular to the longitudinal channel axis, the T-bolt must be completely loosened, re-aligned, re-tightened; finally re-check the orientation of the notch is now correct.

CONTACT HALFEN WORLDWIDE

HALFEN has a global network of Subsidiary Companies to assist you. The main contact information for North America and the European Headquarters is provided below. For a full list of offices please visit www.HALFEN.com



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