HALFEN FLEXIBLE BOLT CONNECTIONS

TECHNICAL PRODUCT INFORMATION

HALFEN FLEXIBLE BOLT CONNECTIONS

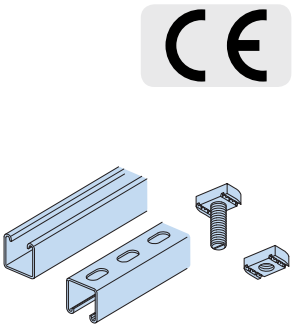
INDUSTRIAL TECHNOLOGY

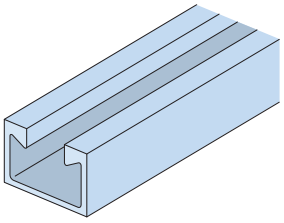
MT-FBC 18-E

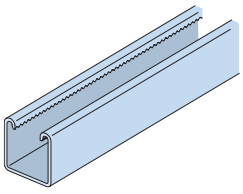
- CE-marking EN 1090-1, EN 1090-2 for all hot-rolled framing channels
- Supplementary load capacities according to Eurocode 3
- Addition of framing channels HM 55/42, HZM 64/44, HZM 41/27

HALFEN
A CRH COMPANY

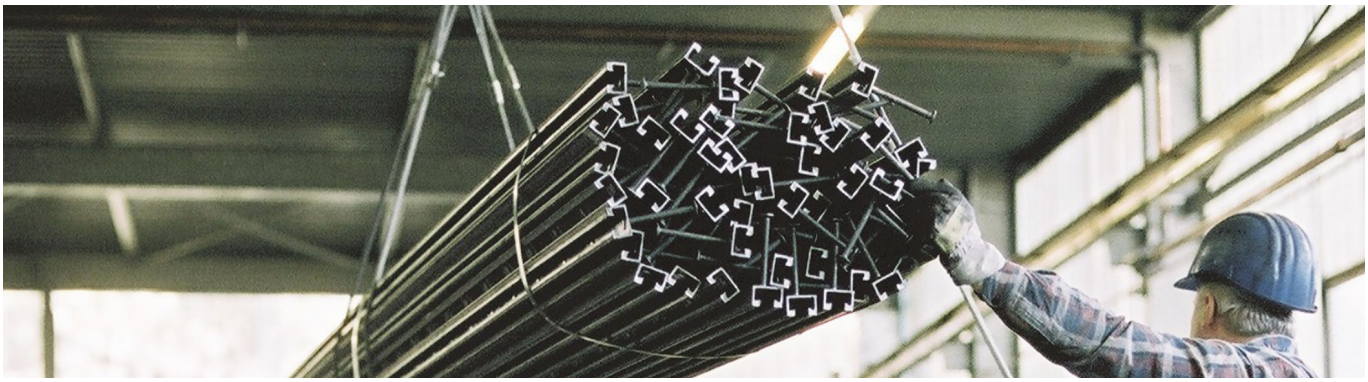
Contents







Contents



European standards EN 1090 / EN 1993

The new EN 1090 series of standards replace the previous DIN 18800-7 standard, regulating execution of steel structures and manufacturing qualifications.
European standard EN 1090-1 specifies requirements for conformity assessment (CE marking) of structural components which will be placed on the European market as construction products.
The conformity assessment covers the manufacturing characteristics and where appropriate the structural design characteristics.
The EN 1090-2 standard regulates the requirements applicable to the execution of steel structures. This standard applies to structures that are verified according to the appropriate section of EN 1993 (EC3).

The phase-out period for DIN 18800-7 ended on the 30th of June 2014.
Basis for the evaluation of conformity of steel construction products is the system of assessment of conformity 2+ according to Construction Products Regulation (CPR) EU No. 305/2011.
The CE marking confirms conformity with the declared performance of HALFEN Products and with all relevant European harmonized standards in the European Union.

EN 1090-1, EN 1090-2
2499 – CPR-0113070-00-01

HALFEN Framing channels are also subject to these regulations. To meet CE evaluation obligations the marked products are statically verified in accordance with EN 1993 and the principal performance characteristics are detailed in the respective Declaration of Performance, CONF-DOP_HM resp. CONF-DOP_HZM.
CE marking is mandatory from the 1st of July 2014 when distributing load bearing metallic construction products in the European market.
HALFEN is certified by the notified Body ZDH-ZERT GmbH. Apart from production, the certification includes the method of calculation required by the HALFEN Engineers and their respective qualifications.

Design method

The European standard EN 1993 was created with the intention to establish uniform, Europe-wide calculation methods for steel structures. However, because these calculation methods have not yet been adopted in all industries we have decided to include two sets of values for load capacities of framing channels and HALFEN Bolts in the following tables.

- **working loads will continue to be defined as "allow. F" and**
- **design values of the resistance will be defined as "F_{Rd}".**

The term "design value" is taken from the current applicable standards, for example EN 1993 (EC3), with new safety concept, and must be strictly differentiated from the term "allowable load". The European standard which is based on the so called "partial safety factors" is applied to material resistance as well as to the action (load). The following verification is required:

$$F_{Ed} \leq F_{Rd}$$

F_{Ed} = calculation value for action
F_{Rd} = design value for resistance

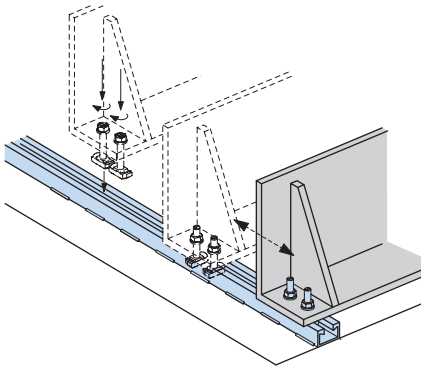
The traditional, deterministic safety concept however is based on the method of using a global safety factor for material resistance and is known as the "allowable load method" resp. "allowable tension method". These methods are used in mechanical and plant engineering. For these cases the allowable values for load capacity are calculated. Verification is as follows:

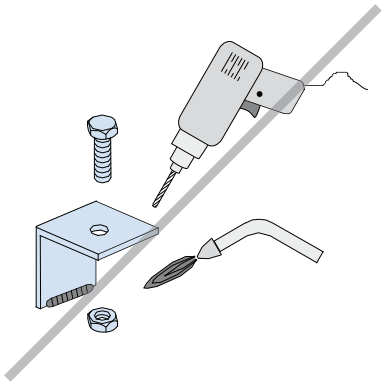
$$F \leq \text{allow. } F$$

F = load on the structure
allow. F = allowable load

Adjustable HALFEN Channel fixing systems offer a whole range of benefits:

- The adjustable HALFEN Channel-bolt system is a supporting as well as a fixing system
- Full flexibility in positioning and dimensioning the bolt connections
- Choice of corrosion protection:
  - Strip galvanized framing channels for low demands
  - Hot-dip galvanized framing channels for high demands
  - Framing channels in stainless steel for maximum requirements
- Quick assembly and adjustment of equipment and structural components
- Change or up-date entire projects with standard tools
- No specialist required to carry out modifications on site
- Dust free and low noise levels when modification work is done on site
- Corrosion protection is not compromised by bolting
- A large selection of standard channels with good load bearing characteristics





With HALFEN Framing channels you avoid:

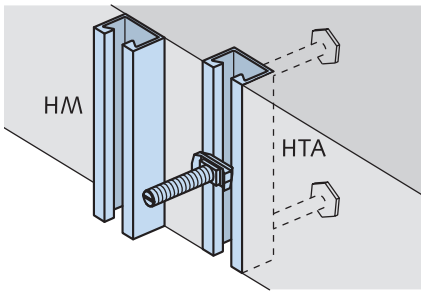
- Time consuming planning of inflexible bolted fixings
- Costly manufacturing of bolt fixings
- Costly corrosion protection work when upgrading already completed structural components i.e. when adjusting components to site

HALFEN Channels

All hot-rolled HALFEN Profiles and some of the light framing channels are also available as **HALFEN HTA/HZA Cast-in channels**. Both versions use the same bolts and locking plates.

You can find more information on HALFEN Channels in our Technical Product Information **"HALFEN Cast-in channels".**

www.halfen.com/
Products/Fixing systems/
HTA-Cast-in channels



Quality

Quality is an outstanding feature of our products. HALFEN materials and products are subject to stringent quality controls.

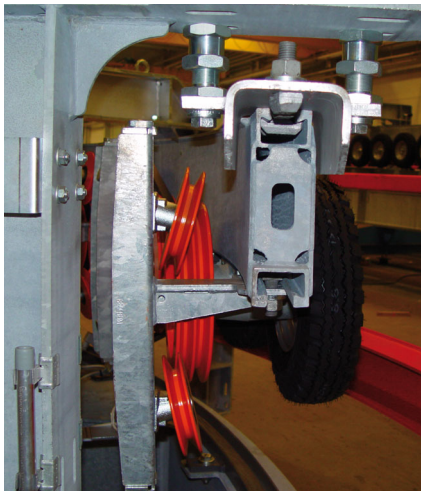
A quality audit by the DNV GL confirmed that our quality management system meets the demands of the ISO 9001:2015 standard.

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001

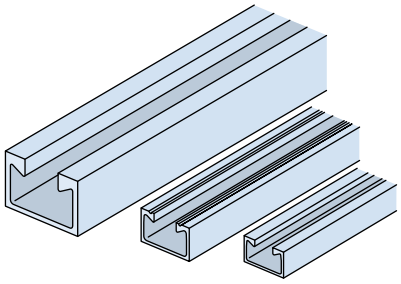
Certificate no. 202384-2016-AQ-GER-DAkkS

Framing channels HM, HL, HZM and HZL

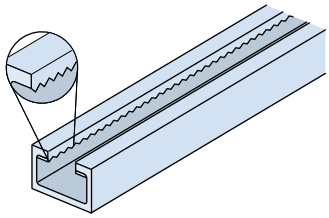
Hot-rolled framing channels
The hot-rolling process makes these framing channels ideally suitable for:
- heavy loads
- dynamic loads
- welding


Roller-bearing fixing of a cableway

Smooth channels HM
- very high tensile load capacity
- by using nibbed bolts longitudinal loads are possible (applies only to standard steel)



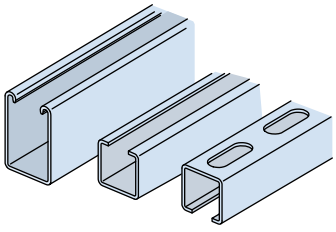
Serrated channels HZM
- serration allows high longitudinal loads
- 5 channel sizes for maximum efficiency

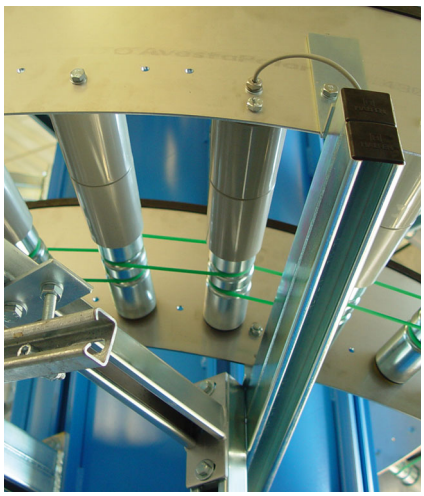



Welding-jig, locomotive construction

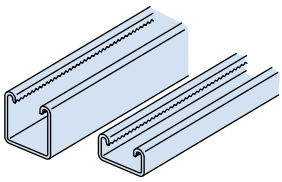
Cold-rolled framing channels
Cold-rolled channels are economic for lower loads.
Channels are available with holes or without holes.

Cold-rolled framing channels HL, HM
- economic due to large selection of channels




Cantilever fixing on a vertical conveyor system

Serrated channels HZL, HZM
- for loads in longitudinal channel direction
- positive-locking connection for high channel loads



HALFEN Bolts HS, HZS and HSR

Type HS

HALFEN Bolts

- suitable for all channels
- load bearing capacity in two directions
- marked at shank end with one notch

Type HSR

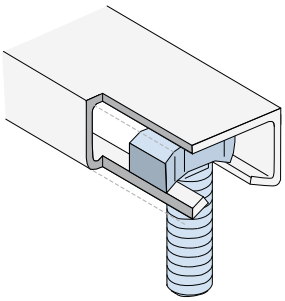
HALFEN Bolts with nibs

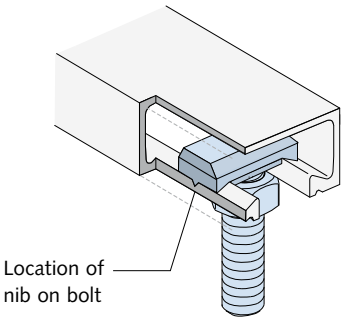
- suitable for use in hot-rolled, standard steel channels from the heavy duty system
- nibbed; therefore positive-locking, load bearing in all directions
- the T-bolts prevent turning under vibration
- marked at shank end with two notches

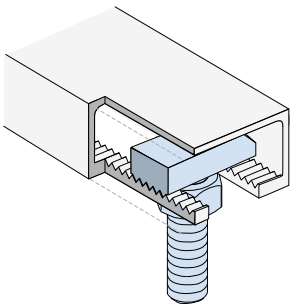
Type HZS

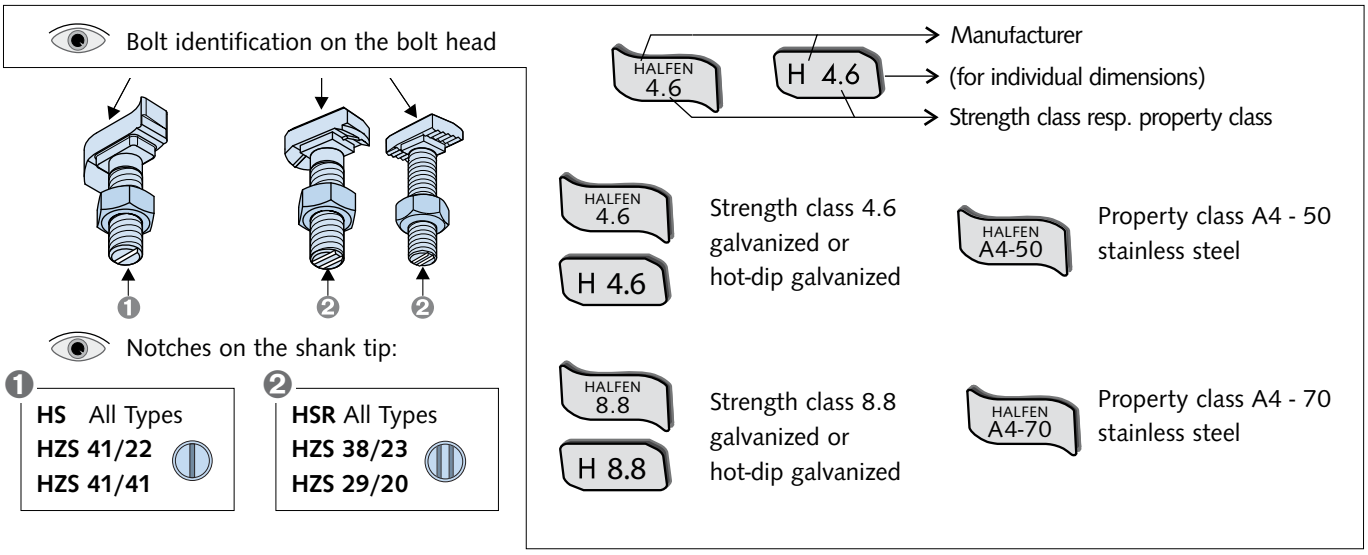
Serrated HALFEN Bolts

- for serrated framing channels HZM and HZL
- serration also provides positive load bearing transmission in longitudinal channel direction; risk of slippage is eliminated
- marked at shank end with two notches



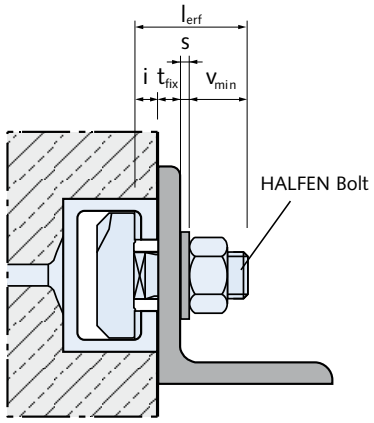






Marking at the shank end of the HALFEN Bolts: After assembly check the correct orientation of the notches on the shank end of the bolts. The slots must be at right angles to the channel length.

Calculating the bolt length l_{req} for HALFEN Bolts (steel construction)



$$l_{req} = t_{fix} + i + s + v_{min}$$

l_{req} = required bolt length
t_{fix} = thickness: attached component
i = channel lip thickness
s = washer thickness → see page 56

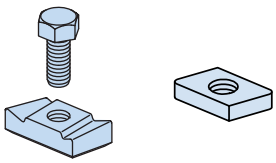
v_{min} = m + u
m = nut height EN ISO 4032
u = bolt protrusion approx. 5 mm according to DIN 78 (bolts larger M20 require min. 7 mm)

Dimensions v_{min}	
Bolt diameter	**v_{min} = m + u [mm]**
M6	11.0
M8	12.5
M10	14.5
M12	17.0
M16	20.5
M20	26.0
M24	29.0
M27	31.5
M30	33.5

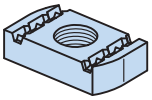
Thickness channel lip i																		
Profile	**28/15**	**29/20**	**38/17**	**36/36**	**38/23**	**40/22**	**40/25**	**41/22**	**41/27**	**422**	**486**	**49/30**	**50/30**	**50/40**	**52/34**	**53/34**	**55/42**	**64/44**	**72/48**
i [mm]	2.25	5.0	3.0	2.5	5.5	6.0	5.6	7.0	7.0	6.0	6.0	7.39	7.85	7.0	10.5	7.5	12.9	10.0	15.5

Locking plates GWP

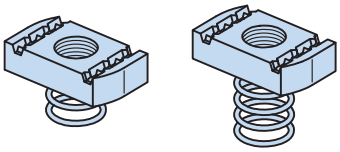
Locking plates (channel nuts) allow any metric bolt or threaded rod to be used.



Locking plates with "grip" **(see medium duty framing system, page 44)**. The "serration" grips the channel lips.



Locking plates with spring are used in particular for securing plates or panels **(see medium duty framing system, page 44)**.



Ordering examples

Order example – framing channels

HM 50/30 - FV - 6070

Type
Material
Length (mm)

or use the 12-digit order no. e.g. 0280.200-00003

Order example – HALFEN Bolts

HS 50/30 M20 × 100 GVs 8.8

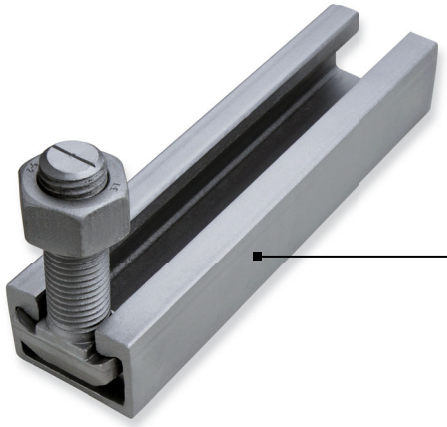
Type
Thread diam.
Length (mm)
Material
Property class

or use the 12-digit order no. e.g. 0350.090-00081
Order numbers for HALFEN Bolts can be found in the HALFEN Pricelist.

Framing Channels

The advantages at a glance

Whether for low or very high loads: you will always find a cost effective solution for your requirements in the HALFEN product range of framing channels and bolts.



Heavy duty framing system
The heavy duty framing channel is predominantly hot-rolled and particularly suitable for heavy loads.

Versatile and adaptable

- adjustable assembly
- all connections stay adjustable; they are easily replaced or extended
- almost unlimited in its range of application; e.g. building construction, industrial construction, steel construction, engineering construction, vehicle manufacturing and many other sectors

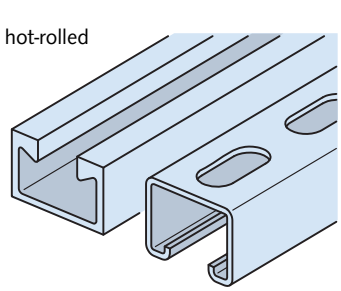
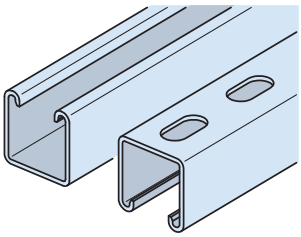
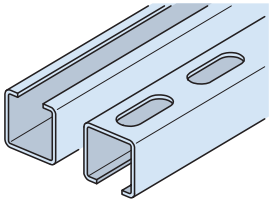
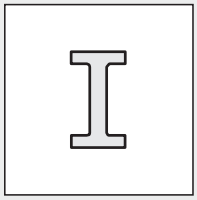
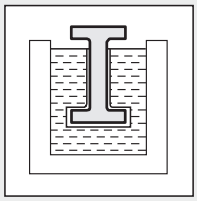
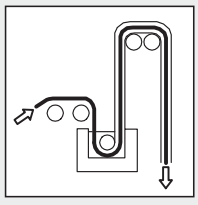
Medium duty framing system
All medium duty framing channels have the same profile width and are compatible with the innovative HALFEN Powerclick assembly system.

Secure and reliable

- corrosion protection is not compromised by bolting
- large selection of standard channels with optimal load bearing capacities
- serrated channels for positive-lock connections

Low duty framing system
The low duty framing channel is the perfect fixing solution for low loads.

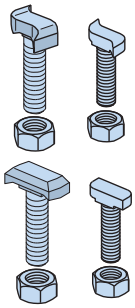
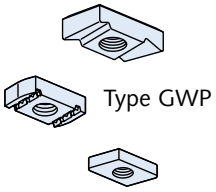
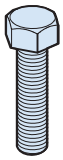
HALFEN Channels

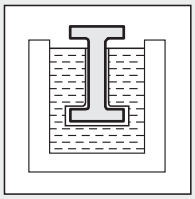
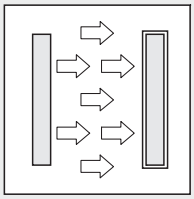
Material: Order code		Heavy duty framing systems	Medium duty framing systems	Light duty framing systems
		 Pages 14 – 34	 Pages 35 – 44	 Pages 45 – 53
 Mill-finished	**WB**	Hot-rolled material S235JR, acc. to EN 10025, material no. 1.0038 Type HZM: S275JR, material no. 1.0044, acc. to EN 10025 Cold-rolled: material S235JR, acc. to EN 10025 mill-finished	Material S235JR, acc. to EN 10025, material no. 1.0038	Material S235JR, acc to EN 10025, material no. 1.0038
 Hot-dip galvanized acc. to EN ISO 1461 suitable for outdoor application	**FV**	Hot-rolled material S235JR, acc. to EN 10025, material no. 1.0038 type HZM: S275JR acc. to EN 10025 Cold-rolled: material S235JR, acc. to EN 10025 Hot-dip galvanized, acc. to EN ISO 1461, zinc coating min. 50 µm	Material S235JR, acc to EN 10025, material no. 1.0038 Hot-dip galvanized, acc. to EN ISO 1461 zinc coating min. 50 µm	Material S235JR, acc. to EN 10025, material no. 1.0038 Hot-dip galvanized, acc. to EN ISO 1461, zinc coating min. 50 µm
 Strip-galvanized acc. to EN 10142 suitable for indoor application	**SV**		DX51D + Z275NA, material no. 1.0226, acc.to EN 10346 Sendzimir galvanized, hot-dip galvanized min. 20 µm	DX51D + Z275NA, material no. 1.0226, acc. to EN 10346 Sendzimir galvanized, hot-dip galvanized min. 20 µm
Stainless steel acc. to EN 10088 and EN 1993-1-4	**A2**			Material no. 1.4301, acc. to EN 10088
	A4	Material no. 1.4571 / 1.4404, acc. to EN 10088	Material no. 1.4571 / 1.4404, acc. to EN 10088	Material no. 1.4571 / 1.4404, acc. to EN 10088
	HCR	HCR = high corroison resistant stainless steel, material no. 1.4529 or 1.4547, acc. to EN 10088, for channels 49/30		HCR = high corroison resistant stainless steel, material no. 1.4529 or 1.4547, acc. to EN 10088, for channels 28/15 and 38/17

HALFEN Bolts/Accessories

① HALFEN Bolts with s-shape head for safer assembly. The head shape guarantees better hold, preventing the bolt turning in the channel, even coping with manufacturing tolerances in the channel widths. HALFEN supplies both types; subject to change.

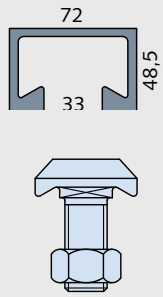
Material: Order code

HALFEN Bolts	Locking plates	Hexagon bolts	Hexagon nuts
Types **HS, HSR, HZS** incl. nut  ① Standard s-shaped head alternative shape of bolt head Pages 54 – 55	 Type GWP	 Type **HSK** EN ISO 4017 DIN 933 Page 57	 Type **MU** DIN EN ISO 4032 DIN 934 Page 56

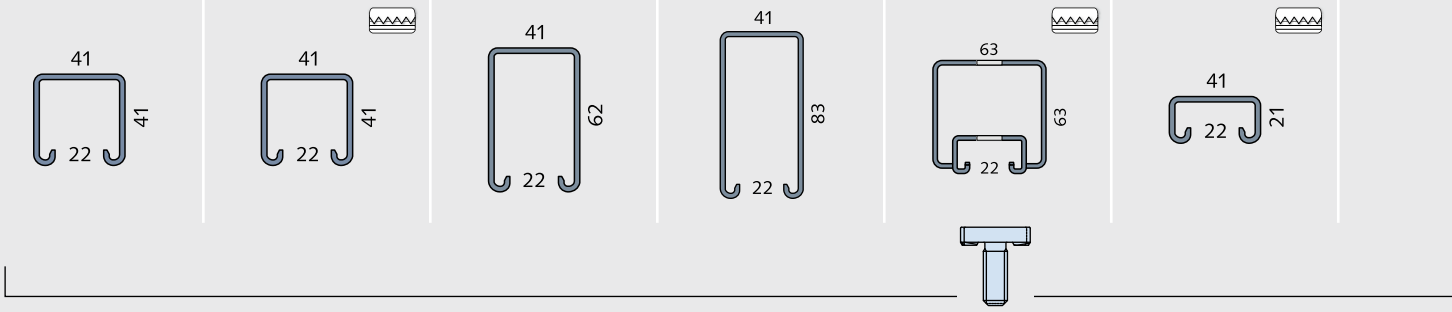
 Hot-dip galvanized acc. to EN ISO 10684, for threaded parts acc. to DIN 267 part 10	**FV 4.6**	Hot-dip galvanized acc. to EN ISO 10684 property class 4.6 acc. to EN ISO 898-1			Hot-dip galvanized acc. to EN ISO 10684 strength 8
	FV 8.8	Hot-dip galvanized acc. to EN ISO 10684 property class 8.8 acc. to EN ISO 898-1			
 Zinc-electroplated acc. to DIN 50961, DIN EN 1403, DIN EN ISO 4042 zinc flake coating	**GV 4.6**	Zinc-electroplated with special coating Cr(VI)-free,GVs zinc coating min. 12 µm, property class 4.6 acc. to EN ISO 898-1	Zinc-electroplated Cr(VI)-free, zinc cover min. 5 µm		Zinc-electroplated Cr(VI)-free, zinc cover min. 5 µm, property class 8
	GV 8.8	Zinc-electroplated with special coating Cr(VI)-free,GVs zinc coating min. 12 µm, property class 8.8 acc. to EN ISO 898-1		Zinc-electroplated Cr(VI)-free, zinc cover ca. 5 µm, property class 8.8	
	zl	Zinc flake coating (only Type HZS 41/41)			
 Stainless steel acc. to EN 10088 or EN 1993-1-4					Stainless steel A2
	A2	Property class 50 acc. to EN ISO 3506-1			
		Property class 70 acc. to EN ISO 3506-1			
	A4		Stainless steel A4	Stainless steel A4-70	Stainless steel A4-70 or A4-80
		Property class 50 acc. to EN ISO 3506-1			
		Property class 70 acc. to EN ISO 3506-1			
	HCR	Material HCR-50, material no. 1.4529, acc. to EN ISO 3506-1 on request			
	FA	Property class 70 material no. 1.4462			

Product Range Overview: Framing Channels and HALFEN Bolts

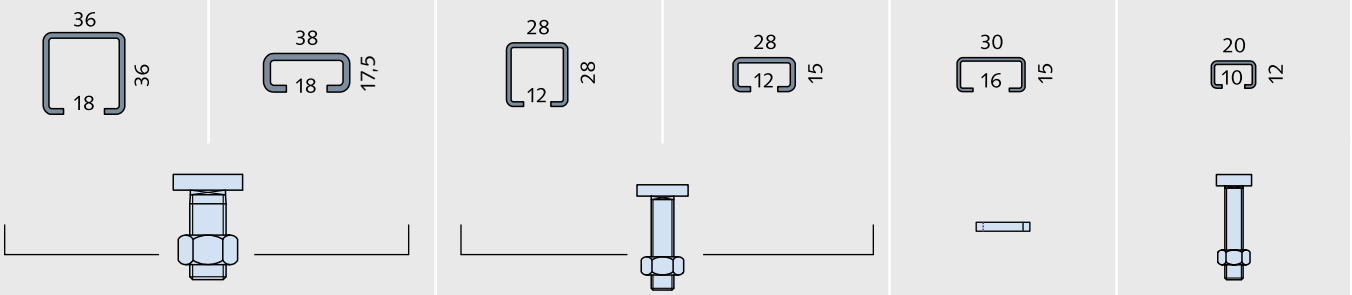
Heavy duty framing system

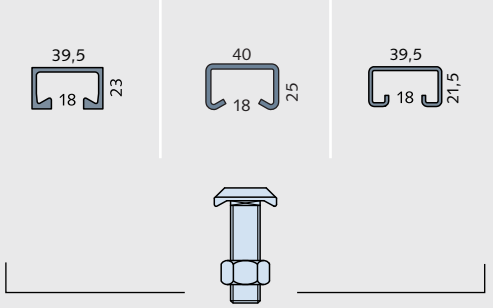
Hot-rolled				Cold-rolled		
HM 72/48	HM 55/42	HM 52/34	HM 50/30	HM 49/30	HM 50/40, HL 50/40	HM 486
						
HS 72/48, HSR 72/48, GWP 72/48	HS 50/30	HS 50/30, HSR 50/30, GWP 50/30		HS 50/30, GWP 50/30 and GWP 50/40		

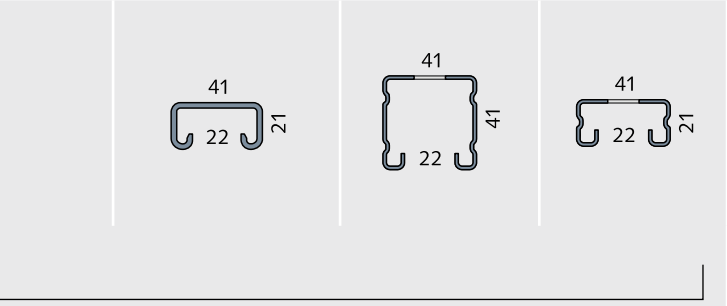
Medium duty framing system

Cold-rolled	Cold-rolled, serrated	Cold-rolled		Cold-rolled, serrated	
HM 41/41, HL 41/41	HZM 41/41, HZL 41/41	HM 41/62, HL 41/62	HM 41/83, HL 41/83	HZL 63/63	HZM 41/22, HZL 41,22
					
HZS/HS 41/41, HZS 41/22 GWP 41/41, GWP 41/22					

Light duty framing system

		Cold-rolled			Cold-rolled
HM 36/36, HL 36/36	HM 38/17	HM 28/28, HL 28/28	HM 28/15, HL 28/15	HM 315	HM 20/12, HL 20/12
					
HS 38/17, GWP 38/17		HS 28/15, GWP 28/15		GWP 28/15	HS 20/12, GWP 20/12

Hot-rolled	Cold-rolled		Hot-rolled, serrated				
HM 40/22	HM 40/25	HM 422	HZM 64/44	HZM 53/34	HZM 41/27	HZM 38/23	HZM 29/20
							
HS 40/22, HSR 40/22, GWP 40/22			HZS 64/44	HZS 53/34	HZS 38/23	HZS 38/23, HS 38/17	HZS 29/20, HS 28/15

Cold-rolled		
HM 41/22, HL 41/22	HLL 41/41	HLL 41/22
		

Material and finishes:

- Hot-dip galvanized FV or mill finish WB
- Sendzimir galvanized SV
- Stainless steel A4 1.4571/1.4404
- Stainless steel A2 1.4301/1.4307
- Stainless steel HCR 1.4547/1.4529

Further information on materials and finishes → see page 10

HZM/HZL serrated profiles

Material grades: abbreviations and explanations

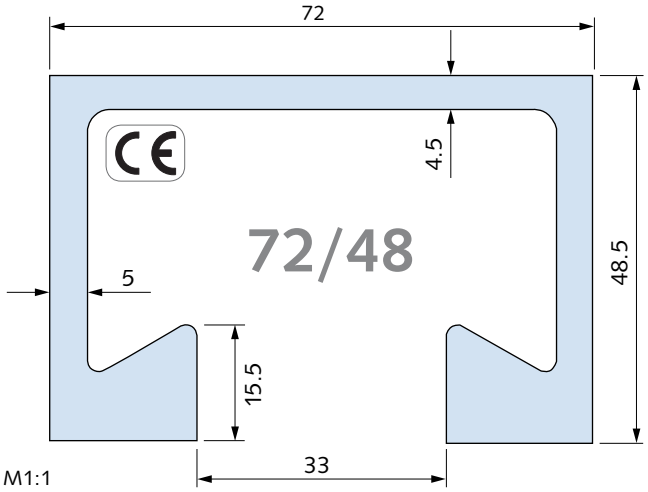
A2: Steel of corrosion resistance class (CRC) II according to EN 1993-1-4 : 2015-10, table A.3

A4: Steel of corrosion resistance class (CRC) III according to EN 1993-1-4 : 2015-10, table A.3

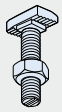
HCR: Steel of corrosion resistance class (CRC) V according to EN 1993-1-4 : 2015-10, table A.3

Framing channel HM 72/48

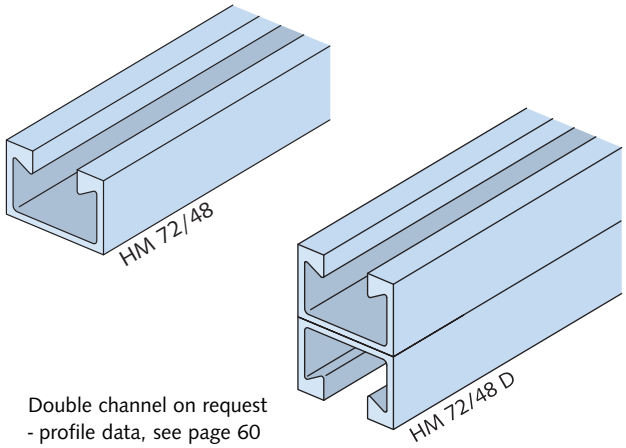
HM 72/48 hot-rolled



M1:1
[mm]



Suitable HALFEN Bolt HS 72/48
and HSR 72/48 → see page 15



Double channel on request
- profile data, see page 60

Dimensions and cross-section properties

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus	
HM 72/48	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]
WB	180-00002	6070	8.85	11.27	34.97	83.35	14.28	23.15
FV	180-00003							
A4	180-00001							

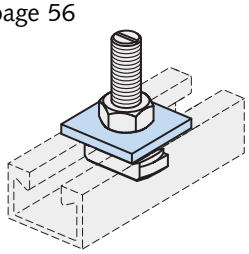
Load capacities

Max. point-load bearing capacity		Bending load capacity at span L		
F_z ① [kN]	e_w [cm]	0.5 m	1.0 m	1.5 m
$F_{z,Rd}$	30.0	F_{Rd}		
65.8		*31.2*	*15.6*	*10.4*
allow. F_z		allow. F		
47.0		22.3	11.2	7.4

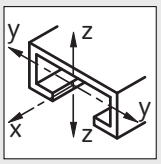
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

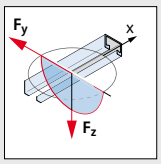
VUS 72/49 Washer
→ see page 56



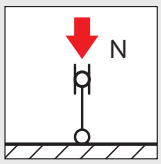
Further design properties



Cross section data
→ page 60

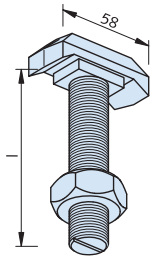


Point-load capacity
→ pages 66–67

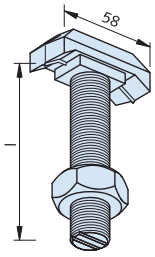


Flexural buckling
→ page 70

HALFEN Bolts HS 72/48 and HSR 72/48



HS 72/48
HALFEN Bolt
incl. nut



HSR 72/48
HALFEN Bolt with nib incl. nut, for hot-rolled channels in mild steel WB/FV

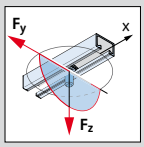
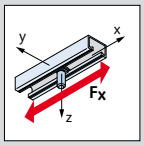
HS 72/48 available bolts

Length l [mm]	M20	M24	M27	M30	Length l [mm]	M20	M24	M27	M30
50	FV 4.6	FV 4.6 A4-50			150	FV 4.6	FV 4.6 GVs 8.8		FV 4.6
60	FV 8.8								
75	FV 4.6 GVs 8.8	FV 4.6 FV 8.8	FV 4.6	FV 4.6	200	FV 4.6	FV 4.6		FV 4.6
100	FV 4.6 GVs 8.8	FV 4.6 GVs 8.8 A4-50	FV 4.6 FV 8.8	FV 4.6					

HSR 72/48 available bolts

Length l [mm]	M20
75	FV 8.8

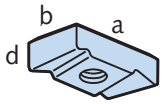
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts  F [kN] ①				Recommended load capacity per HALFEN Bolt in channel longitudinal direction  F_x [kN]				Recommended torque  T_{inst} [Nm]			
72/48		HS			HSR	HS ②			HSR ν = 3 ③	HS			HSR
		4.6	8.8	A4-50	8.8	4.6	8.8	A4-50	8.8	4.6	8.8	A4-50	8.8
M20	F_{Rd}	*35.2*	*78.4*	-	*78.4*	*1.96*	*6.58*	-	*10.5*	130	360	-	400
	allow. F	25.1	56.0	-	56.0	1.4	4.7	-	7.5				
M24	F_{Rd}	*50.7*	*113.0*	*44.5*	-	*2.8*	*9.52*	*2.8*	-	200	680	200	-
	allow. F	36.2	80.7	31.8	-	2.0	6.8	2.0	-				
M27	F_{Rd}	*66.0*	*146.9*	-	-	*3.64*	*12.46*	-	-	300	1000	-	-
	allow. F	47.1	104.9	-	-	2.6	8.9	-	-				
M30	F_{Rd}	*80.6*	-	-	-	*4.48*	*15.26*	-	-	400	1400	-	-
	allow. F	57.6	-	-	-	3.2	10.9	-	-				

① Note: do not exceed the max. channel load bearing capacity
② Load capability due to friction
③ Acc. to expert report

Locking plates

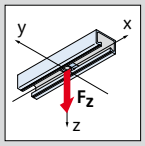
Locking plate **GWP 72/48**



GWP 72/48 available plates

GV thread	A4 thread	a [mm]	b [mm]	d [mm]
M12	M12	62	31	22
M16	M16			
M20	M20			

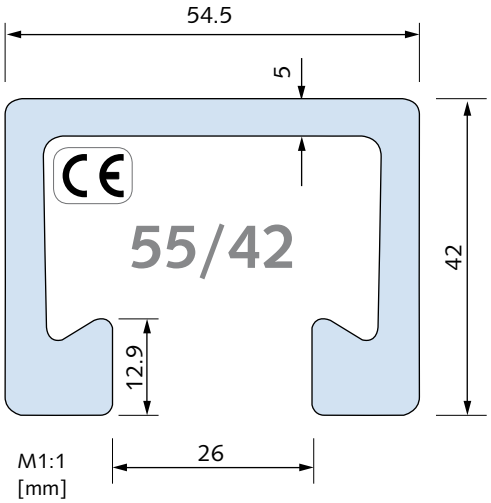
Load capacities GWP 72/48

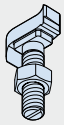


Thread	Load capacity [kN]	
M12	F_{Rd}	*13.0*
	allow. F	9.3
M16	F_{Rd}	*24.2*
	allow. F	17.3
M20	F_{Rd}	*30.8*
	allow. F	22.0

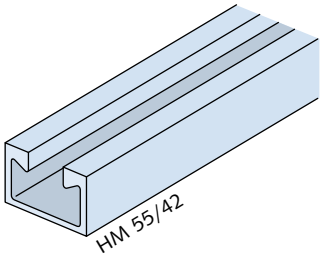
Framing channel HM 55/42

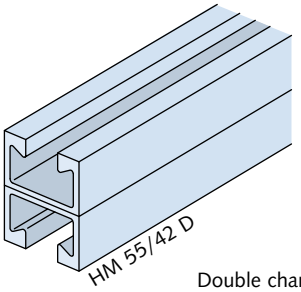
HM 55/42 hot-rolled





Suitable HALFEN Bolt HS 50/30,
see page 21





Double channel on request
- profile data, see page 60

Dimensions and cross-section properties

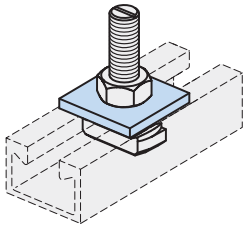
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HM 55/42	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	e_w [cm]	0.5 m	1.0 m	1.5 m
WB	290-00001	6070	6.76	8.6	18.75	36.29	8.49	13.32	$F_{z,Rd}$	25.0	F_{Rd}		
									54.0		23.5	11.7	7.8
FV	290-00002								allow. F_z		allow. F		
									38.6		16.8	8.4	5.6

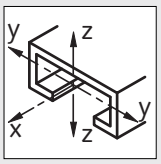
① F_z = max. load bearing capacity of the channel lips → see also page 66

Accessories

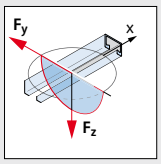
VUS 72/49 Washer
→ see page 56



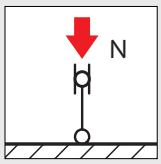
Further design properties



Cross section data
→ page 60



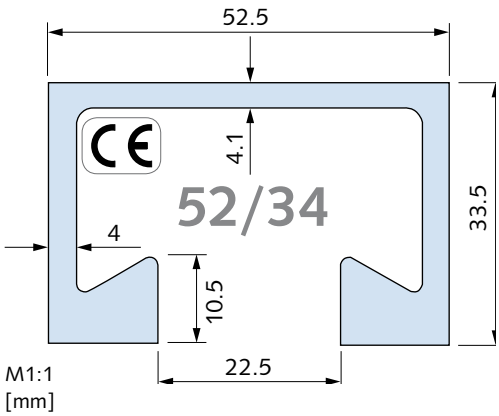
Point-load capacity
→ pages 66–67

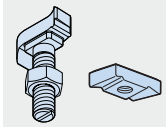


Flexural buckling
→ page 70

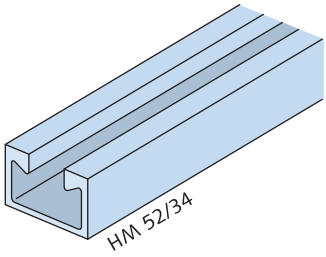
Framing channel HM 52/34

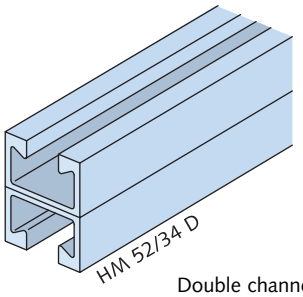
HM 52/34 hot-rolled





Suitable HALFEN Bolts and locking plates HS 50/30, HSR 50/30, GWP 50/40 and GWP 50/30 → see pages 21–22





Double channel on request
profile data → see page 60

Dimensions and cross-section properties

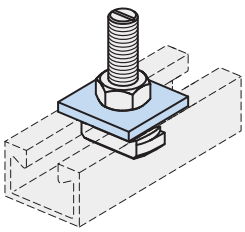
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. Point-load bearing capacity		Bending load capacity at span L		
									F_z ①	e_w	F [kN]		
HM 52/34	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	190-00002	6070	4.98	6.35	9.33	23.74	5.36	9.04	$F_{z,Rd}$	20.0	F_{Rd}		
FV	190-00003								*36.3*		*12.3*	*6.1*	*3.9*
A4	190-00001								allow. F_z		allow. F		
									25.9		8.8	4.4	2.8

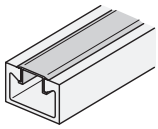
① F_z = max. load bearing capacity of the channel lips → see also page 66

Accessories

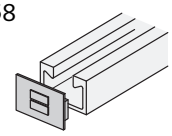
VUS 52/34 Washer
→ see page 56



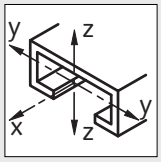
PA - 22 Channel cover
→ see page 58



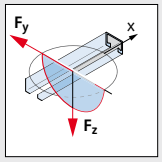
HPE 52/34 Channel end cap
→ see page 58



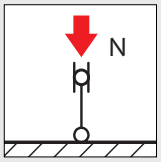
Further design properties



Cross section data
→ page 60



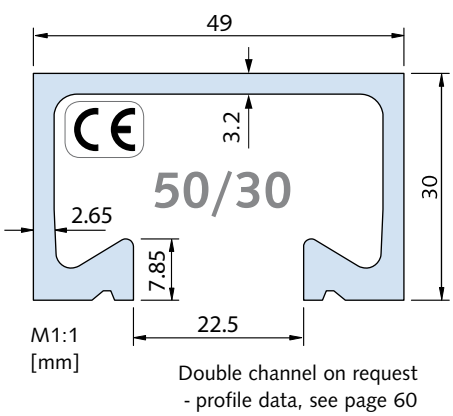
Point-load capacity
→ pages 66–67



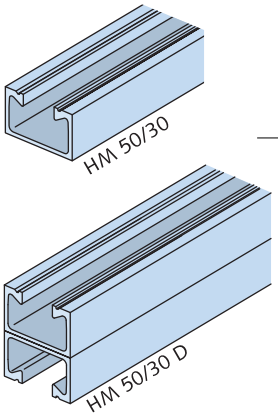
Flexural buckling
→ page 70

Framing channel HM 50/30 and HM 49/30

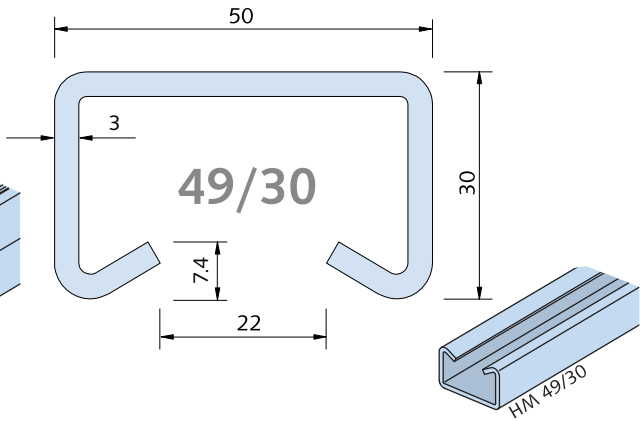
HM 50/30 hot-rolled



Double channel on request
- profile data, see page 60



HM 49/30 cold-rolled



Dimensions and cross-section properties

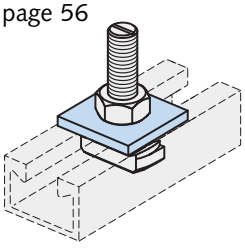
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HM 50/30	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	e_w [cm]	0.5 m	1.0 m	1.5 m
WB	200-00002	6070	3.26	4.15	5.19	13.99	3.24	5.67	$F_{z,Rd}$	20	F_{Rd}		
FV	200-00003								20.2		7.5	3.7	2.2
A4	200-00001								allow. F_z		allow. F		
									14.4		5.3	2.7	1.6
HM 49/30	0280.												
WB	220-00001	6070	2.88	3.67	4.16	13.23	2.35	5.29	$F_{z,Rd}$	46	F_{Rd}		
FV	220-00002								6.9		6.1	3.0	1.7
A2 ②	220-00003								allow. F_z		allow. F		
A4	220-00004								4.9		4.3	2.2	1.2

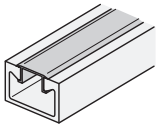
① F_z = max. load bearing capacity of the channel lips; ② Stainless steel A2 on request. Note: HCR for HM 49/30 on request

Accessories

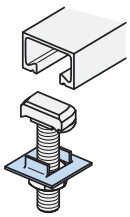
VUS 52/34 Washer
→ see page 56

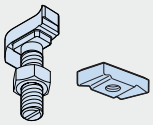


PA - 41 Channel cover
→ see page 58



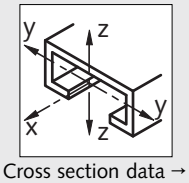
SIC 50/30 Locking washer → see page 56



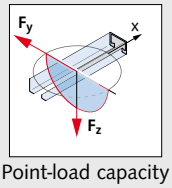


Suitable HALFEN Bolts and locking plates
HS 50/30, HSR 50/30 and
GWP 50/30 → see pages 21–22

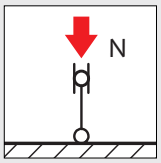
Further design properties



Cross section data →
→ pages 60, 62



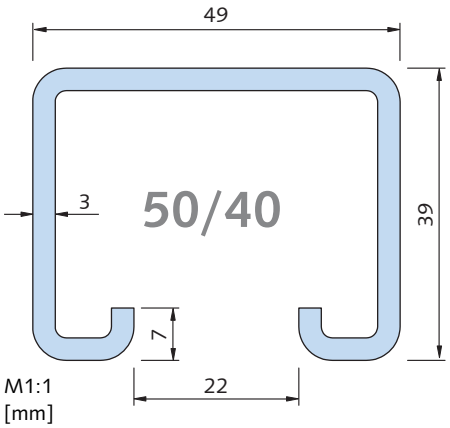
Point-load capacity
→ pages 66–67

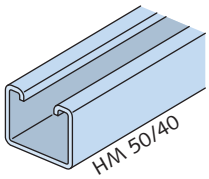


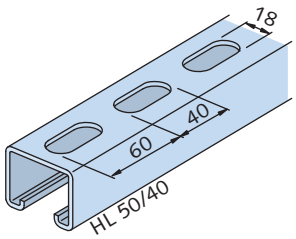
Flexural buckling
→ pages 70–71

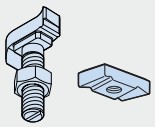
Framing channel HM and HL 50/40

HM 50/40 and HL 50/40 cold-rolled









Suitable HALFEN Bolts and locking plates
HS 50/30, GWP 50/40
→ see pages 21–22

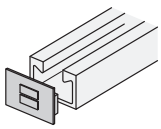
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	≤ e_w	F [kN]		
HM 50/40	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	090-00002	6000	3.35	4.26	8.64	15.49	3.96	6.32	$F_{z,Rd}$	63.0	F_{Rd}		
FV	090-00003								7.6		9.5	4.7	3.2
A4	090-00001								allow. F_z		allow. F		
									5.4		6.8	3.4	2.3
HL 50/40	0281.												
WB	100-00001	6000	3.15	3.73	7.14	15.36	3.65	6	$F_{z,Rd}$	53.0	F_{Rd}		
FV	100-00002								7.6		8.0	4.1	2.7
A4	100-00003								allow. F_z		allow. F		
									5.4		5.7	2.9	1.9

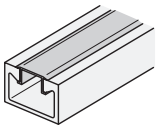
① F_z = max. load bearing capacity of the channel lips

Accessories

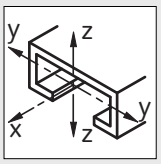
HPE 50/40 Channel end cap
→ see page 58



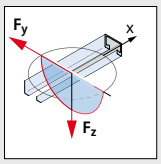
PA - 41 Channel cover
→ see page 58



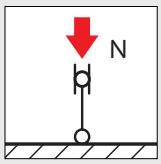
Further design properties



Cross section data
→ pages 62, 64



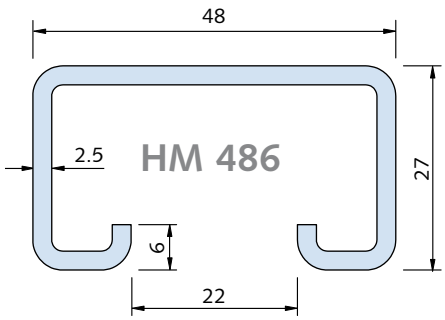
Point-load capacities
→ page 68



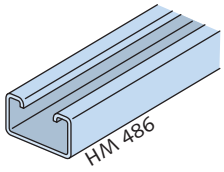
Flexural buckling
→ page 71

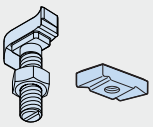
Framing channel HM 486

HM 486 cold-rolled



M1:1
[mm]





Suitable HALFEN Bolts and locking plates HS 50/30 and GWP 50/40
→ see pages 21–22

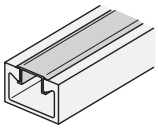
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	≤ e_w			
HM 486	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	100-00001	6000	2.31	2.95	2.97	9.62	1.92	4.01	$F_{Rd,z}$	47.0	F_{Rd}		
									4.7		*4.6*	*2.3*	*1.2*
FV	100-00002								allow. F_z		allow. F		
									3.5		3.3	1.7	0.9

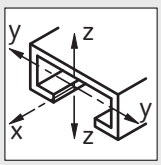
① F_z = load bearing capacity of the channel lips

Accessories

PA - 41 Channel cover
→ see page 58

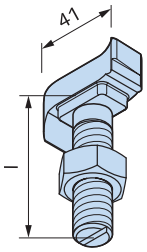


Further design properties



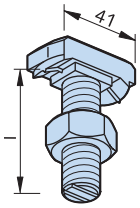
Cross section data
→ page 62

HALFEN Bolts HS 50/30 and HSR 50/30



HS 50/30
HALFEN Bolt
incl. nut

Li = left-hand thread
T = partial thread



HSR 50/30
HALFEN Bolt with nib, incl. nut, for hot-rolled profiles in mild steel WB/FV

HS 50/30 available bolts

Length l [mm]	M10	M12	M16	M20	Length l [mm]	M10	M12	M16	M20
30	GVs 4.6 FV 4.6	GVs 4.6 A4-70	GVs 4.6 A4-50	-	75	-	-	-	GVs 4.6 A4-50 FA-70
35				GVs 4.6					
40	GVs 4.6	GVs 4.6 FV 4.6 A4-70	GVs 4.6 GVs 8.8 FV 4.6 A4-50	-	80	-	GVs 4.6 GVs 8.8	GVs 4.6 GVs 8.8 A4-50 A4-70	GVs 8.8
45	-	GVs 8.8	-	GVs 4.6 GVs 8.8 A4-50	80 Li	-	-	A4-50	
50	GVs 4.6	GVs 4.6 A4-70	GVs 4.6 FV 4.6 A4-50 A4-70	-	100	-	GVs 4.6 A4-50	GVs 4.6 GVs 8.8 FV 4.6	GVs 4.6 GVs 8.8 FV 4.6 A4-50 FA-70
55	-	-	-	GVs 4.6 FV 4.6 A4-50	100 T			A4-50	
60	-	GVs 4.6 GVs 8.8	GVs 4.6 GVs 8.8 FV 8.8 A4-50	GVs 8.8	125	-	GVs 4.6	GVs 4.6	GVs 4.6 A4-50
65	-	-	-	GVs 4.6	150	-	GVs 4.6	GVs 4.6 FV 4.6 A4-50	GVs 4.6 GVs 8.8 A4-50
					200	-	GVs 4.6	GVs 4.6	GVs 4.6
					300	-	-	GVs 4.6	GVs 4.6

High corrosion resistant stainless steeel HCR for HS 50/30 on request

HSR 50/30 available bolts

Length l [mm]	M10	M12	M16	M20	Length l [mm]	M10	M12	M16	M20
40			FV 8.8		75				GVs 8.8
45				GVs 8.8					
60			GVs 8.8	GVs 8.8					

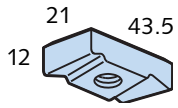
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts F [kN]						Recommended load capacity per HALFEN Bolt in channel longitudinal direction F_x [kN]					Recommended torque T_{inst} [Nm]					
50/30		HS					HSR	HS ②				HSR ③	HS					HSR
		4.6	8.8	A4-50	A4-70	FA-70	8.8	4.6	8.8	A4-50; A4-70	FA-70	8.8	4.6	8.8	A4-50	A4-70	FA-70	8.8
M10	F_{Rd}	*8.3*	*18.6*	-	-	-	-	*0.42*	*1.54*	-	-	-	15	40	-	-	-	-
	allow. F	5.9	13.3	-	-	-	-	0.3	1.1	-	-	-						
M12	F_{Rd}	*12.1*	*27.0*	*10.6*	*22.7*	-	-	*0.7*	*2.24*	*0.7*	-	-	25	70	25	-	-	-
	allow. F	8.6	19.3	7.6	16.2	-	-	0.5	1.6	0.5	-	-						
M16	F_{Rd}	*22.6*	*50.2*	*19.8*	*42.2*	-	*50.2*	*1.26*	*4.2*	*1.26*	-	*7.0*	65	180	60	130	-	200
	allow. F	16.1	35.9	14.1	30.2	-	35.9	0.9	3.0	0.9	-	5.0						
M20	F_{Rd}	*35.2*	*78.4*	*30.9*	-	*66.0*	*78.4*	*1.96*	*6.58*	*1.96*	*1.96*	*10.5*	130	360	120	-	250	400
	allow. F	25.1	56.0	22.1	-	47.1	56.0	1.4	4.7	1.4	1.4	7.5						
M24	F_{Rd}	*50.7*	-	-	-	-	-	*2.8*	*9.5*	-	-	-	230	-	-	-	-	-
	allow. F	36.2	-	-	-	-	-	2.0	6.8	-	-	-						

① Note: do not exceed the max. channel load bearing capacity
② Load capability due to friction
③ acc. to expert report, ν = 3

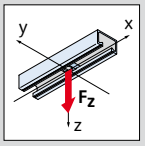
Locking plates GWP 50/30

Locking plate
GWP 50/30



GWP 50/30 available bolts		
FV	GV	A4
-	M8	M8
M10	M10	M10
M12	M12	M12
M16	M16	M16

Load capacities for locking plates 50/30

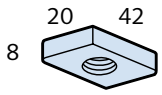


50/30

Thread		Load capacity [kN]
M8	F_{Rd}	*5.6*
	allow. F	4.0
M10	F_{Rd}	*9.0*
	allow. F	6.4
M12	F_{Rd}	*13.0*
	allow. F	9.3
M16	F_{Rd}	*13.0*
	allow. F	9.3

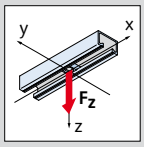
Locking plates GWP 50/40

Locking plate
GWP 50/40



GWP 50/40 available bolts	
GV	A4
M6	M6
M8	M8
M10	M10
M12	M12
M16	M16

Load capacities for locking plates 50/40

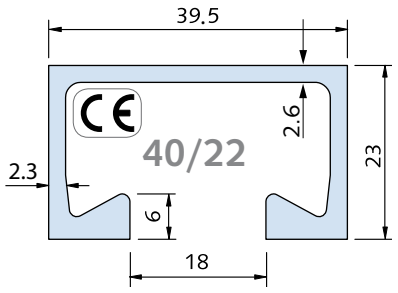


50/40

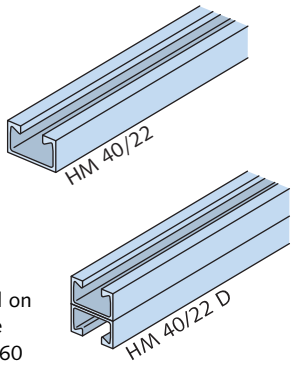
Thread		Load capacity [kN]
M6	F_{Rd}	*3.1*
	allow. F	2.2
M8	F_{Rd}	*5.6*
	allow. F	4.0
M10	F_{Rd}	*9.0*
	allow. F	6.4
M12	F_{Rd}	*9.0*
	allow. F	6.4
M16	F_{Rd}	*9.0*
	allow. F	6.4

Framing channel HM 40/22, HM 40/25

HM 40/22 hot-rolled

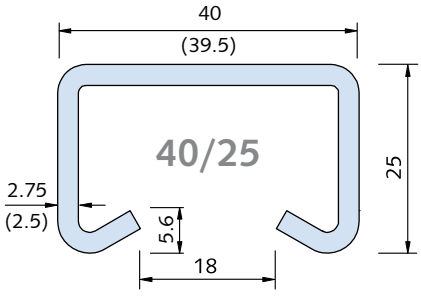


M1:1
[mm]

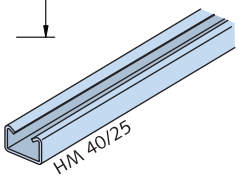


Double channel on request - profile data, see page 60

HM 40/25 cold-rolled



Values in brackets for stainless steel A2 and A4



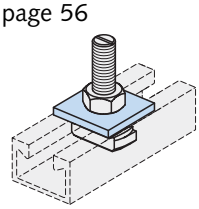
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	e_w	F [kN]		
HM 40/22	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	210-00002	6070	2.12	2.70	1.98	5.77	1.59	2.92	$F_{z,Rd}$	15.0	F_{Rd}		
FV	210-00003								*11.4*		*3.7*	*1.9*	*0.8*
A4	210-00001								allow. F_z		allow. F		
									8.2		2.6	1.3	0.6
HM 40/25	0280.												
WB	230-00001	6070	2.09	2.66	2.05	6.09	1.39	3.05	$F_{z,Rd}$	33.0	F_{Rd}		
FV	230-00002								*5.3*		*3.6*	*1.8*	*0.9*
A2	230-00003								allow. F_z		allow. F		
A4	230-00004								3.8		2.6	1.3	0.6

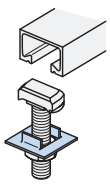
① F_z = max. load bearing capacity for the channel lips → see also page 66

Accessories

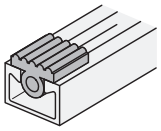
VUS 40/25
Washer
→ see page 56

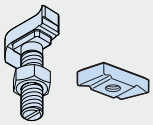


SIC 40/22
Locking washer
→ see page 56



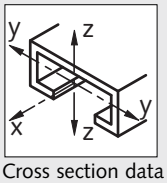
SDM - 36/6
Rubber vibration absorber
→ see catalogue MT-FFC



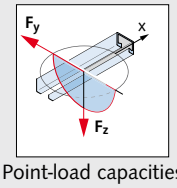


Suitable HALFEN Bolts and locking plates
HS 40/22, HSR 40/22 and
GWP 40/22 → see page 25

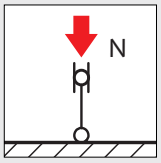
Further design properties



Cross section data
→ pages 60, 62



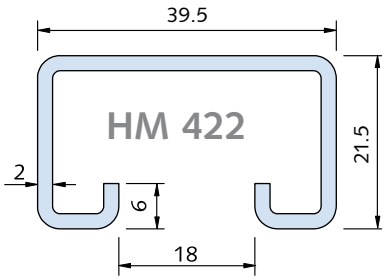
Point-load capacities
→ pages 66–67



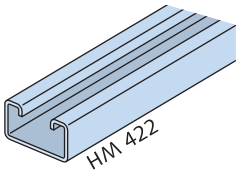
Flexural buckling
→ pages 70–71

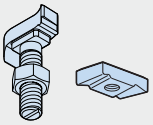
Framing channel HM 422

HM 422 (C40) cold-rolled



M1:1
[mm]





Suitable HALFEN Bolts and locking plates HS 40/22 and GWP 40/22
→ see page 25

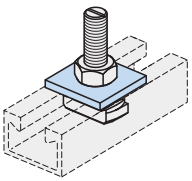
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HM 422	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	110-00001	6000	1.55	1.98	1.27	4.29	1.04	2.17	$F_{z,Rd}$ 3.5	36.0	F_{Rd} 2.5	1.2	0.5
FV	110-00002								allow. F_z 2.5		allow. F 1.8	0.9	0.4

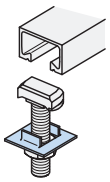
① F_z = max. load bearing capacity of the channel lips

Accessories

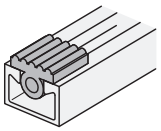
VUS 40/25
Washer
→ see page 56



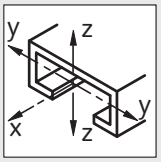
SIC 40/22
Locking washer
→ see page 56



SDM - 36/6
Rubber vibration absorber
→ see catalogue MT-FFC

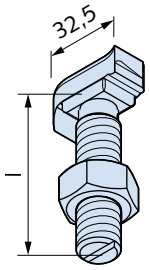


Further design properties



Cross section data
→ page 62

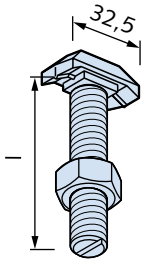
HALFEN Bolts HS 40/22 and HSR 40/22



HS 40/22
HALFEN Bolt
incl. nut

Li = left-hand thread

HSR 40/22
HALFEN Bolt with nib, incl. nut, for hot-rolled profiles in mild steel WB/FV



HS 40/22 available bolts

Length l [mm]	M10	M12	M16	Length l [mm]	M10	M12	M16
20	GVs 4.6	GVs 4.6		60	GVs 4.6	GVs 4.6 GVs 8.8	GVs 4.6 GVs 8.8 FV 4.6 A4-50
30	GVs 4.6 A4-70	GVs 4.6 GVs 8.8 FV 4.6 A4-50	GVs 4.6 A4-50	80	GVs 4.6	GVs 4.6 GVs 8.8 A4-50	GVs 4.6 GVs 8.8 A4-50
40	GVs 4.6 A4-70	GVs 4.6 GVs 8.8 A4-50 A4-70	GVs 4.6 A4-50 A4-70	80 Li	-	A4-50	A4-50
45		GVs 8.8		100	GVs 4.6	GVs 4.6 GVs 8.8 A4-50	GVs 4.6 FV 4.6 A4-50
50	GVs 4.6 A4-70	GVs 4.6 FV 4.6 A4-50	GVs 4.6 FV 4.6 A4-50 A4-70	125	-	GVs 4.6	GVs 4.6
				150	-	GVs 4.6 A4-50	GVs 4.6 A4-50
				200	-	GVs 4.6	GVs 4.6
				250	-	-	GVs 4.6
				300	-	-	GVs 4.6

HSR 40/22 available bolts

Length l [mm]	M10	M12	M16
40	-	-	GVs 8.8
60	-	-	GVs 8.8

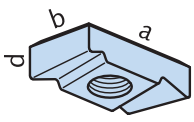
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts F [kN]					Recommended load capacity per HALFEN Bolt in channel longitudinal direction ② F_x [kN]					Recommended torque T_{inst} [Nm]				
40/22		HS				HSR	HS				HSR ③	HS				HSR
		4.6	8.8	A4-50	A4-70	8.8	4.6	8.8	A4-50	A4-70	8.8	4.6	8.8	A4-50	A4-70	8.8
M10	F_{Rd}	8.3	-	-	15.6	-		-	-	0.42	-	15	-	-	30	-
	allow. F	5.9	-	-	11.2	-	0.3	-	-	0.3						
M12	F_{Rd}	12.1	27.0	10.6	-	-			0.7	-	-	25	70	25	-	70
	allow. F	8.6	19.3	7.6	-	-	0.5	1.6	0.5	-						
M16	F_{Rd}	22.6	50.2	19.8	42.2	50.2			1.26	1.26	7.0	65	180	60	130	200
	allow. F	16.1	35.9	14.1	30.2	39.9	0.9	3.0	0.9	0.9	5.0					

① Note: do not exceed the channel load bearing capacity
② Load capability due to friction
③ acc. to expert report, ν = 3

Locking plates GWP 40/22

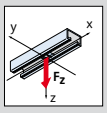
Locking plate
GWP 40/22



GWP 40/22 available plates

GV	A4	a [mm]	b [mm]	d [mm]
M5	-	35	17	10
M6	-			
M8	M8			
M10	M10			
M12	M12			11.5

Load capacities for GWP 40/22

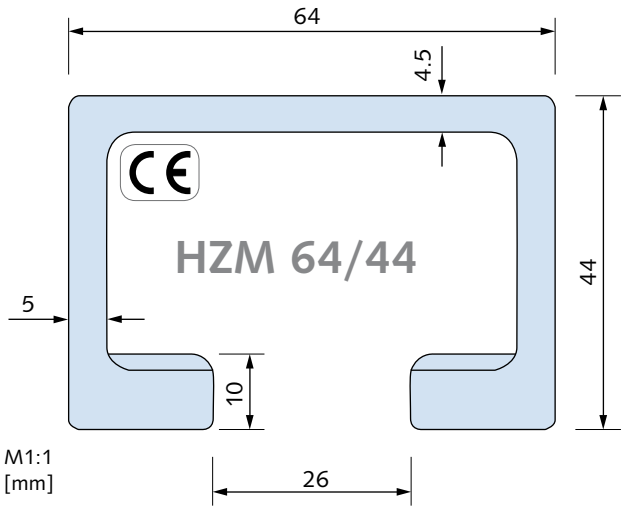


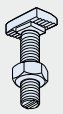
40/22

Thread	Load capacity [kN]	
M5	F_{Rd}	3.1
	allow. F	2.2
M6	F_{Rd}	3.1
	allow. F	2.2
M8	F_{Rd}	5.6
	allow. F	4.0
M10	F_{Rd}	9.0
	allow. F	6.4
M12	F_{Rd}	13.0
	allow. F	9.3

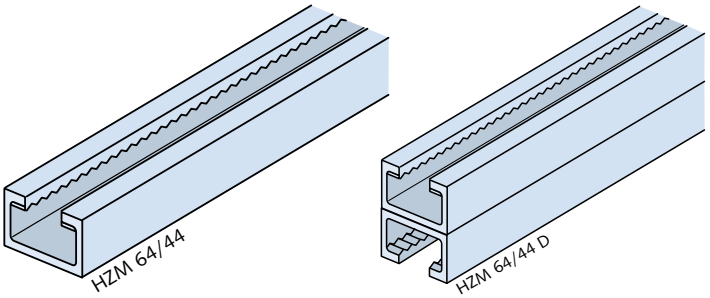
Framing channel HZM 64/44

HZM 64/44 hot-rolled, serrated





Suitable HALFEN Bolts
HZS 64/44 → see page 27



Double channel on request
- profile data, see page 60

Dimensions and cross-section properties

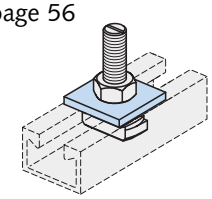
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZM 64/44	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	080-00002	6070	7.15	9.1	23.83	53.94	10.36	16.85	$F_{z,Rd}$	25.0	F_{Rd}		
FV	080-00003								*53.3*		*34.8*	*17.4*	*10.0*
A4	080-00001								allow. F_z		allow. F		
									38.1		24.8	12.4	7.1

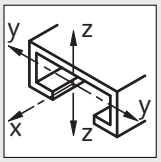
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

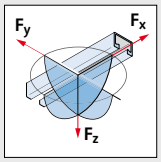
VUS 72/48
Washer
→ see page 56



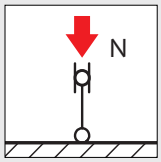
Further design properties



Cross section data
→ page 60

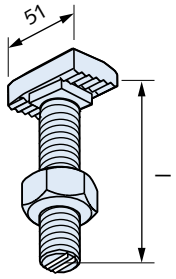


Point-load capacities
→ pages 66–67



Flexural buckling
→ page 70

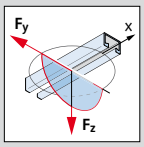
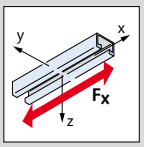
HALFEN Bolts HZS 64/44



HZS 64/44
HALFEN Bolt,
serrated
incl. nut

HZS 64/44 available bolts		
Length l [mm]	**M20**	**M24**
80	GVs 8.8 A4-70	GVs 8.8 A4-70
125	GVs 8.8 A4-70	–
150	–	GVs 8.8 A4-70

Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts  F [kN] ①		Max. load capacity per HALFEN Bolt in channel longitudinal direction  F_x [kN] ①		Recommended torque  T_{inst} [Nm]
64/44		**HZS**		**HZS**		**HZS**
		8.8	**A4-70**	**8.8**	**A4-70**	**8.8** / **A4-70**
M20	F_{Rd}	*79.0*	51.5	*37.8*	*37.8*	350 / 350
	allow. F	56.4	36.8	27.0	27.0	
M24	F_{Rd}	*113.7*	54.3	*37.8*	*37.8*	450 / 450
	allow. F	81.2	38.8	27.0	27.0	

① Note: do not exceed the max. channel load bearing capacity

In case of simultaneously loading in all directions (longitudinal -x, transverse -y, centrical tension -z) the resultant load must not exceed the load bearing capacity given in the table.

$$\sqrt{F_x^2 + F_y^2 + F_z^2} \leq \text{allow. F}$$

resp.

$$\sqrt{F_{x,Ed}^2 + F_{y,Ed}^2 + F_{z,Ed}^2} \leq F_{Rd}$$

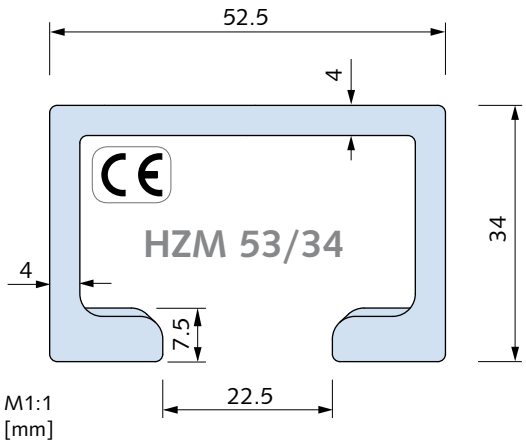
F_x, F_y, F_z = existing loads
allow. F = allowable load bearing capacity of the bolt

resp.

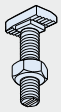
$F_{x,Ed}$, $F_{y,Ed}$, $F_{z,Ed}$ = design values of action
F_{Rd} = design value of resistance

Framing channel HZM 53/34

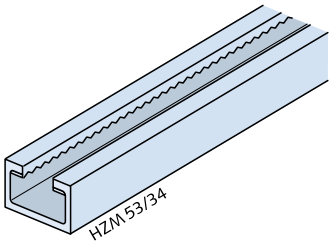
HZM 53/34 hot-rolled, serrated



M1:1
[mm]



Suitable HALFEN Bolts HZS 53/34
→ see page 29



Double channel on request
- profile data, see page 60

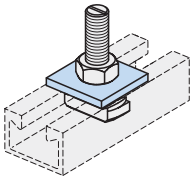
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elalstic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	≤ e_w			
HZM 53/34	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	070-00002	6070	4.63	5.88	9.19	23.18	4.95	8.83	$F_{z,Rd}$	20.0	F_{Rd}		
FV	070-00003								*43.3*		*17.3*	*8.6*	*3.8*
A4	070-00001								allow. F_z		allow. F		
									30.9		12.4	6.2	2.7

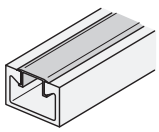
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

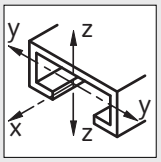
VUS 52/34
Washer
→ see page 56



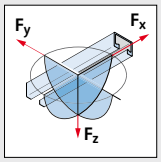
PA - 22
Channel cover
→ see page 58



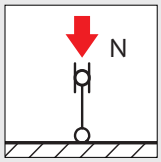
Further design properties



Cross section data
→ page 60

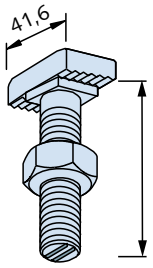


Point-load capacities
→ pages 66–67



Flexural buckling
→ page 70

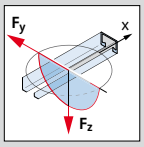
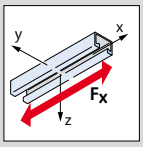
HALFEN Bolts HZS 53/34



HZS 53/34
HALFEN Bolt,
serrated
incl. nut

HZS 53/34 available bolts		
Length l [mm]	**M16**	**M20**
60	GVs 8.8 A4-70	-
65	-	GVs 8.8 A4-70
100	GVs 8.8 A4-70	GVs 8.8 A4-70

Load bearing capacities for HALFEN Bolts ①

	Load capacities for HALFEN Bolts 		Max. load capacity per bolt in channel longitudinal direction 		Recommended torque 	
Thread Ø	**F** [kN] ①		**F_x** [kN] ①		**T_{inst}** [Nm]	
53/34		**HZS**		**HZS**		**HZS**
		8.8	**A4-70**	**8.8**	**A4-70**	**8.8**	**A4-70**
M16	***F_{Rd}***	*50.5*	*33.0*	*30.8*	*26.6*	200	200
	allow. F	36.1	23.6	22.0	19.0		
M20	***F_{Rd}***	*79.0*	*51.5*	*30.8*	*26.6*	350	350
	allow. F	56.4	36.8	22.0	19.0		

① Note: do not exceed the max. channel load bearing capacity

In case of simultaneously loading in all directions (longitudinal -x, transverse -y, centrical tension -z) the resultant load must not exceed the load bearing capacity given in the table.

$$\sqrt{F_x^2 + F_y^2 + F_z^2} \leq \text{allow. F}$$

resp.

$$\sqrt{F_{x,Ed}^2 + F_{y,Ed}^2 + F_{z,Ed}^2} \leq F_{Rd}$$

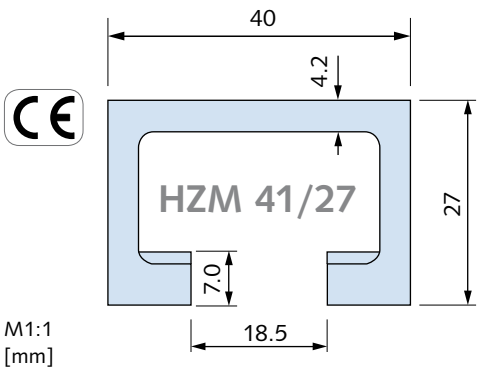
F_x, F_y, F_z = existing loads
allow. F = allowable load bearing capacity of the bolt

resp.

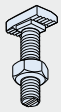
$F_{x,Ed}$, $F_{y,Ed}$, $F_{z,Ed}$ = design values of action
F_{Rd} = design value of resistance

Framing channel HZM 41/27

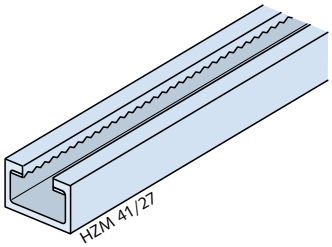
HZM 41/27 hot-rolled, serrated

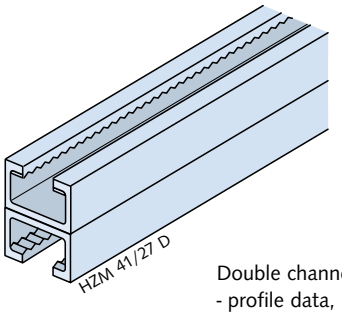


M1:1
[mm]



Suitable HALFEN Bolts HZS 38/23
→ see page 32





Double channel on request
- profile data, see page 60

Dimensions and cross-section properties

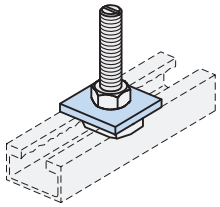
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZM 41/27	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	090-00002	6070	3.38	4.31	3.90	9.49	2.57	4.75	$F_{z,Rd}$	20.0	F_{Rd}		
									25.0		*9.5*	*3.7*	*1.6*
FV	090-00001								allow. F_z		allow. F		
									17.8		6.8	2.6	1.2

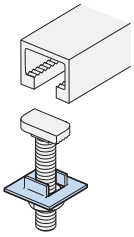
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

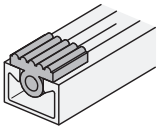
VUS 40/25
Washer
→ see page 56



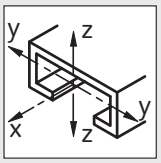
SIC 38/23
Locking washer
→ see page 56



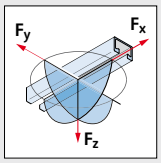
SDM - 36/6
Rubber vibration absorber
→ see catalogue MT-FFC



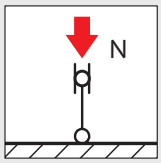
Further design properties



Cross section data
→ page 60



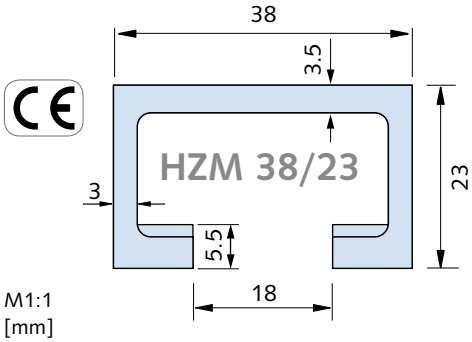
Point-load capacities
→ pages 66–67



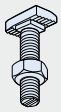
Flexural buckling
→ page 70

Framing channel HZM 38/23

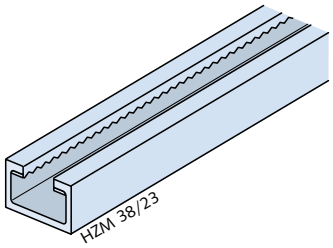
HZM 38/23 hot-rolled, serrated

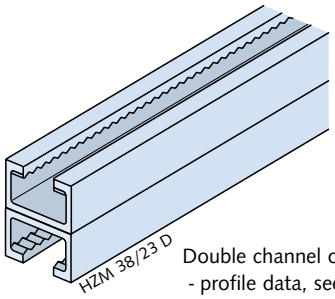


M1:1
[mm]



Suitable HALFEN Bolts HZS 38/23 and HS 38/17 → see page 32





Double channel on request
- profile data, see page 60

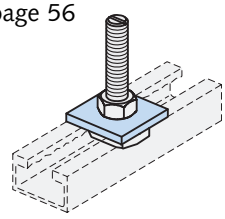
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZM 38/23	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	060-00001	6070	2.43	3.09	2.11	6.17	1.59	3.25	$F_{z,Rd}$		F_{Rd}		
FV	060-00003								*18.0*	20	*5.9*	*2.0*	*0.9*
A4	060-00002								allow. F_z		allow. F		
									12.8		4.2	1.4	0.6

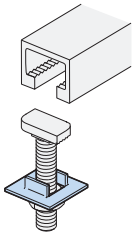
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

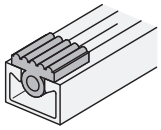
VUS 40/25
Washer
→ see page 56



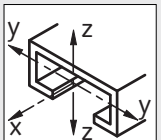
SIC 38/23
Locking washer
→ see page 56



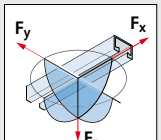
SDM - 36/6
Rubber vibration absorber
→ see catalogue MT-FFC



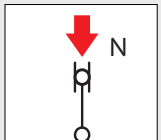
Further design properties



Cross section data
→ page 60

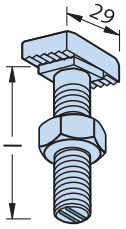


Point-load capacities
→ pages 66–67

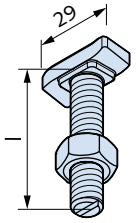


Flexural buckling
→ page 70

HALFEN Bolts HZS 38/23 and HS 38/17



HZS 38/23
HALFEN Bolt
serrated incl. nut



HS 38/17
HALFEN Bolt
incl. nut

Li = left-hand thread

High corrosion resistant steel HCR for HS 38/17 on request

HZS 38/23 available bolts

Length l [mm]	M12	M16	Length l [mm]	M12	M16
30	GVs 8.8	GVs 8.8	80	GVs 8.8	GVs 8.8 A4-70
40	GVs 8.8	GVs 8.8	100	GVs 8.8	GVs 8.8
50	GVs 8.8	GVs 8.8	125	GVs 8.8	GVs 8.8
60	GVs 8.8	GVs 8.8 FV 8.8 A4-70	150	GVs 8.8	GVs 8.8
			200	-	GVs 8.8
			300	-	GVs 8.8

HS 38/17 available bolts

Length l [mm]	M10	M12	M16	Length l [mm]	M10	M12	M16
20	GVs 4.6	GVs 4.6	GVs 4.6 ①	60	GVs 4.6 A4-70	GVs 4.6 GVs 8.8 A4-70	GVs 4.6 GVs 8.8 FV 8.8 A4-50
25	-	A4-70	A4-50 ①	70	-	FV 8.8	
30	GVs 4.6 FV 4.6 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-50 ① A4-50	80	GVs 4.6	GVs 4.6 A4-70	GVs 4.6 A4-50 A4-70 ①
40	GVs 4.6 A4-70	GVs 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-50 ① A4-50	80 Li	-		A4-50
50	GVs 4.6 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A4-50	100	GVs 4.6	GVs 4.6 A4-50	GVs 4.6 FV 4.6 A4-50
				125	-	GVs 4.6	GVs 4.6
				150	GVs 4.6	GVs 4.6 A4-50 ①	GVs 4.6 A4-50
				200		GVs 4.6 A4-50 ①	GVs 4.6 A4-50 ①

① on request

Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts F [kN] ①				Max. load capacity per bolt in channel longitudinal direction F_x [kN] ①	Recommended torque T_{inst} [Nm]		
38/23		HZS				HZS	HZS		
		8.8		A4-70		For all strength classes	8.8	A4-70	
M12	F_{Rd}	27.2		-		16.8	80	-	
	allow. F	19.4		-		12.0			
M16	F_{Rd}	50.5		33.0		16.8	120	120	
	allow. F	36.1		23.6		12.0			
38/17		HS				HS	HS		
		4.6	8.8	A2-50; A4-50	A2-70; A4-70	-	4.6	8.8	A2-50; A4-50	A2-70; A4-70
M10	F_{Rd}	8.3	18.6	7.3	15.6	HALFEN Bolts HS are not suited for longitudinal loads!	15	40	15	30
	allow. F	5.9	13.3	5.2	11.2					
M12	F_{Rd}	12.1	27.0	10.6	22.7		25	70	25	50
	allow. F	8.6	19.3	7.6	16.2					
M16	F_{Rd}	22.6	50.2	19.8	42.2		65	180	60	130
	allow. F	16.1	35.9	14.1	30.2					

① Note: do not exceed the max. channel load bearing capacity

In case of simultaneously loading in all directions (longitudinal -x, transverse -y, centrical tension -z) the resultant load must not exceed the load bearing capacity given in the table.

$$\sqrt{F_x^2 + F_y^2 + F_z^2} \leq \text{allow. F}$$

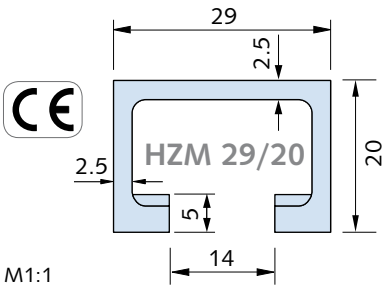
resp.

$$\sqrt{F_{x,Ed}^2 + F_{y,Ed}^2 + F_{z,Ed}^2} \leq F_{Rd}$$

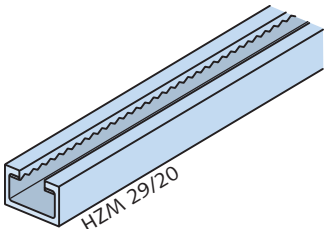
F_x, F_y, F_z = existing loads
allow. F = allowable load bearing capacity of the bolt
resp.
$F_{x,Ed}$, $F_{y,Ed}$, $F_{z,Ed}$ = design values of action
F_{Rd} = design value of resistance

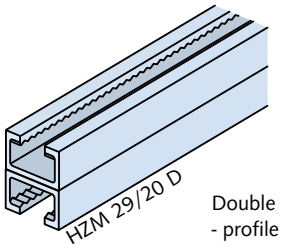
Framing channel HZM 29/20

HZM 29/20 hot-rolled, serrated

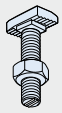


M1:1
[mm]





Double channel on request
- profile data, see page 60



Suitable HALFEN Bolt HZS 29/20 and HS 28/15 → see page 34

Dimensions and cross-section properties

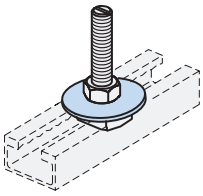
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZM 29/20	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	050-00001	6070	1.55	1.98	1.02	2.42	0.91	1.67	$F_{z,Rd}$	15.0	F_{Rd}		
									11.2		*3.3*	*1.0*	*0.4*
FV	050-00003								allow. F_z		allow. F		
									8.0		2.4	0.7	0.3

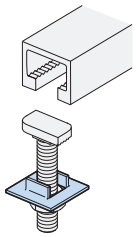
① F_z = max. load bearing capacity of the channel lips - see also page 66

Accessories

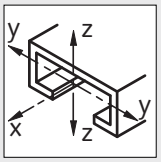
US DIN 9021
Washer
→ see page 56



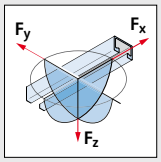
SIC 29/20
Locking washer
→ see page 56



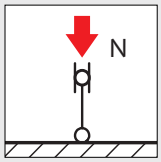
Further design properties



Cross section data
page 60

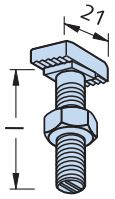


Point-load capacities
pages 66–67

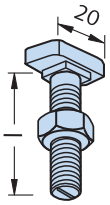


Flexural buckling
page 70

HALFEN Bolts HZS 29/20 and HS 28/15



HZS 29/20
HALFEN Bolt serrated incl. nut



HS 28/15
HALFEN Bolt incl. nut

High corrosion resistant stainless steel HCR for HS 28/15 on request

HZS 29/20 available bolts

Length l [mm]	M12	Length l [mm]	M12
30	GVs 8.8	125	GVs 8.8
40	GVs 8.8	150	GVs 8.8
50	GVs 8.8	200	GVs 8.8
60	GVs 8.8	250	GVs 8.8
80	GVs 8.8	300	GVs 8.8
100	GVs 8.8		

HS 28/15 available bolts

Length l [mm]	M6	M8	M10	M12	Length l [mm]	M6	M8	M10	M12
15	GVs 4.6	GVs 4.6	GVs 4.6		50		GVs 4.6	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6
20	GVs 4.6	GVs 4.6 GVs 8.8 A2-70	GVs 4.6 A2-70 A4-70		60		GVs 4.6	GVs 4.6 GVs 8.8 A4-70	
25	GVs 4.6	GVs 4.6 A2-70	GVs 4.6 A2-70 A4-70		80		GVs 4.6	GVs 4.6 A4-70	GVs 4.6
30	GVs 4.6	GVs 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6	100		GVs 4.6	GVs 4.6 A4-50	
35				GVs 4.6	125			GVs 4.6 A4-50	
40	GVs 4.6	GVs 4.6	GVs 4.6 FV 8.8 A2-70 A4-70		150		GVs4.6①	GVs 4.6 A4-50	
					200			GVs 4.6 A4-50	

① on request

Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts F [kN] ①	Max. load capacity per bolt in channel longitudinal direction F_x [kN] ①	Recommended torque T_{inst} [Nm]
29/20		HZS 8.8	HZS 8.8	HZS 8.8
M12	F_{Rd}	27.2	11.2	80
	allow. F	19.4	8.0	

28/15		HS 4.6	HS 8.8	HS A2/A4-50	HS A2/A4-70	HS -	HS 4.6	HS 8.8	HS A2/A4-50	HS A2/A4-70
M6	F_{Rd}	2.9	-	-	-	HALFEN Bolts HS are not suited for longitudinal loads!	3	-	3	-
	allow. F	2.1	-	-	-					
M8	F_{Rd}	5.3	11.7	-			8	20	8	15
	allow. F	3,8	8.3	-	5.5					
M10	F_{Rd}	8.3	18.6	7.3	15.6		15	40	15	30
	allow. F	5,9	13.3	5.2	11.2					
M12	F_{Rd}	12.1	-	-	-		25	70	25	50
	allow. F	8,6	-	-	-					

① Note: do not exceed the max. channel load bearing capacity

In case of simultaneously loading in all directions (longitudinal -x, transverse -y, centrical tension -z) the resultant load must not exceed the load bearing capacity given in the table.

$$\sqrt{F_x^2 + F_y^2 + F_z^2} \leq \text{allow. F}$$

resp.

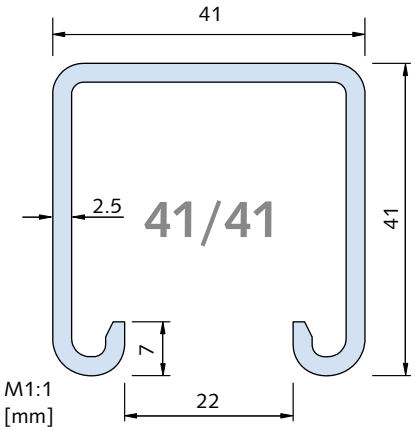
$$\sqrt{F_{x,Ed}^2 + F_{y,Ed}^2 + F_{z,Ed}^2} \leq F_{Rd}$$

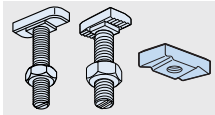
F_x, F_y, F_z = existing loads
allow. F = allowable load bearing capacity of the bolt

resp.
$F_{x,Ed}$, $F_{y,Ed}$, $F_{z,Ed}$ = design values of action
F_{Rd} = design value of resistance

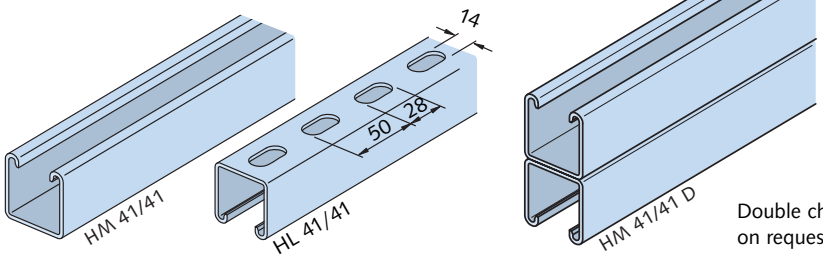
Framing channels HM 41/41 and HL 41/41

HM 41/41 resp. HL 41/41 cold-rolled





Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



Double channel on request

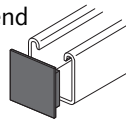
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	≤ e_w	F [kN]		
HM 41/41	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	080-00001	6000	2.67	3.4	7.47	9.44	3.24	4.57	$F_{z,Rd}$	49.0	F_{Rd}		
SV	080-00002								*7.8*		*7.8*	*3.9*	*2.6*
FV	080-00003								allow. F_z		allow. F		
A4	080-00004								5.6		5.6	2.8	1.9
HL 41/41	0281.										0.5 m	1.0 m	1.5 m
WB	010-00001	6000	2.46	2.98	6.07	9.16	2.84	4.43	$F_{z,Rd}$	42.0	F_{Rd}		
SV	010-00003								*7.8*		*6.6*	*3.2*	*2.2*
FV	010-00002								allow. F_z		allow. F		
A4	010-00004								5.6		4.7	2.3	1.6
HM 41/41 D	0280.										1.0 m	1.5 m	2.0 m
WB	150-00001	6000	5.34	6.81	37.60	18.88	9.10	9.14	$F_{z,Rd}$	132.0	F_{Rd}		
FV	150-00003								*7.8*		*10.6*	*7.1*	*5.3*
A4	150-00002								allow. F_z		allow. F		
									5.6		7.6	5.1	3.8

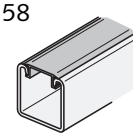
① F_z = max. load bearing capacity of the channel lips

Accessories

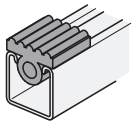
HPE 41/41 Channel end cap → see page 58



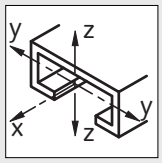
PA - 41 Channel cover → see page 58



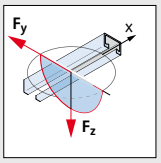
SDM - 41/8
Rubber vibration absorber → see catalogue MT-FFC



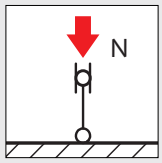
Further design properties



Cross section data pages 62, 64



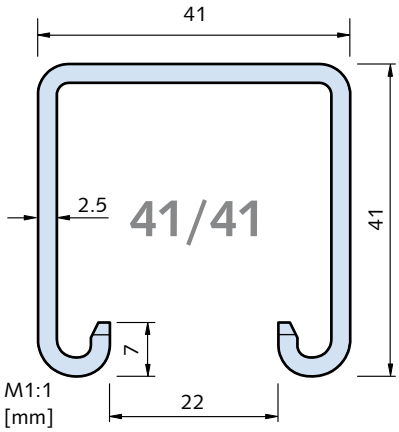
Point-load capacities page 68

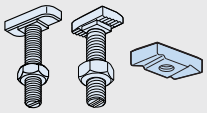


Flexural buckling page 71

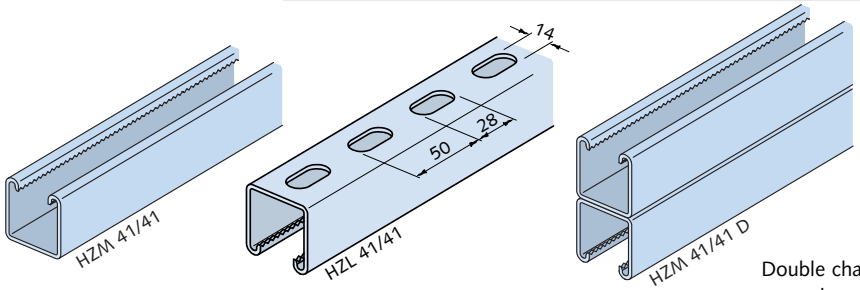
Framing channel HZM 41/41 and HZL 41/41

HZM resp. HZL 41/41 cold-rolled, serrated





Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



Double channel on request

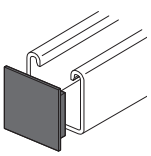
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
									F_z ①	≤ e_w	F [kN]		
HZM 41/41	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	010-00001	6000	2.63	3.35	7.34	9.37	3.15	4.54	$F_{z,Rd}$	47.0		F_{Rd}	
FV	010-00002								7.8		7.7	3.8	2.6
A4	010-00003								allow. F_z			allow. F	
									5.6		5.5	2.7	1.8
HZL 41/41	0283.										0.5 m	1.0 m	1.5 m
WB	010-00001	6000	2.46	2.90	5.87	9.04	2.69	4.38	$F_{z,Rd}$	41.0		F_{Rd}	
FV	010-00002								7.8		6.3	3.2	2.1
A4	010-00003								allow. F_z			allow. F	
									5.6		4.5	2.3	1.5
HZM 41/41 D	0284.										1.0 m	1.5 m	2.0 m
WB	030-00001	6000	5.27	6.7	36.45	18.73	8.83	9.07	$F_{z,Rd}$	126.0		F_{Rd}	
FV	030-00002								7.8		10.3	6.9	5.2
A4	030-00003								allow. F_z			allow. F	
									5.6		7.4	4.9	3.7

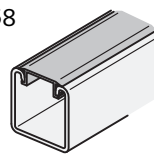
① F_z = max. load bearing capacity of the channel lips

Accessories

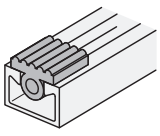
HPE 41/41
Channel end cap
→ see page 58



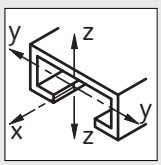
PA - 41 Channel cover
→ see page 58



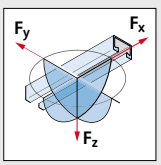
SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC



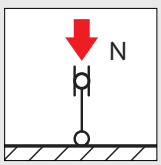
Further design properties



Cross section data
pages 62, 64



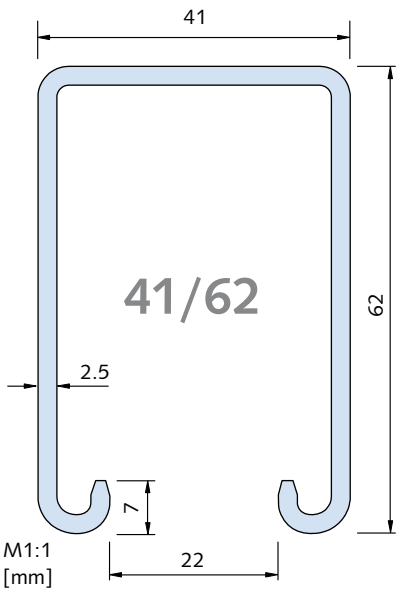
Point-load capacities
page 68

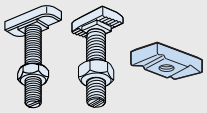


Flexural buckling
page 71

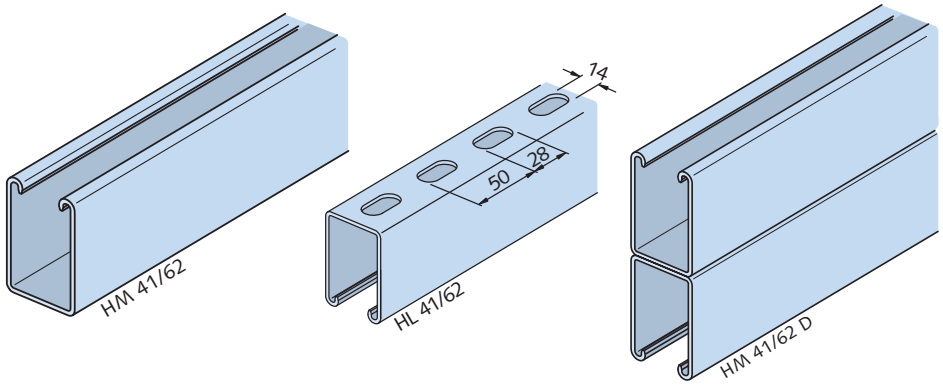
Framing channel HM 41/62 and HL 41/62

HM resp. HL 41/62 cold-rolled





Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



Double channel on request

Note on span L: take constructive measures to prevent failure caused by bulging, tilting and buckling

Dimensions and cross-section properties									Load capacities				
		Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
Material	Order no.		G	A	I_y	I_z	W_y	W	F_z ①	≤ e_w			
HM 41/62	0280.	[mm]	[kg/m]	[cm²]	[cm⁴]	[cm⁴]	[cm³]	[cm³]	[kN]	[cm]	1.0 m	2.0 m	3.0 m
WB	140-00002	6000	3.48	4.44	20.96	13.34	6.21	6.46	$F_{z,Rd}$	92.0	F_{Rd}		
									7.8		*7.4*	*3.7*	*2.2*
FV	140-00003								allow. F_z		allow. F		
									5.6		5.3	2.6	1.6
HL 41/62	0281.										1.0 m	2.0 m	3.0 m
WB	040-00001	6000	3.14	3.99	17.27	13.03	5.47	6.31	$F_{z,Rd}$	81.0	F_{Rd}		
SV	040-00003								*7.8*		*6.3*	*3.1*	*1.8*
FV	040-00002								allow. F_z		allow. F		
									5.6		4.5	2.2	1.3
HM 41/62 D	0280.										1.0 m	1.5 m	2.0 m
WB	170-00001	6000	6.97	8.88	112.88	26.68	18.21	12.92	$F_{z,Rd}$	269.0	F_{Rd}		
									7.8		*21.4*	*14.3*	*10.7*
FV	170-00002								allow. F_z		allow. F		
									5.6		15.3	10.2	7.7

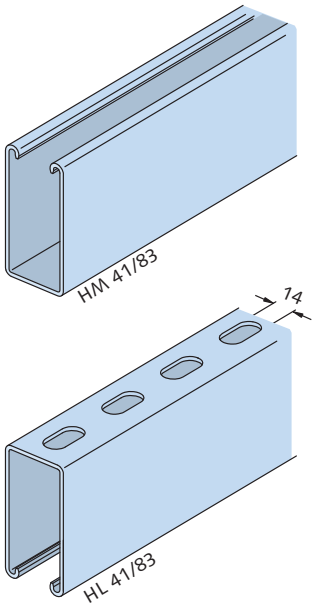
① F_z = max. load bearing capacity of the channel lips

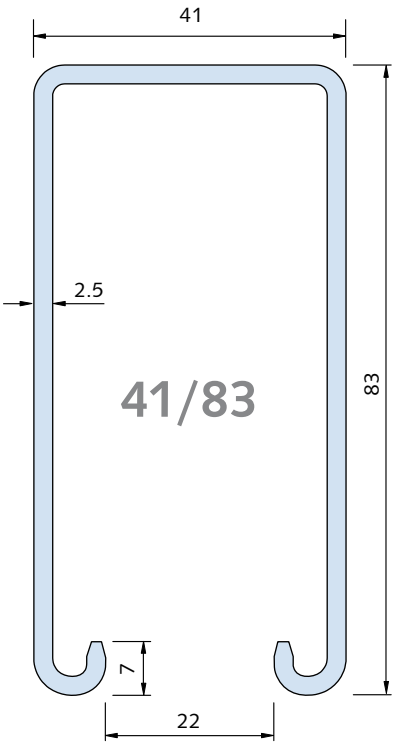
Accessories: PA - 41 Channel cover, see page 58; **SDM - 41/8** Rubber vibration absorber, see Technical Product Information: "HALFEN Flexible Framing Connections" MT-FFC.

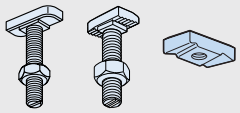
Further design properties: Cross section data → pages 62, 64

Framing channel HM 41/83 and HL 41/83

HM 41/83 resp. HL 41/83 cold-rolled

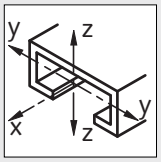






Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44

Further design properties



Cross section data pages 62, 64

Note on span L: take constructive measures to prevent failure caused by bulging, tilting and buckling

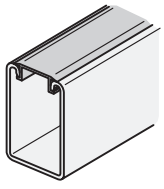
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HM 41/83	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	1.0 m	2.0 m	3.0 m
WB	130-00002	6000	4.29	5.47	43.82	17.22	9.91	8.34	$F_{z,Rd}$	148.0	F_{Rd}		
SV	130-00001								*7.8*		*11.7*	*5.9*	*3.9*
FV	130-00003								allow. F_z		allow. F		
									5.6		8.4	4.2	2.8
HL 41/83	0281.										1.0 m	2.0 m	3.0 m
WB	030-00004	6000	3.93	5.02	37.07	16.93	8.85	8.20	$F_{z,Rd}$	133.0	F_{Rd}		
SV	030-00006								*7.8*		*10.2*	*5.2*	*3.4*
FV	030-00005								allow. F_z		allow. F		
									5.6		7.3	3.7	2.4

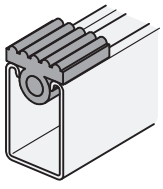
① F_z = max. load bearing capacity of the channel lips

Accessories

PA - 41
Channel cover
→ see page 58

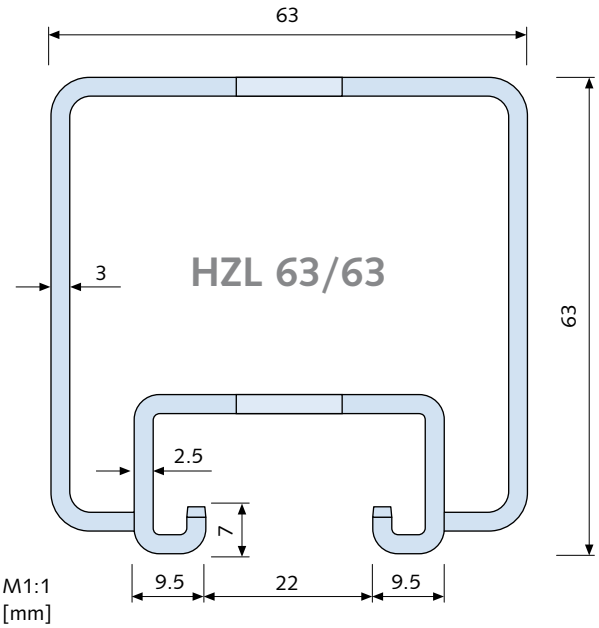


SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC



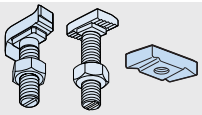
Framing channel HZL 63/63

HZL 63/63 cold-rolled, serrated

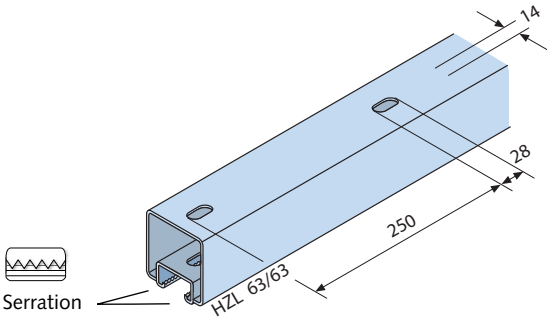


M1:1
[mm]

Standard profile for HALFEN Powerclick System 63. More information on the HALFEN Framing System "Powerclick" can be found in Technical Product Information "HALFEN Powerclick PC63".



Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



Serration

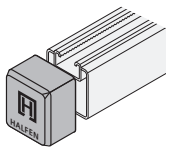
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZL 63/63	0283.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
FV	030-00001	3000	6.35	7.09	33.07	42.95	10.06	13.63	$F_{z,Rd}$ 7.8	134.0	F_{Rd} 23.1	11.5	7.7
FV	030-00003	6000							allow. F_z 5.6		allow. F 16.5	8.2	5.5

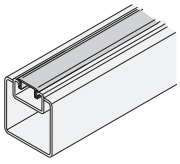
① F_z = max. load bearing capacity of the channel lips

Accessories

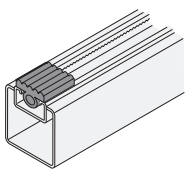
HPE 63/63
Channel end cap
→ see page 58



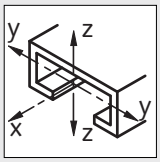
PA - 41
Channel cover
→ see page 58



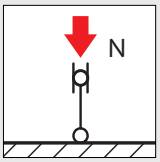
SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC



Further design properties



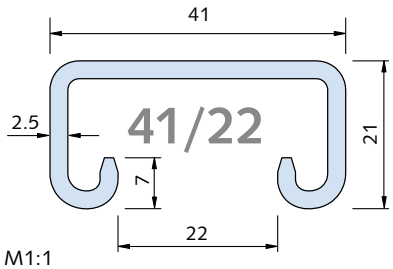
Cross section data
page 64



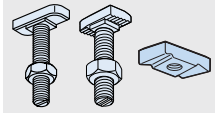
Flexural buckling
page 71

Framing channel HM 41/22 and HL 41/22

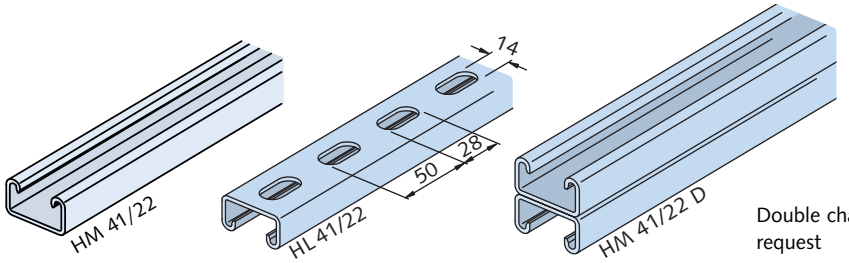
HM 41/22 resp. HL 41/22 cold-rolled



M1:1
[mm]



Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



Double channel on request

Dimensions and cross-section properties

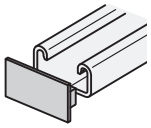
Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HM 41/22	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	120-00001	6000	1.86	2.37	1.28	5.56	1.05	2.69	$F_{z,Rd}$	15.0	F_{Rd}		
SV	120-00002								7.8		2.7	1.2	0.5
FV	120-00003								allow. F_z		allow. F		
A4	120-00004								5.6		1.9	0.9	0.4
HL 41/22	0281.										0.5 m	1.0 m	1.5 m
WB	020-00001	6000	1.57	1.95	0.99	5.27	0.89	2.55	$F_{z,Rd}$	12.0	F_{Rd}		
SV	020-00003								7.8		2.2	1.0	0.4
FV	020-00002								allow. F_z		allow. F		
A4	020-00004								5.6		1.6	0.7	0.3
HM 41/22 D	0280.										1.0 m	1.5 m	2.0 m
WB	160-00001	6000	3.73	4.75	6.02	11.11	2.91	5.38	$F_{z,Rd}$	42.0	F_{Rd}		
FV	160-00002								7.8		3.5	2.3	1.4
A4	160-00003								allow. F_z		allow. F		
									5.6		2.5	1.7	1.0

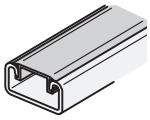
① F_z = max. load bearing capacity of the channel lips

Accessories

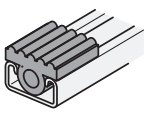
HPE 41/22
Channel end cap
→ see page 58



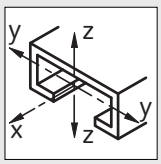
PA - 41
Channel cover
→ see page 58



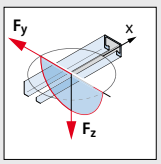
SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC



Further design properties



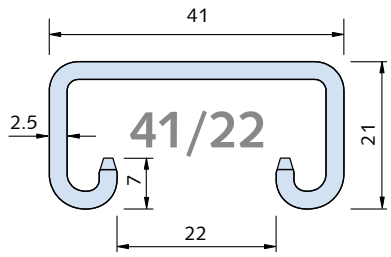
Cross section data
→ pages 62, 64



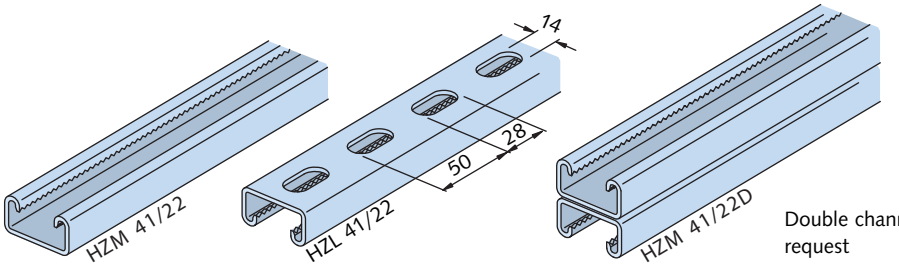
Point-load capacities
→ page 68

Framing channel HZM 41/22 and HZL 41/22

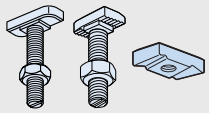
HZM resp. HZL 41/22 cold-rolled, serrated



M1:1
[mm]



Double channel on request



Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44

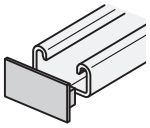
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
HZM 41/22	0284.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	020-00001	6070	1.83	2.33	1.26	5.48	1.03	2.66	$F_{z,Rd}$	14.0	F_{Rd}		
FV	020-00002								*7.8*		*2.7*	*1.2*	*0.5*
A4	020-00003								allow. F_z		allow. F		
									5.6		1.9	0.8	0.4
HZL 41/22											**0.5 m**	**1.0 m**	**1.5 m**
WB	020-00001	6000	1.57	1.87	0.97	5.15	0.86	2.49	$F_{z,Rd}$	12.0	F_{Rd}		
FV	020-00002								*7.8*		*2.1*	*0.8*	*0.4*
A4	020-00003								allow. F_z		allow. F		
									5.6		1.5	0.6	0.3
HZM 41/22 D											**1.0 m**	**1.5 m**	**2.0 m**
WB	040-00001	6070	3.58	4.65	5.83	10.97	2.82	5.31	$F_{z,Rd}$	42.0	F_{Rd}		
FV	040-00002								*7.8*		*3.4*	*2.2*	*1.4*
A4	040-00003								allow. F_z		allow. F		
									5.6		2.4	1.6	1.0

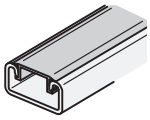
① F_z = max. load bearing capacity of the channel lips

Accessories

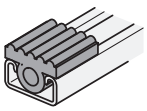
HPE 41/22
Channel end cap
→ see page 58



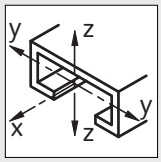
PA - 41
Channel cover
→ see page 58



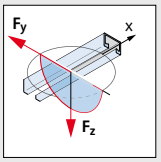
SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC



Further design properties



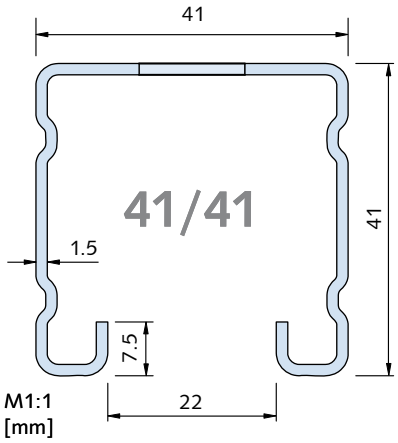
Cross section data
pages 62, 64



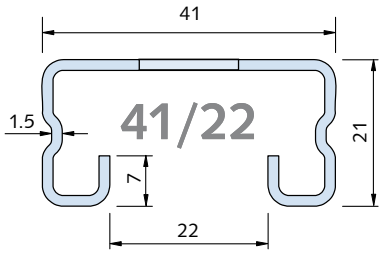
Point-load capacities
page 68

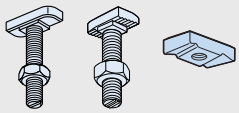
Framing channel HLL 41/41 and HLL 41/22

HLL 41/41 cold-rolled

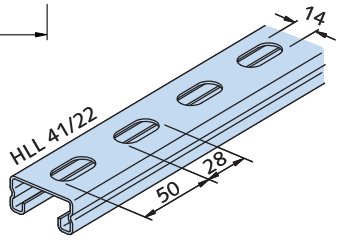


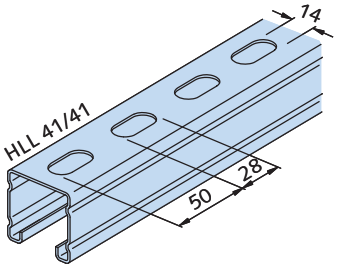
HLL 41/22 cold-rolled





Suitable HALFEN Bolts HS 41/41, HZS 41/41, HZS 41/22 and locking plates → see pages 43–44



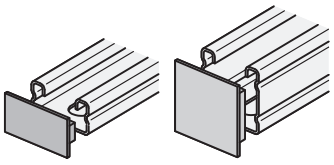


Dimensions and cross-section properties									Load capacities				
		Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
Material	Order no.		G	A	I_y	I_z	W_y	W_z	F_z ①	≤ e_w			
HLL 41/41	0282.	[mm]	[kg/m]	[cm²]	[cm⁴]	[cm⁴]	[cm³]	[cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
SV	010-00002	6000	1.61	1.92	4.24	6.10	2.04	2.95	$F_{z,Rd}$	91.0	F_{Rd}		
									2.5		4.5	2.2	1.4
									allow. F_z		allow. F		
									1.8		3.2	1.6	1.0
HLL 41/22	0282.												
SV	020-00003	6000	1.14	1.33	0.75	3.67	0.71	1.78	$F_{z,Rd}$	31.0	F_{Rd}		
									2.5		1.54	0.56	0.28
									allow. F_z		allow. F		
									1.8		1.1	0.4	0.2

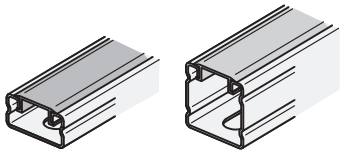
① F_z = max. load bearing capacity of the channel lips

Accessories

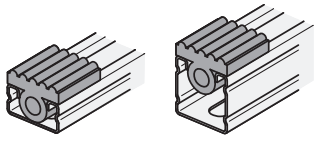
HPE 41/41 resp. **HPE 41/22**
Channel end cap
→ see page 58



PA - 41 Channel cover
→ see page 58

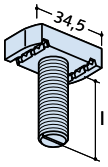


SDM - 41/8
Rubber vibration absorber
→ see catalogue MT-FFC

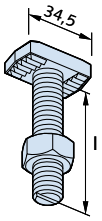


HALFEN Bolts HZS 41/41, HZS 41/22 and HS 41/41

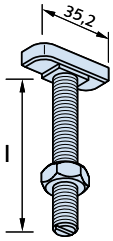
HALFEN Bolts for all 41/... channels:



HZS 41/41
HALFEN Bolt
serrated,
order nut separately



HZS 41/22
HALFEN Bolt serrated,
incl. nut
for serrated channels 41/41, 41/22 and 63/63



HS 41/41
HALFEN Bolt
incl. nut

HZS 41/41 available bolts

Length l [mm]	M6	M8	M10	M12	M16 ①②
30	ZL	ZL	ZL	ZL	-
50	-	ZL	ZL	ZL	-
63	-	-	-	-	ZL
75	-	-	ZL	ZL	-
100	-	-	-	ZL FV4.6	-
102	-	-	-	-	ZL

① Diameter M16 is not compatible with profile 41/22
② Diameter M16 can only be inserted into the slot from channel end
ZL = zinc flake coating

HZS 41/22 available bolts

Length l [mm]	M12	M16
35	FV 8.8 A4-50	A4-50 -
50	FV 8.8 A4-50	FV 8.8 A4-50
80	A4-50	-
100	-	FV 8.8

HS 41/41 available bolts

Length l [mm]	M10	M12
35	FV 4.6 A4-70	FV 4.6 A4-70
50	-	FV 4.6

Torques for HALFEN Bolts ①

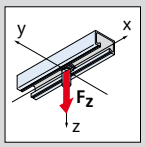
41/...

Recommended torques T_{inst} [Nm]

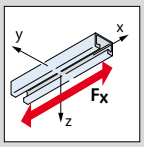
Thread Ø	HZS 41/41 steel	HZS 41/22 8.8	HZS 41/22 A4-50	HS 41/41 4.6	HS 41/41 A4-70
M6	12	-	-	-	-
M8	28	-	-	-	-
M10	55	-	-	15	15
M12	60 (55)	50	50	25	25
M16	125 (95)	80	80	-	-

( ) values for HLL profiles in brackets

Load capacities for 41/... HALFEN Bolts



Load bearing capacities per bolt for centric tension for **all 41/... and 63/... profiles**
F_z [kN]
– Do not exceed the channel load bearing capacity –



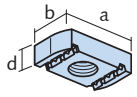
Recommended load capacity per HALFEN Bolt in channel longitudinal direction
F_x [kN]

41/... Thread Ø		For profiles HZM/HZL 41/22, 41/41, 63/63					For profiles HM/HL 41/22, 41/41, 41/62, 41/83					For profiles HLL 41/22, 41/41
		HZS 41/41	HZS 41/22	HZS 41/22	HS 41/41	HS 41/41	HZS 41/41③	HZS 41/22	HZS 41/22	HZS 41/41	HZS 41/22	HZS 41/41
		steel	8.8	A4-50	4.6	A4-70	steel	8.8	A4-50	steel	A4-50	steel
M6	F_{Rd}	*7.0*	-	-	-	-	*3.1*	-	-	*1.4*	-	*1.4*
	allow. F	5.0	-	-	-	-	2.2	-	-	1.0	-	1.0
M8	F_{Rd}	*8.4*	-	-	-	-	*5.6*	-	-	*3.4*	-	*3.4*
	allow. F	6.0	-	-	-	-	4.0	-	-	2.4	-	2.4
M10	F_{Rd}	*9.8*	-	-	*9.0*	*9.0*	*7.0*	-	-	*4.9*	-	*4.9*
	allow. F	7.0	-	-	6.4	6.4	5.0	-	-	3.5	-	3.5
M12	F_{Rd}	*9.8*	*9.8*	*9.8*	*11.2*	*13.0*	*7.0*	*7.0*	*7.0*	*5.6*	*2.4*	*5.0*
	allow. F	7.0	7.0	7.0	8.0	9.3	5.0	5.0	5.0	4.0	1.7	3.6
M16	F_{Rd}	*16.8* ①②	*16.8*	*16.8*	-	-	*5.6* ①②	*7.0*	*7.0*	*5.6* ①②	*5.6*	*5.6* ①②
	allow. F	12.0 ①②	12.0	12.0	-	-	4.0 ①②	5.0	5.0	4.0 ①②	4.0	4.0 ①②

① Diameter M16 is not compatible with profile 41/22
② Diameter M16 can only be inserted into the slot from channel end
③ HZS 41/41 M16 × 102 without serration

Locking plates GWP 41/41 - SN, - SH, GWP 41/22

GWP 41/41
Locking plate for **all 41/... channels** and **profile 63/63**

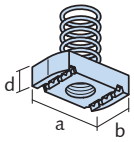


GWP 41/41 available plates

FV	GV	A4	d [mm]	b [mm]	a [mm]
-	M6	M6	6	20	34.5
M8	M8	M8	8/6		
M10	M10	M10	9		
FM12	FM12	FM12			
M12	M12	-	12		
M16	-	M16		30	

F = flat shape, fits to all flat 41/.. and 63/.. profiles

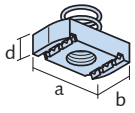
GWP 41/41 SH
Locking plate with long spring for **channel 41/41**



GWP 41/41 SH available plates

GV	d [mm]	b [mm]	a [mm]
M6	6	20	34,5
M8	8		
M10	9		
M12	12		

GWP 41/41 SN
Locking plate with short spring for **channels 41/22** and **63/63**

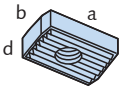


GWP 41/41 SN available plates

GV	d [mm]	b [mm]	a [mm]
M6	6	20	34,5
M8	8		
M10	9		
F M12			

F = flat shape, fits to all 41/.. and 63/.. profiles

GWP 41/22
Locking plate for **serrated channel 41/22 and 41/41**



GWP 41/22 available plates

GV	A4	d [mm]	b [mm]	a [mm]
M6	-	7.5	20	34.5
M8	M8			
M10	M10			
M12	M12			
M16	M16			

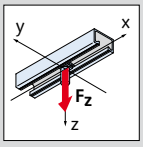
Torques for 41/... locking plates

41/...

Thread Ø	Recommended torques T_{inst} [Nm] GWP 41/41 steel	GWP 41/41 A4	GWP 41/22 steel	GWP 41/22 A4
M6	12	6.5	12	6.5
M8	28	16.0	28	16.0
M10	55	31.5	55	31.5
M12	75 (55)	-	50	50
FM12	60 (55)	55	-	-
M16	125 (95)	125	80	80

( ) values for HLL profiles in brackets

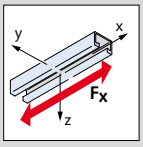
Load capacities for 41/... locking plates



Load bearing capacities for centric tension for **all 41/... and 63/... profiles**

F_z [kN]

– Do not exceed the channel load bearing capacity –



Recommended load capacity for locking plates in channel longitudinal direction

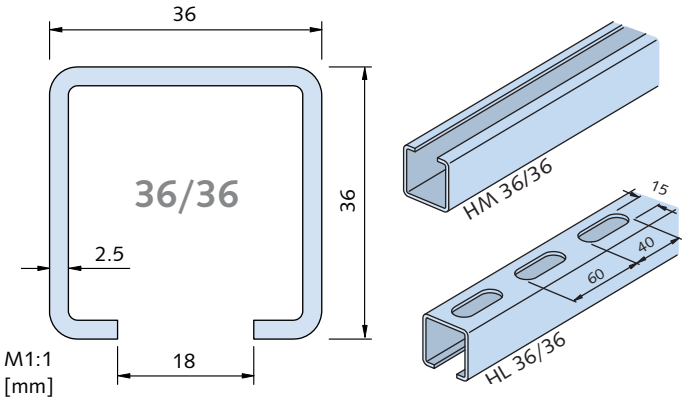
F_x [kN]

Thread Ø		For profiles HZM/HZL 41/22, 41/41, HZL 63/63								For profiles HM/HL 41/22, 41/41, 41/62, 41/83	For profiles HLL 41/22, 41/41
41/...		GWP 41/41 steel	GWP 41/41 A4	GWP 41/22 steel	GWP 41/22 A4	GWP 41/41 steel	GWP 41/41 A4	GWP 41/22 steel	GWP 41/22 A4	GWP 41/41 steel	GWP 41/41 steel
M6	F_{Rd}	*7.0*	*7.0*	*7.0*	*7.0*	*3.1*	*3.1*	*3.1*	-	*1.4*	*1.4*
	allow. F	5.0	5.0	5.0	5.0	2.2	2.2	2.2	-	1.0	1.0
M8	F_{Rd}	*8.4*	*8.4*	*8.4*	*8.4*	*5.6*	*5.6*	*5.6*	*5.6*	*3.4*	*3.4*
	allow. F	6.0	6.0	6.0	6.0	4.0	4.0	4.0	4.0	2.4	2.4
M10	F_{Rd}	*9.8*	*9.8*	*9.8*	*9.8*	*7.0*	*7.0*	*7.0*	*7.0*	*4.9*	*4.9*
	allow. F	7.0	7.0	7.0	7.0	5.0	5.0	5.0	5.0	3.5	3.5
M12	F_{Rd}	*12.6* ①	-	*9.8*	*9.8*	*7.0* ①	-	*7.0*	*7.0*	*7.0*	*5.0*
	allow. F	9.0 ①	-	7.0	7.0	5.0 ①	-	5.0	5.0	5.0	3.6
FM12	F_{Rd}	*9.8*	*9.8*	-	-	*7.0*	*7.0*	-	-	*5.6*	*5.0*
	allow. F	7.0	7.0	-	-	5.0	5.0	-	-	4.0	3.6
M16 ①②	F_{Rd}	*16.8* ①②	*9.8* ①②	*9.8*	*9.8*	*10.5* ①②	*7.0* ①②	*10.5*	*7.0*	*10.5* ①②	*6.3* ①②
	allow. F	12.0 ①②	7.0 ①②	7.0	7.0	7.5 ①②	5.0 ①②	7.5	5.0	7.5 ①②	4.5 ①②

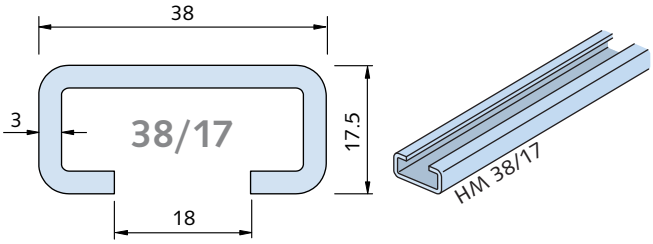
F = flat shape, fits to all standard 41/.. and 63/.. profiles
① Not compatible with profiles 41/22 and 63/63
② Diameter M16 can only be inserted into the slot from channel end

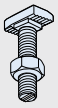
Framing channel HM 36/36, HL 36/36 and HM 38/17

HM 36/36 resp. HL 36/36 cold-rolled



HM 38/17 cold-rolled





Suitable HALFEN Bolts
HS 38/17 → see page 46

Dimensions and cross-section properties

Load capacities

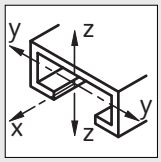
Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Dending load capacity at span L		
									F_z ①	≤ e_w	F [kN]		
HM 36/36	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	070-00001	6000	2.2	2.80	4.54	5.89	2.19	3.27	$F_{z,Rd}$	44	F_{Rd}		
FV	070-00002								6.2		5.5	2.7	1.8
A4	070-00003								allow. F_z		allow. F		
									4.4		3.9	1.9	1.3
HL 36/36	0281.												
WB	050-00001	6000	2.0	2.42	3.65	5.78	1.97	3.21	$F_{z,Rd}$	36	F_{Rd}		
FV	050-00002								6.2		4.5	2.2	1.5
A4	050-00003								allow. F_z		allow. F		
									4.4		3.2	1.6	1.1
HM 38/17	0290.												
WB	020-00001	6070	1.78	2.27	0.84	4.13	0.80	2.20	$F_{z,Rd}$	11	F_{Rd}		
FV	020-00002								6.7		2.10	0.84	0.42
A2 ②	020-00003								allow. F_z		allow. F		
A4	020-00004								4.8		1.5	0.6	0.3

① F_z = max. load bearing capacity of the channel lips
② Stainless steel A2 on request; Note: high corrosion resistant stainless steel HCR for HM 38/17 on request

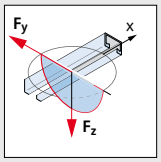
Accessories

PA 18 H Channel cover → see page 58
HPE 36/36 Channel end cap for HM and HL 36/36 → see page 58
SIC 38/17 Locking washer → see page 56
SDM - 36/6 Rubber vibration absorber → see catalogue MT-FFC

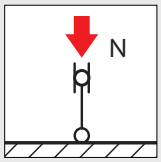
Further design properties



Cross section data pages 62, 64

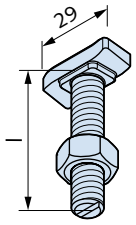


Point-load capacities page 68



Flexural buckling page 71

HALFEN Bolts HS 38/17



HS 38/17

HALFEN Bolt
incl. nut

Li = left-hand thread

High corrosion resistant stainless steel
HCR on request

HS 38/17 available bolts

Length l [mm]	M10	M12	M16	Length l [mm]	M10	M12	M16
20	GVs 4.6	GVs 4.6	GVs 4.6 ①	60	GVs 4.6 A4-70	GVs 4.6 GVs 8.8 A4-70	GVs 4.6 GVs 8.8 FV 8.8 A4-50
25		A4-70	A4-50 ①				
30	GVs 4.6 FV 4.6 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-50 ① A4-50	70		FV 8.8	
40	GVs 4.6 A4-70	GVs 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-50 ① A4-50	80	GVs 4.6	GVs 4.6 A4-70	GVs 4.6 A4-50 A4-70 ①
				80 Li			A4-50
50	GVs 4.6 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A4-50 A4-70	100	GVs 4.6	GVs 4.6 A4-50	GVs 4.6 FV 4.6 A4-50
				125		GVs 4.6	GVs 4.6
				150	GVs 4.6	GVs 4.6 A4-50 ①	GVs 4.6 A4-50
				200		GVs 4.6 A4-50 ①	GVs 4.6 A4-50 ①

① on request

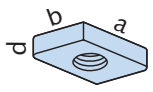
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts F [kN]				Recommended load bearing capacities per HALFEN Bolt in channel longitudinal direction F_x [kN] ②			Recommended torques T_{inst} [Nm]			
38/17		HS				HS			HS			
		4.6	8.8	A2-50 A4-50	A2-70 A4-70	4.6	8.8	A2-50; A4-50 A2-70; A4-70	4.6	8.8	A2-50 A4-50	A2-70 A4-70
M10	F_{Rd}	*8.3*	*18.6*	*7.3*	*15.6*	*0.42*	*1.54*	*0.42*	15	40	15	30
	allow. F	5.9	13.3	5.2	11.2	0.3	1.1	0.3				
M12	F_{Rd}	*12.1*	*27.0*	*10.6*	*22.7*	*0.7*	*2.2*	*0.7*	25	70	25	50
	allow. F	8.6	19.3	7.6	16.2	0.5	1.6	0.5				
M16	F_{Rd}	*22.6*	*50.2*	*19.8*	*42.2*	*1.3*	*4.2*	*1.26*	65	180	60	130
	allow. F	16.1	35.9	14.1	30.2	0.9	3.0	0.9				

① Note: do not exceed the max. channel load bearing capacity!
② Load capability due to friction

Locking plates

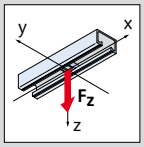
GWP 38/17



GWP 38/17 available bolts

GV	A4	a [mm]	b [mm]	d [mm]
M6	M6	33.5	17.5	6
M8	M8			
M10	M10			
M12	M12			

Load capacities GWP 38/17

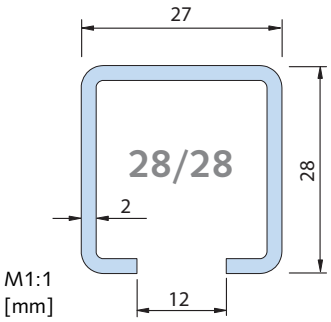


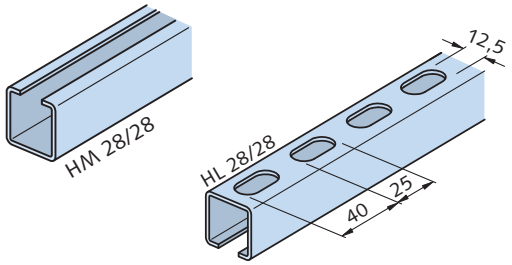
38/17

Thread	Load capacity [kN]	
M6	F_{Rd}	*3.1*
	allow. F	2.2
M8	F_{Rd}	*5.6*
	allow. F	4.0
M10	F_{Rd}	*8.0*
	allow. F	5.7
M12	F_{Rd}	*8.0*
	allow. F	5.7

Framing channels HM 28/28 and HL 28/28

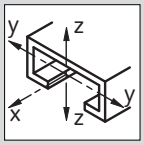
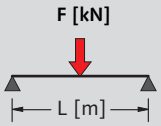
HM 28/28 resp. HL 28/28 cold-rolled





Suitable HALFEN Bolts
HS 28/15 → see page 50

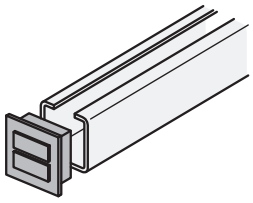
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
													
HM 28/28	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	050-00001	6000	1.36	1.73	1.70	2.01	1.08	1.49	$F_{z,Rd}$	31.0	F_{Rd}		
SV	050-00003								*4.2*		*2.7*	*1.3*	*0.7*
FV	050-00002								allow. F_z		allow. F		
A4	050-00004								*3.0*		*1.9*	*0.9*	*0.5*
HL 28/28	**0281.**												
WB	060-00001	6000	1.22	1.48	1.33	1.98	0.95	1.47	$F_{z,Rd}$	25.5	F_{Rd}		
SV	060-00003								*4.2*		*2.10*	*1.12*	*0.56*
FV	060-00002								allow. F_z		allow. F		
A4	060-00004								*3.0*		*1.5*	*0.8*	*0.4*

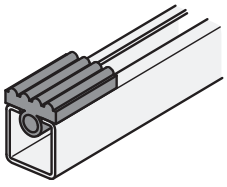
① F_z = max. load bearing capacity of the channel lips

Accessories

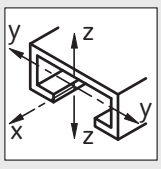
HPE 28/28
Channel end cap
→ see page 58



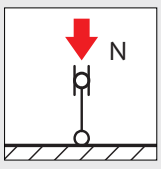
SDM - 28/6
Rubber vibration absorber
→ see catalogue MT-FFC



Further design properties



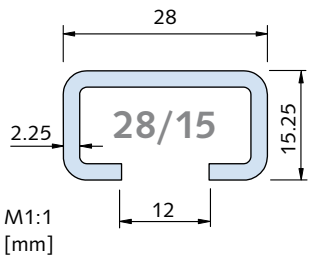
Cross section data
pages 62, 64

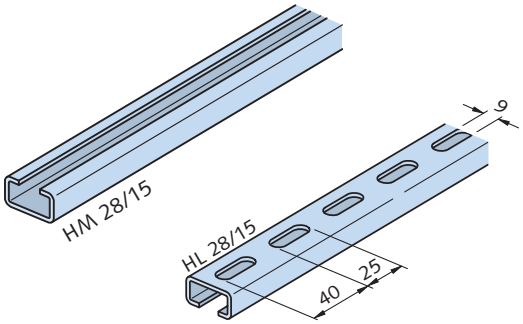


Flexural buckling
page 71

Framing channel HM 28/15 and HL 28/15

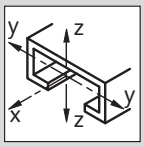
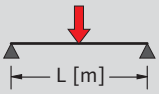
HM 28/15 and HL 28/15 cold-rolled





Suitable HALFEN Bolts
HS 28/15 → see page 50

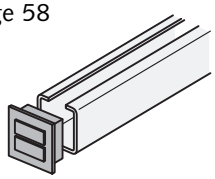
Dimensions and cross-section properties / Load capacities

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
											F [kN] 		
HM 28/15	0280.	[mm]	G [kg/m]	A [cm²]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	F_z ① [kN]	≤ e_w [cm]	0.5 m	1.0 m	1.5 m
WB	010-00001	6070	1.09	1.39	0.41	1.45	0.46	1.03	$F_{z,Rd}$	8.2	F_{Rd}		
FV	010-00002								*5.5*		*1.15*	*0.38*	*0.17*
A2 ②	010-00004								allow. F_z		allow. F		
A4 ②	070-00003								3.9		0.82	0.27	0.12
HL 28/15	0281.												
WB	080-00001	6070	0.86	1.16	0.32	1.35	0.40	0.98	$F_{z,Rd}$	7.0	F_{Rd}		
FV	080-00004								*5.5*		*0.98*	*0.31*	*0.14*
A2 ②	080-00002								allow. F_z		allow. F		
A4	080-00003								3.9		0.7	0.22	0.10

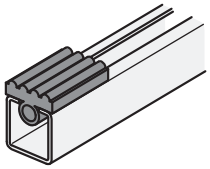
① F_z = max. load bearing capacity of the channel lips
② Stainless steel A2 on request; Note: high corrosion resistant stainless steel HCR for HM 28/15 on request

Accessories

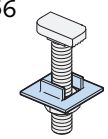
HPE 28/15 Channel end cap
→ see page 58



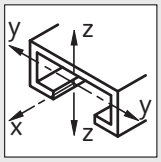
SDM 28/6 Rubber vibration absorber
→ see catalogue MT-FFC



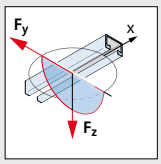
SIC 28/15 Locking washer
→ see page 56



Further design properties



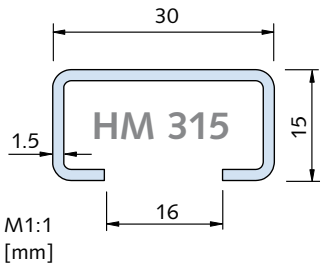
Cross section data
pages 62, 64

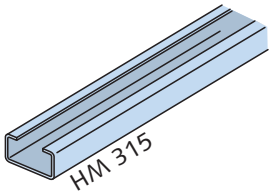


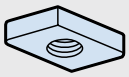
Point-load capacities
page 68

Framing channel HM 315 (C30)

HM 315 (C30) cold-rolled







Suitable locking plates
GWP 28/15 → see page 50

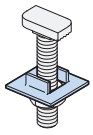
Dimensions and cross-section properties | **Load capacities**

Material	Order no.	Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
					I_y	I_z	W_y	W_z	F_z ①	≤ e_w	F [kN]		
HM 315	0280.	[mm]	G [kg/m]	A [cm²]	[cm⁴]	[cm⁴]	[cm³]	[cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	060-00001	6000	0.77	0.97	0.30	1.26	0.32	0.84	$F_{z,Rd}$	17.7	F_{Rd}		
									2.32		0.81	0.28	0.13
FV	060-00002								allow. F_z		allow. F		
									1.66		0.58	0.20	0.09

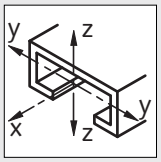
① F_z = max. load bearing capacity of the channel lips

Accessories

SIC 28/15 Locking plate
→ see page 56

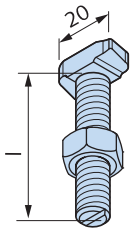


Further design properties



Cross section data
page 62

HALFEN Bolts HS 28/15



HS 28/15
HALFEN Bolts
incl. nut
Li = left-hand thread

Not for HM 315

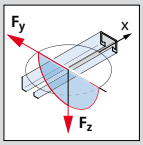
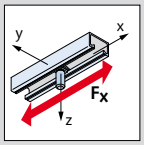
High corrosion resistant stainless steel
HCR on request

HS 28/15 available bolts

Length l [mm]	M6	M8	M10	M12	Length l [mm]	M6	M8	M10	M12
15	GVs 4.6	GVs 4.6	GVs 4.6		50		GVs 4.6	GVs 4.6 FV 4.6	GVs 4.6
20	GVs 4.6	GVs 4.6 GVs 8.8 A2-70	GVs 4.6 A2-70 A4-70		60		GVs 4.6	GVs 4.6 GVs 8.8 A4-70	
25	GVs 4.6	GVs 4.6 A2-70	GVs 4.6 A2-70 A4-70		80		GVs 4.6	GVs 4.6 GVs 8.8 A4-70	GVs 4.6
30	GVs 4.6	GVs 4.6 A2-70 A4-70	GVs 4.6 FV 4.6 A2-70 A4-70	GVs 4.6	100		GVs 4.6	GVs 4.6 A4-50	
35				GVs 4.6	125			GVs 4.6 A4-50	
40	GVs 4.6	GVs 4.6	GVs 4.6 FV 8.8 A2-70 A4-70		150		GVs4.6①	GVs 4.6 A4-50	
					200			GVs 4.6 A4-50	

① on request

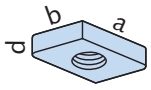
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts  F [kN]				Recommended load bearing capacity per HALFEN Bolt in channel longitudinal direction  F_x [kN] ②		Recommended torque  T_{inst} [Nm]			
28/15		HS				HS		HS			
		4.6	8.8	A2-50 A4-50	A2-70 A4-70	4.6; 8.8	A2-50; A4-50; A2-70; A4-70	4.6	8.8	A2-50 A4-50	A2-70 A4-70
M6	F_{Rd}	*2.9*	*6.4*	*2.5*	*5.4*	*0.14*	*0.14*	3	-	3	-
	allow. F	2.1	4.6	1.8	3.8	0.1	0.1				
M8	F_{Rd}	*5.3*	*11.7*	*4.6*	*9.9*	*0.28*	*0.28*	8	20	8	15
	allow. F	3.8	8.3	3.3	7.1	0.2	0.2				
M10	F_{Rd}	*8.3*	*18.6*	*7.3*	*15.6*	*0.42*	*0.42*	15	40	15	30
	allow. F	5.9	13.3	5.2	11.2	0.3	0.3				
M12	F_{Rd}	*12.1*	*27.0*	*10.6*	*22.7*	*0.7*	*0.7*	25	70	25	50
	allow. F	8.6	19.3	7.6	16.2	0.5	0.5				

① Note: do not exceed the max. channel load bearing capacity
② Load capability due to friction

Locking plates

GWP 28/15
for profiles 28/15
and HM 315 (C30)

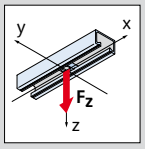


Assembly notes:
M6 and M8: insert the locking plate at an angle through the channel slot!
M10: insert the locking plate first, then fit and turn the threaded rod!

GWP 28/15 available plates

GV	A4	a [mm]	b [mm]	d [mm]
M5	-	24.5	13.0	4
M6	M6			
M8	M8			
M10	M10	33.5	17.5	5

GWP 28/15 Load capacities

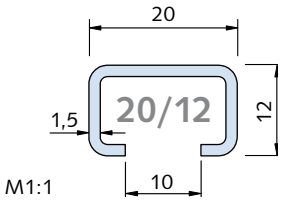


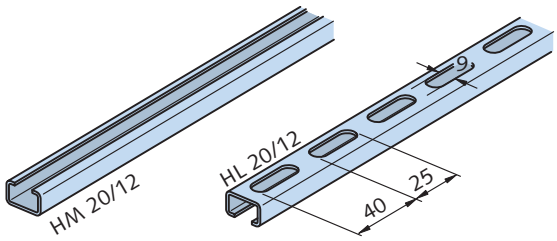
28/15

Thread	F_z [kN]	
M5	F_{Rd}	*2.1*
	allow. F	1.5
M6	F_{Rd}	*2.7*
	allow. F	1.9
M8	F_{Rd}	*3.9*
	allow. F	2.8
M10	F_{Rd}	*4.2*
	allow. F	3.0

Framing channel HM 20/12 and HL 20/12

HM 20/12 resp. HL 20/12 cold-rolled





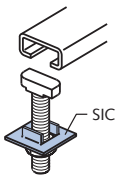
Suitable HALFEN Bolt
HS 20/12 → see page 52

Dimensions and cross-section properties									Load capacities				
		Length	Weight	Cross section area	Moment of inertia		Elastic section modulus		Max. point-load bearing capacity		Bending load capacity at span L		
Material	Order no.		G	A	I_y	I_z	W_y	W_z	F_z ①	≤ e_w	F [kN]		
HM 20/12	0280.	[mm]	[kg/m]	[cm²]	[cm⁴]	[cm⁴]	[cm³]	[cm³]	[kN]	[cm]	0.5 m	1.0 m	1.5 m
WB	030-00001	6000	0.52	0.66	0.12	0.36	0.16	0.36	$F_{z,Rd}$	5.8	F_{Rd}		
FV	030-00003								*3.14*		*0.42*	*0.11*	*0.06*
A2	030-00002								allow. F_z		allow. F		
									2.24		0.30	0.08	0.04
HL 20/12	0281.												
WB	090-00001	6000	0.45	0.53	0.09	0.35	0.14	0.36	$F_{z,Rd}$	4.6	F_{Rd}		
FV	090-00002								*3.14*		*0.32*	*0.08*	*0.04*
A2	090-00003								allow. F_z		allow. F		
									2.24		0.23	0.06	0.03

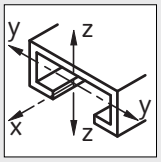
① F_z = max. load bearing capacity of the channel lips

Accessories

SIC 20/12 Locking washer
→ see page 56

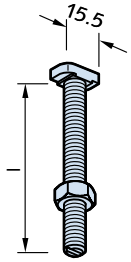


Further design properties



Cross section data
pages 62, 64

HALFEN Bolts HS 20/12



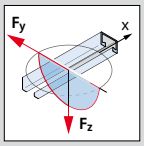
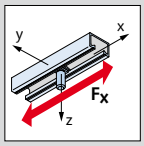
HS 20/12
HALFEN Bolts
incl. nut

HS 20/12 available bolts

Length l [mm]	M6	M8	Length l [mm]	M6	M8
15	-	GVs 4.6	40	GVs 4.6 -	GVs 4.6 A2-70
20	GVs 4.6 -	GVs 4.6 A2-70	50	-	GVs 4.6 A2-70 ①
25	-	GVs 4.6	60	-	GVs 4.6
30	GVs 4.6 -	GVs 4.6 A2-70	80	-	GVs 4.6
			100	-	GVs 4.6 ①

① on request

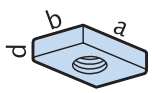
Load bearing capacities for HALFEN Bolts ①

Thread Ø		Load capacities for HALFEN Bolts  F [kN]		Recommended load capacity per HALFEN Bolt in channel longitudinal direction  F_x [kN] ②		Recommended torque  T_{inst} [Nm]	
20/12		HS		HS		HS	
		4.6	A2-70	4.6	A2-70	4.6	A2-70
M6	F_{Rd}	*2.9*	*5.4*	*0.14*	*0.14*	3	-
	allow. F	2.1	3.8	0.1	0.1		
M8	F_{Rd}	*5.3*	*9.9*	*0.28*	*0.28*	8	8
	allow. F	3.8	7.1	0.2	0.2		

① Note: do not exceed the max. channel load bearing capacity
② Load capability due to friction

Locking plates

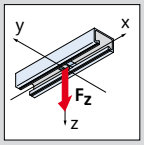
Locking plate **GWP 20/12**



GWP 20/12 available plates

GV Thread	A4 Thread	a [mm]	b [mm]	d [mm]
M5	M5	16	9	4
M6	M6			

Load capacities for GWP 20/12



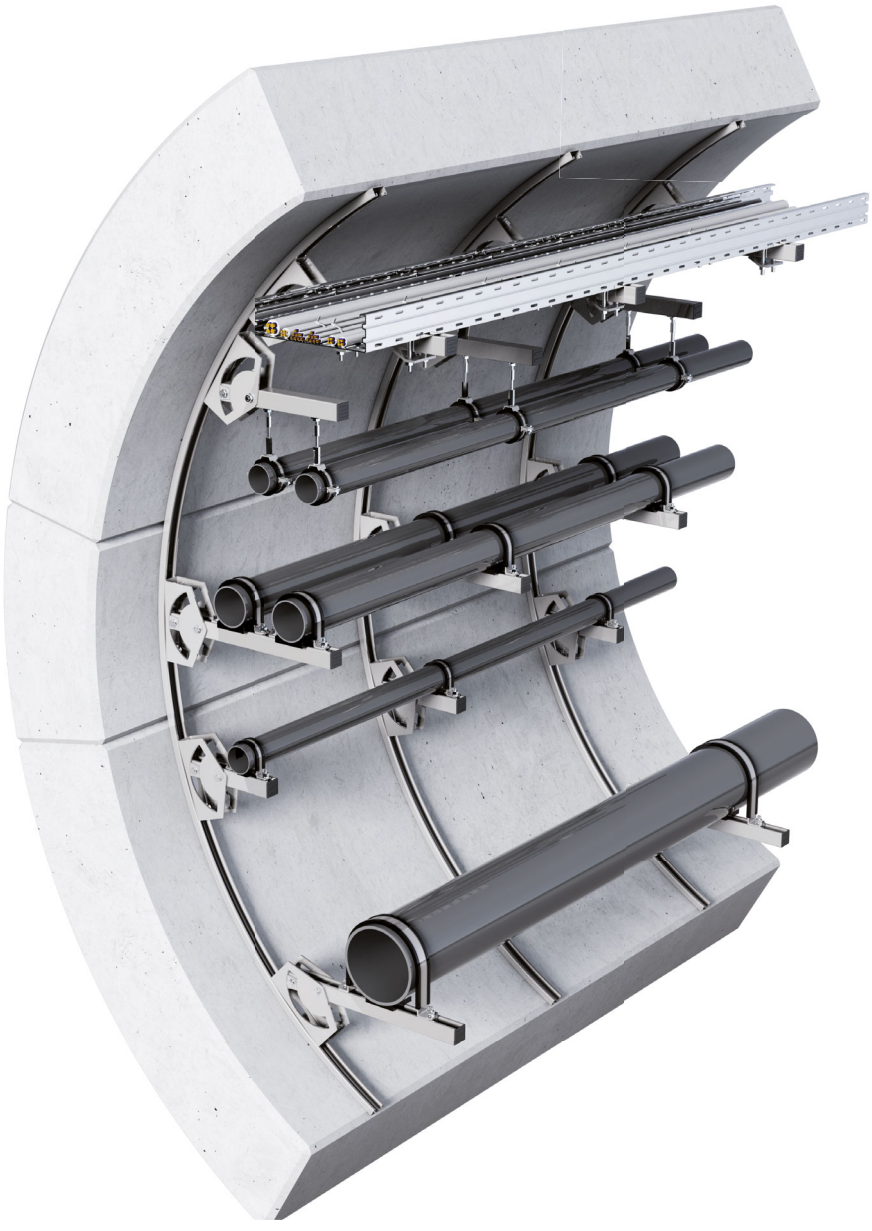
20/12

Thread	F_z [kN]	
M5	F_{Rd}	2.1
	allow. F	1.5
M6	F_{Rd}	2.7
	allow. F	1.9

HALFEN Adjustable Cantilever

The advantages at a glance

***A** Revolution in tunnel pipe support. The HALFEN Adjustable Cantilever combines the established high load bearing of the medium duty system with much faster installation. Specifically designed for tunnels or other areas with a curved or inclined substrate. It is not necessary to know the cantilever angle at the time of design.*



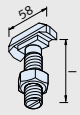
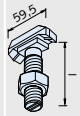
One part for all locations, dramatically reduced complexity

- suitable for pipe clamps, shoes and cable trays
- can be used for laid or suspended pipes
- takes up site tolerance. Cope with changes due to site conditions

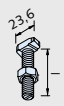
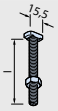
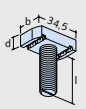
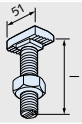
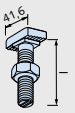
No custom cantilevers required, no angles to measure

- simplified design
- no risk of custom cantilevers not fitting
- rapid delivery of stock item = no custom fabrication lead time

Further information on HALFEN Cantilevers is available at www.halfen.de
Catalogue "Flexible Framing Connections": "HALFEN Flexible Framing Connections" Technical Product Information, MT-FFC.

Profile	HM 72/48					HM/HL 55/42, 52/34, 50/30, 49/30, 50/40, 50/40, 486				HM 52/34 HM 50/30		HM 40/22, HM 40/25, HM 422			HM 40/22	HM 36/36, HL 36/36, HM 38/17		
Bolt	HS 72/48				HSR 72/48	HS 50/30 ①				HSR 50/30		HS 40/22			HSR 40/22	HS 38/17 ①		
l \ Ø																		
[mm]	M20	M24	M27	M30	M20	M10	M12	M16	M20	M16	M20	M10	M12	M16	M16	M10	M12	M16
15																		
20												GVs4.6	GVs4.6			GVs4.6	GVs4.6	GVs 4.6
25																	A4-70	A4-50
30						GVs4.6 FV4.6	GVs4.6 A4-70	GVs4.6 A4-50				GVs4.6 A4-70	GVs4.6 GVs8.8 FV4.6 A4-50	GVs4.6 A4-50		GVs4.6 FV4.6 A4-70	GVs4.6 FV4.6 A2-70 A4-70	GVs 4.6 FV4.6 A2-50 A4-50
35									GVs4.6									
40						GVs4.6	GVs4.6 FV4.6 A4-70	GVs4.6 GVs8.8 FV4.6 A4-50		FV 8.8		GVs4.6 A4-70	GVs4.6 GVs8.8 A4-50 A4-70	GVs4.6 A4-50 A4-70	GVs8.8	GVs4.6 A4-70	GVs4.6 A2-70 A4-70	GVs 4.6 FV4.6 A2-50 A4-50
45							GVs8.8		GVs4.6 GVs8.8 A4-50		GVs8.8		GVs8.8					
50	FV4.6	FV4.6 A4-50				GVs4.6	GVs4.6 A4-70	GVs4.6 FV4.6 A4-50 A4-70				GVs4.6 A4-70	GVs4.6 FV4.6 A4-50	GVs4.6 FV4.6 A4-50 A4-70		GVs4.6 A4-70	GVs4.6 FV4.6 A2-70 A4-70	GVs 4.6 FV4.6 A4-50 A4-70
55									GVs4.6 FV4.6 A4-50									
60	FV 8.8						GVs4.6 GVs8.8	GVs4.6 GVs8.8 FV 8.8 A4-50	GVs8.8	GVs8.8	GVs8.8	GVs4.6	GVs4.6 GVs8.8	GVs4.6 GVs8.8 FV4.6 A4-50	GVs8.8	GVs4.6 A4-70	GVs4.6 GVs8.8 A4-70	GVs 4.6 GVs 8.8 FV 8.8 A4-50
63																		
65									GVs4.6									
70																	FV 8.8	
75	FV4.6 GVs8.8	FV4.6 FV 8.8	FV4.6	FV4.6	FV 8.8				GVs4.6 A4-50 FA-70		GVs8.8							
80							GVs4.6 GVs8.8	GVs4.6 GVs8.8 A4-50 A4-70	GVs8.8			GVs4.6	GVs4.6 GVs8.8 A4-50	GVs4.6 GVs8.8 A4-50		GVs4.6	GVs4.6 A4-70	GVs 4.6 A4-50 A4-70
80 Li								A4-50					A4-50	A4-50				A4-50
100	FV4.6 GVs8.8	FV4.6 GVs8.8 A4-50	FV4.6 FV 8.8	FV4.6			GVs4.6 A4-50	GVs4.6 GVs8.8 FV4.6	GVs4.6 GVs8.8 FV4.6 A4-50 FA-70			GVs4.6	GVs4.6 GVs8.8 A4-50	GVs4.6 FV4.6 A4-50		GVs4.6	GVs4.6 A4-50 A4-50	GVs 4.6 FV4.6 A4-50
125							GVs4.6	GVs4.6	GVs4.6 A4-50				GVs4.6	GVs4.6			GVs4.6	GVs 4.6
150	FV4.6	FV4.6 GVs8.8		FV4.6			GVs4.6	GVs4.6 FV4.6 A4-50	GVs4.6 GVs8.8 A4-50				GVs4.6 A4-50	GVs4.6 A4-50		GVs4.6	GVs4.6 A4-50	GVs 4.6 A4-50
200	FV4.6	FV4.6		FV4.6			GVs4.6	GVs4.6	GVs4.6				GVs4.6	GVs4.6			GVs4.6 A4-50	GVs 4.6 A4-50
250														GVs4.6				
300								GVs4.6	GVs4.6					GVs4.6				

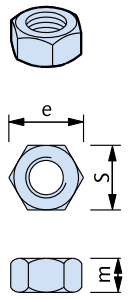
Li = left-hand thread; ZL = zinc flake coated

	HM/HL 28/28, HM/HL 28/15				HM 20/12, HL 20/12		HM/HL/HLL/HZM/HZL 41/41, 41/22, HM/HL 41/62, HM/HL 41/83							HZL 63/63 all 41/...		HZM 64/44		HZM 53/34		HZM 41/27, HZM 38/23		HZM 29/20
	HS 28/15 ①				HS 20/12		HS 41/41		HZS 41/41					HZS 41/22		HZS 64/44		HZS 53/34		HZS 38/23		HZS 29/20
																						
M6	M8	M10	M12	M6	M8	M10	M12	M6	M8	M10	M12	M16	M12	M16	M20	M24	M16	M20	M12	M16	M12
GVs4.6	GVs4.6	GVs4.6			GVs4.6																
GVs4.6	GVs4.6 GVs8.8 A2-70	GVs4.6 A2-70 A4-70		GVs4.6	GVs4.6 A2-70																
GVs4.6	GVs4.6 A2-70	GVs4.6 A2-70 A4-70			GVs4.6																
GVs4.6	GVs4.6 A2-70 A4-70	GVs4.6 FV4.6 A2-70 A4-70	GVs4.6	GVs4.6	GVs4.6 A2-70			ZL	ZL	ZL	ZL								GVs8.8	GVs8.8	GVs8.8
			GVs4.6			FV4.6 A4-70	FV4.6 A4-70						FV 8.8 A4-50	A4-50							
GVs4.6	GVs4.6	GVs4.6 FV 8.8 A2-70 A4-70		GVs4.6	GVs4.6 A2-70														GVs8.8	GVs8.8	GVs8.8
	GVs4.6	GVs4.6 FV4.6 A2-70 A4-70	GVs4.6		GVs4.6 A2-70		FV4.6		ZL	ZL	ZL		FV 8.8 A4-50	FV 8.8 A4-50					GVs8.8	GVs8.8	GVs8.8
	GVs4.6	GVs4.6 GVs8.8 A4-70			GVs4.6												GVs8.8 A4-70		GVs8.8	GVs8.8 FV 8.8 A4-70	GVs8.8
												ZL									
																		GVs8.8 A4-70			
										ZL	ZL										
	GVs4.6	GVs4.6 A4-70	GVs4.6		GVs4.6								A4-50		GVs8.8 A4-70	GVs8.8 A4-70			GVs8.8	GVs8.8 A4-70	GVs8.8
	GVs4.6	GVs4.6 A4-50			GVs4.6						ZL FV4.6			FV 8.8			GVs8.8 A4-70	GVs8.8 A4-70	GVs8.8	GVs8.8	GVs8.8
		GVs4.6 A4-50													GVs8.8 A4-70				GVs8.8	GVs8.8	GVs8.8
	GVs4.6	GVs4.6 A4-50														GVs8.8 A4-70			GVs8.8	GVs8.8	GVs8.8
		GVs4.6 A4-50																		GVs8.8	GVs8.8
																					GVs8.8
																				GVs8.8	GVs8.8

① High corrosion resistant stainless steel HCR on request

MU

Hexagonal nuts
EN ISO 4032/
DIN 934

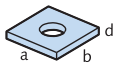
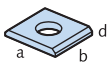
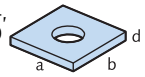
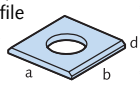
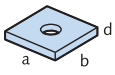


GV Galvanized F.k. 8 Thread	A4 Stainless steel A4 Thread	S/m DIN [mm]	S/m ISO [mm]	e [mm]
M6	M6	10/5	10/6	11.5
M8	M8	13/6.5	13/7.5	15.0
M10	M10	17/8	16/ 9.5	19.6
M12	M12	19/10	18/12	21.9
M16	M16	24/13	24/15.5	27.7
M20	M20	30/16	30/19	34.6
M24	-	36/19	36/22	41.5

FV Hot-dip galvanized Thread	A2 Stainless steel A4 Thread	S/m DIN [mm]	S/m EN [mm]	e [mm]
M6, M8	M8	13/6.5	13/7.5	15.0
M10	M10	17/08	16/9.5	19.6
M12	M12	19/10	18/12	21.9
M16	M16	24/13	24/15.5	27.7

VUS

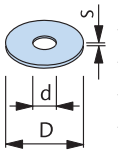
Square washers

	FV Hot-dip galvanized For bolt size:	A4 Stainless steel A4 For bolt size:	a x b x d [mm]
VUS 40/25 for profile 40/25; HZA 41/22 	M10	M10	40 x 40 x 5
	M12	M12	40 x 40 x 5
	M16	M16	40 x 40 x 5
VUS 49/30 for profile 54/33, 49/30 	M10	M10	37 x 37 x 5
	M12	M12	37 x 37 x 5
	M16	M16	37 x 37 x 5
	M20	M20	37 x 37 x 5
VUS 52/34 for profile 52/34, 50/30 	M16	M16	50 x 50 x 6
	M20	M20	50 x 50 x 6
VUS 72/49 for profile 72/48, 72/49 	M20	M20	54 x 54 x 6
	M24	M24	54 x 54 x 6
	M27	M27	54 x 54 x 6
	M30	M30	54 x 54 x 6
VUS 41/41 for all 41/.. profiles 	M6	M6	40 x 40 x 6
	M10	M10	40 x 40 x 6
	M12	M12	40 x 40 x 6

Ordering example: **VUS 52/34 - FV - M20**

US

Washers
DIN 9021/
EN ISO 7094/
DIN 440

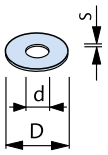


DIN	GV Galvanized For bolt	A4 Stainless steel For bolt	D [mm]	d [mm]	s [mm]
440	M6	-	22	6.6	2
9021	M8	M8	24	8.4	2
9021	M10	M10	30	10.5	2.5
440	M12	-	45	13.5	4
9021	M12	M12	37	13	3
9021	M16	M16	50	17	3
440	M20	-	72	22	6

Ordering example: **US - M12 - GV - DIN 9021**

US

Washers
EN ISO 7089/
DIN 125

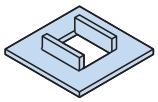


GV Galvanized For bolt	A4 Stainless steel A4 For bolt	D [mm]	d [mm]	s [mm]
M6	M6	12	6.4	1.6
M8	M8	16	8.4	1.6
M10	M10	21	10.5	2
M12	M12	24	13	2.5
M16	M16	30	17	3
M20	M20	37	21	3
M24	-	44	25	4
FV Hot-dip galvanized For bolt	**A2** Stainless steel A2 For bolt	D [mm]	d [mm]	s [mm]
-	M8	17	8.4	1.6
M10	M10	21	10.5	2
M12	M12	24	13	2.5
M16	M16	30	17	3

Ordering example: **US - M12 - GV - DIN 125**

SIC

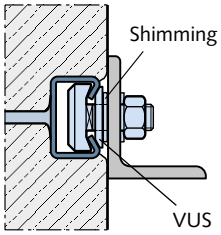
Locking washer



GV Galvanized	A4 Stainless steel	Suitable for HALFEN Bolts	
		Type	Dimensions
SIC - 50/30 - GV	SIC - 50/30 - A4	50/30	M16, M20
SIC - 40/22 - GV	SIC - 40/22 - A4	38/17 40/22	M16
SIC - 38/23 - GV	-	38/23	M16
SIC - 29/20 - GV	-	29/20	M12
SIC - 38/17 - GV	SIC - 38/17 - A4	38/17 40/22	M12, M10
SIC - 28/15 - GV	SIC - 28/15 - A4	28/15	M8, M10
SIC - 20/12 - GV	SIC - 20/12 - A4	20/12	M8

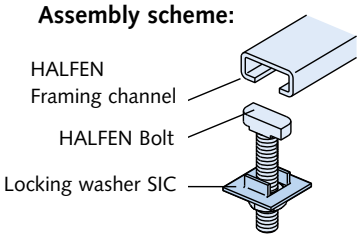
Ordering example: **SIC - 38/17 - GV**

Application VUS:
for shimming non-flush installation of HALFEN Anchor channels or for stand-off installations
→ see page 69



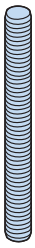
Application SIC:
for securing HALFEN Bolts; prevents bolts turning when tightening nuts

Assembly scheme:



GWS

Threaded rods
DIN 976-1

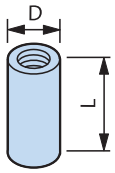


GV Galvanized F.k. 4.6 Thread	A4 Stainless steel A4 Thread	Length [mm]	F_{Rd} ① [kN]	allow. F [kN]
M6	M6	1000	3.1	2.2
M8	M8	1000	5.6	4.0
M10	M10	1000	9.0	6.4
M12	M12	1000	13.0	9.3
M16	M16	1000	24.2	17.3
M20	M20	1000	37.8	27.0
M24	-	1000	54.3	38.8

Ordering example: **GWS - M12 × 1000 - GV**

VBM

Coupler sleeves, round

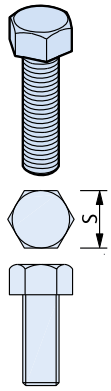


GV Galvanized Thread	A4 Stainless steel Thread	D [mm]	L [mm]	F_{Rd} ① [kN]	allow. F [kN]
M6	M6	10/10	15	3.1	2.2
M8	M8	12/14	20	5.6	4.0
M10	M10	13/16	25	9.0	6.4
M12	M12	16/20	30	13.0	9.3
M16	M16	21/25	40	24.2	17.3
M20	M20	26/32	50	37.8	27.0

Ordering example: **VBM - A4 - M16**

HSK

Hexagonal head bolts
EN ISO 4017/
DIN 933
(without nut)

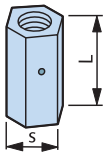


Hex bolts are used in combination with HALFEN Locking plates

GV 8.8 Galvanized FK 8.8 Dimensions	A4 Stainless steel Dimensions	S DIN [mm]	S EN ISO [mm]
M 6 x 12		10	10
M 6 x 25			
M 8 x 25	M8 x 25	13	13
M 8 x 40			
M 10 x 20		17	16
M 10 x 30	M10 x 30		
M 10 x 45	M10 x 45		
M 10 x 60			
M 10 x 70			
M 12 x 22		19	18
M 12 x 25	M12 x 25		
M 12 x 30	M12 x 30		
M 12 x 40	M12 x 40		
M 12 x 50			
M 12 x 60	M12 x 60		
M 12 x 80	M12 x 80		
M 12 x 90			
M 16 x 40	M16 x 40	24	24
M 16 x 60	M16 x 60		
M 16 x 90	M16 x 90		

SKM

Hexagonal coupler sleeves with view holes

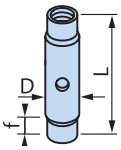


FV Hot-dip galvanized Thread	A4 Stainless steel Thread	S [mm]	L [mm]	F_{Rd} ① [kN]	allow. F [kN]
M10	M10	13	40	9.0	6.4
M12	M12	17	40	13.0	9.3
M16	M16	22	50	24.2	17.3

Ordering example: **SKM - FV - M12**

SPH

Turnbuckles with right- and left-hand thread



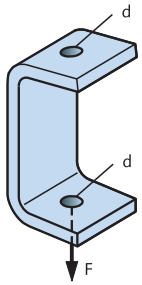
f = min. screw depth
M12 ≙ 10mm
M16 ≙ 13 mm

A4 Stainless steel Thread M12 × Length L [mm]	A4 Stainless steel Thread M16 × Length L [mm]	D For M12 [mm]	D For M16 [mm]
M 12 × 60	M 16 × 60	16	22
M 12 × 75	M 16 × 75	16	22
M 12 × 95	M 16 × 95	16	22
M 12 × 115	M 16 × 115	16	22
M 12 × 135	M 16 × 135	16	22
allow. F = 5 kN F_{Rd} = 7 kN	allow. F = 10 kN F_{Rd} = 14 kN		

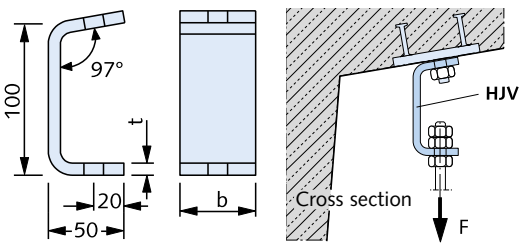
Ordering example: **SPH - A4 - M12 x 75**

HJV

Adjustment coupler

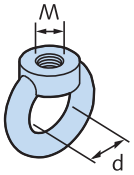


FV Hot-dip galvanized Type	A4 Stainless steel Type	t [mm]	b [mm]	d [mm]	max. F_{Ed} ② [kN]	allow. F [kN]
1	1	6	40	13	2.1	1.5
2	2	8	50	17	4.6	3.3
3	3	10	50	17	7.0	5



RM

Ring nut
DIN 582
from 2010-09



GV C 15E, galvanized Thread	d [mm]	F_{Rd} ① [kN]	allow. F [kN]
M8	20	2.0	1.4
M10	25	3.2	2.3
M12	30	4.8	3.4
M16	35	9.8	7.0
M20	40	16.8	12.0

Ordering example: **RM - GV - M12**

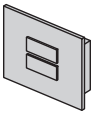
① Recommended design value of the load capacity with a centric tensile stress

② Recommended design value of the load

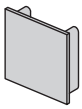
HPE Channel end caps

Channel end caps in plastic

Type **HPE 63/63**
Colour: blue



Type **HPE**
Colour: black

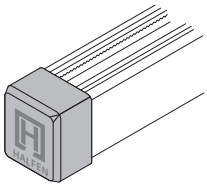


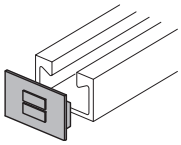
Type **HPE 41/41**
Type **HPE 41/22**
Colour: black

Product range		
Description	**Order no. 0318.000-**	**Suitable for channel**
HPE 63/63	00010	63/63
HPE 52/34	00001	52/34
HPE 50/40	00002	50/40
HPE 41/41	00003	41/41
HPE 41/22	00004	41/22
HPE 36/36	00005	36/36
HPE 28/28	00006	28/28
HPE 28/15	00011	28/15

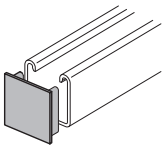
Assembly diagram:

Type **HPE 63/63**





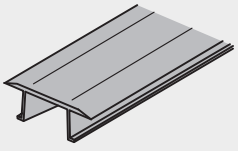
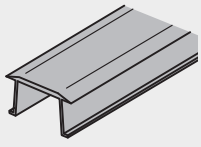
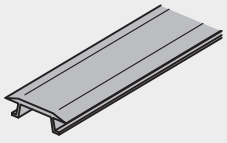
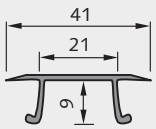
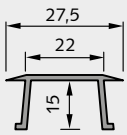
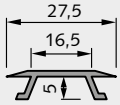
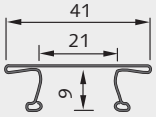
Type **HPE**



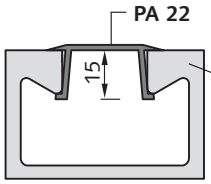
Type **HPE 41/41**
Type **HPE 41/22**

PA Channel cover

The channel cover **PA** is used to protect the channel slot against dirt etc.

Type overview			
Type	**PA 41**	**PA 22**	**PA 18 H**
	Suitable for profiles: 50/40, 50/30, 486, all 41/... Profiles	**Suitable for profile 52/34**	**Suitable for profiles 36/36, 38/17**
			
Quality: hard PVC (**KS**)			
	white	medium grey	medium grey
Quality: steel sendzimir zinc plated (**SV**)			

Assembly diagram:



HALFEN Channel i.e. HM 52/34

Available types				
Type			**Length [mm]**	**Order no. 0321.000-**
PA -	41	- KS	- 3000	00002
PA -	41	- SV	- 3000	00001
PA -	22	- KS	- 3000	00003
PA -	18H	- KS	- 3000	00004

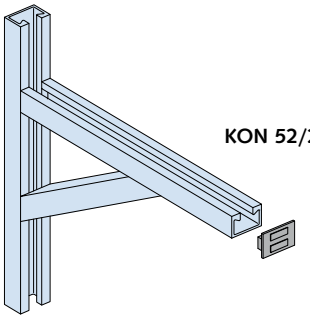
Cantilevers KON

Flexible comprehensive support system
Whether for low or very high requirements: you are guaranteed to find the most cost-efficient solution for your requirements using the HALFEN product range. With its adjustable bolt connections, components can be installed, dismantled, moved and adjusted quickly and simply.

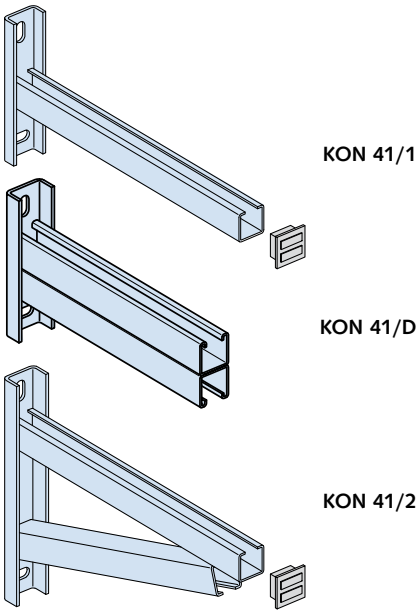
Short assembly times
The flexibility of HALFEN Cantilevers/ Bolts make them ideal when the positions and sizes of bolts can not be defined during the planning stage of a project. Using the HALFEN product range avoids costly and complex adjustment, drilling or thread cutting in corrosion protected components.


Pipe supports with cantilevers brackets in a sewage treatment plant

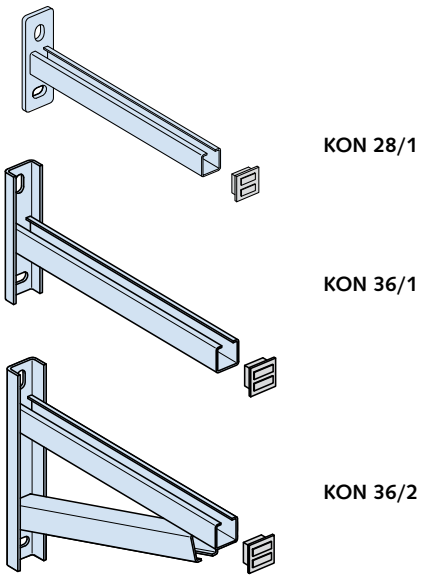
Cantilever 52:



Cantilever 41:



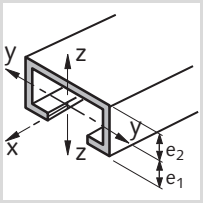
Cantilever 36/28:



Note: Depending on the number of items ordered, custom cantilevers are available

Further information on HALFEN Cantilevers is available at www.halfen.de
Take a look at our catalogue "Flexible Framing Connections":
"HALFEN Flexible Framing Connections" Technical Product Information, MT-FFC.

HALFEN Framing Channels, Hot-Rolled, Non-Slotted – Bending Load Capacities



			Materials/coatings					Channel weight	Cross section area	Centroid	Moment of inertia		Elastic/plastic section modulus				Max. point-load bearing capacity ①		
																	allow. F_z	$F_{z,Rd}$	e_w
								G [kg/m]	A [cm²]	e_2 [cm]	I_y [cm⁴]	I_z [cm⁴]	$W_{y,el}$ [cm³]	$W_{z,el}$ [cm³]	$W_{y,pl}$ [cm³]	$W_{z,pl}$ [cm³]	[kN]	[kN]	[cm]
	HM 72/48	Hot-rolled	WB	-	FV	-	A4	8.85	11.27	2.45	34.97	83.35	14.28	23.15	18.28	28.94	47.0	*65.8*	30.0
	HM 55/42		WB	-	FV	-	-	6.76	8.61	1.99	18.75	36.29	8.49	13.32	11.73	16.69	38.6	*54.0*	25.0
	HM 52/34							4.98	6.35	1.61	9.33	23.74	5.36	9.04	7.19	11.50	25.9	*36.3*	20.0
	HM 50/30		WB	-	FV	-	A4	3.26	4.15	1.37	5.26	13.78	3.23	5.62	4.38	7.05	14.4	*20.2*	20.0
	HM 40/22							2.12	2.70	1.05	1.99	5.77	1.59	2.92	2.17	3.68	8.2	*11.4*	15.0
	HM 72/48 D ④		⑤	-	⑤	-	⑤	17.70	22.54	4.85	205.15	166.70	42.30	46.30	55.20	57.89	47.0	*65.8*	30.0
	HM 55/42 D ④							13.52	17.22	4.20	105.70	72.58	25.17	26.64	34.27	33.37	38.6	*54.0*	25.0
	HM 52/34 D ④							9.96	12.70	3.35	51.49	47.48	15.37	18.09	20.42	23.00	25.9	*36.3*	20.0
	HM 50/30 D ④							6.52	8.27	3.00	26.56	28.14	8.85	11.49	11.52	14.27	14.4	*20.2*	20.0
	HM 40/22 D ④							4.24	5.33	2.30	10.06	11.61	4.38	5.88	5.73	7.36	8.2	*11.4*	15.0
	HZM 64/44		WB	-	FV	-	A4	7.15	9.10	2.10	23.83	53.94	10.36	16.85	13.66	20.86	38.1	*53.3*	25.0
	HZM 53/34		WB	-	FV	-	A4	4.63	5.88	1.54	9.19	23.18	4.95	8.83	6.80	10.94	30.9	*43.3*	20.0
	HZM 41/27		WB	-	FV	-	-	3.38	4.31	1.19	3.90	9.49	2.57	4.75	3.74	5.98	17.8	*25.0*	20.0
	HZM 38/23		WB	-	FV	-	A4	2.43	3.10	0.97	2.11	6.17	1.59	3.25	2.31	4.06	12.8	*18.0*	20.0
	HZM 29/20		WB	-	FV	-	-	1.55	1.99	0.88	1.02	2.42	0.91	1.67	1.31	2.06	8.0	*11.2*	15.0
	HZM 64/44 D ④		⑤	-	⑤	-	⑤	14.3	18.21	4.40	127.94	107.87	29.08	33.71	38.23	41.72	38.1	*53.3*	25.0
	HZM 53/34 D ④							9.26	11.75	3.40	46.38	46.36	13.64	17.66	18.14	21.89	30.9	*43.3*	20.0
	HZM 41/27 D ④							6.76	8.62	2.70	19.91	18.98	7.37	9.49	10.22	11.96	17.8	*25.0*	20.0
	HZM 38/23 D ④							4.86	6.19	2.30	10.04	12.35	4.36	6.50	6.00	8.13	12.8	*18.0*	20.0
	HZM 29/20 D ④							3.10	3.97	2.00	5.12	4.84	2.56	3.34	3.49	4.11	8.0	*11.2*	15.0

① Observe the minimum distance a_e between the channel end and the load point (HALFEN Bolt, locking plate):
heavy and medium duty framing systems: $a_e \geq 30$ mm,
light duty framing systems: $a_e \geq 20$ mm.

② Do not exceed the bolt load capacity or the max. channel load bearing capacity.

③ For maximum point-load capacity:
F_z = max. load bearing capacity of the channel lips.

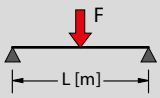
④ Take constructive measures to prevent failure caused by bulging, tilting and buckling.

⑤ On request.

HALFEN Framing Channels, Hot-Rolled, Non-Slotted – Bending Load Capacities

Material: steel, type WB, FV E= 210.000 N/mm²

Bending load capacity at span L (single span element) ②



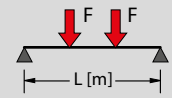
F [kN]

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
22.3	*31.2*	11.2	*15.6*	7.4	*10.4*
16.8	*23.5*	8.4	*11.7*	5.6	*7.8*
8.8	*12.3*	4.4	*6.1*	2.8	*3.9*
5.4	*7.5*	2.7	*3.7*	1.6	*2.2*
2.6	*3.7*	1.3	*1.9*	0.6	*0.8*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
33.7	*47.2*	16.8	*23.6*	11.2	*15.7*
24.5	*34.3*	12.2	*17.1*	7.9	*11.0*
12.5	*17.4*	6.2	*8.7*	3.8	*5.4*
7.0	*9.8*	3.5	*4.9*	2.0	*2.8*
3.5	*4.9*	1.7	*2.4*	0.8	*1.1*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
24.8	*34.8*	12.4	*17.4*	7.1	*10.0*
12.4	*17.3*	6.2	*8.6*	2.7	*3.8*
6.8	*9.5*	2.6	*3.7*	1.2	*1.6*
4.2	*5.9*	1.4	*2.0*	0.6	*0.9*
2.4	*3.3*	0.7	*1.0*	0.3	*0.4*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
34.8	*48.7*	17.4	*24.3*	9.6	*13.4*
16.5	*23.1*	7.8	*10.9*	3.5	*4.8*
9.3	*13.0*	3.3	*4.7*	1.5	*2.1*
5.5	*7.6*	1.7	*2.4*	0.7	*1.0*
3.2	*4.4*	0.9	*1.2*	0.4	*0.5*



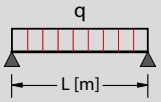
F [kN]

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
16.7	*23.4*	8.4	*11.7*	5.6	*7.8*
12.6	*17.6*	6.3	*8.8*	3.3	*4.6*
6.6	*9.2*	3.3	*4.6*	1.6	*2.3*
4.0	*5.6*	2.0	*2.8*	0.9	*1.3*
2.0	*2.8*	0.8	*1.1*	0.3	*0.5*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
25.3	*35.4*	12.6	*17.7*	8.4	*11.8*
18.4	*25.7*	9.2	*12.8*	4.6	*6.5*
9.3	*13.1*	4.7	*6.5*	2.3	*3.2*
5.3	*7.4*	2.6	*3.7*	1.2	*1.6*
2.6	*3.7*	1.0	*1.4*	0.4	*0.6*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
18.6	*26.1*	9.3	*13.0*	4.2	*5.8*
9.3	*13.0*	3.6	*5.1*	1.6	*2.3*
5.1	*7.1*	1.5	*2.2*	0.7	*1.0*
3.2	*4.4*	0.8	*1.2*	0.4	*0.5*
1.6	*2.3*	0.4	*0.6*	0.2	*0.3*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
26.1	*36.5*	12.6	*17.7*	5.6	*7.8*
12.4	*17.3*	4.6	*6.4*	2.0	*2.8*
7.0	*9.8*	2.0	*2.7*	0.9	*1.2*
4.0	*5.5*	1.0	*1.4*	0.4	*0.6*
2.0	*2.8*	0.5	*0.7*	0.2	*0.3*



q [kN/m]

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
89.3	*125.0*	22.3	*31.2*	9.9	*13.9*
67.0	*93.8*	16.8	*23.5*	6.0	*8.4*
35.1	*49.1*	8.8	*12.3*	3.0	*4.2*
21.4	*30.0*	5.4	*7.5*	1.7	*2.3*
10.6	*14.8*	2.1	*3.0*	0.6	*0.9*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
67.4	*94.3*	16.8	*23.6*	7.5	*10.5*
49.0	*68.5*	12.2	*17.1*	4.2	*5.9*
24.9	*34.9*	6.2	*8.7*	2.1	*2.9*
14.1	*19.7*	3.5	*4.9*	1.1	*1.5*
7.0	*9.8*	1.4	*1.9*	0.4	*0.6*

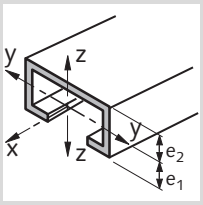
allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
99.4	*139.1*	24.8	*34.8*	7.6	*10.6*
49.4	*69.2*	9.9	*13.8*	2.9	*4.1*
27.2	*38.1*	4.2	*5.9*	1.2	*1.7*
16.8	*23.5*	2.3	*3.2*	0.7	*0.9*
8.8	*12.3*	1.1	*1.5*	0.3	*0.5*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
69.5	*97.3*	17.2	*24.1*	5.1	*7.1*
33.0	*46.2*	6.2	*8.7*	1.8	*2.6*
18.6	*26.0*	2.7	*3.7*	0.8	*1.1*
10.8	*15.1*	1.3	*1.9*	0.4	*0.6*
5.5	*7.7*	0.7	*1.0*	0.2	*0.3*

All load capacities are calculated using the elastic-plastic method acc. to EN 1993-1,
partial safety factor γ_F = 1,4; deflection ≤ l /150.
Determination of the allowable value
allow. F_z = F_{Rd} / 1.4

Note: For stainless steel framing channels the bending deflection value must be verified separately using the valid E-modulus of elasticity.

HALFEN Framing Channels, Cold-Rolled, Non-Slotted – Bending Load Capacities



			Materials/coatings					Channel weight	Cross section area	Centroid	Moment of inertia		Elastic/plastic section modulus				Max. point-load bearing capacity ①		
																	allow. F_z	$F_{z,Rd}$	e_w
								G [kg/m]	A [cm²]	e_2 [cm]	I_y [cm⁴]	I_z [cm⁴]	$W_{y,el}$ [cm³]	$W_{z,el}$ [cm³]	$W_{y,pl}$ [cm³]	$W_{z,pl}$ [cm³]	[kN]	[kN]	[cm]
	HM 49/30	Cold-rolled	WB	-	FV	-	A4	2.88	3.67	1.23	4.16	13.23	2.35	5.29	3.56	6.49	4.9	*6.9*	46.0
	HM 40/25		WB	-	FV	-	A4	2.09	2.66	1.02	2.05	6.09	1.39	3.05	2.11	3.75	3.8	*5.3*	33.0
	HM 50/40		WB	-	FV	-	A4	3.35	4.26	1.72	8.64	15.49	3.96	6.32	5.53	7.62	5.4	*7.6*	63.0
	HM 486		WB	-	FV	-	-	2.31	2.95	1.15	2.97	9.62	1.92	4.01	2.71	4.95	3.5	*4.7*	47.0
	HM 422 (C40)		WB	-	FV	-	-	1.55	1.98	0.93	1.27	4.29	1.04	2.17	1.46	2.71	2.5	*3.5*	36.0
	HM 41/41		WB	SV	FV	-	A4	2.67	3.40	1.82	7.47	9.44	3.24	4.57	4.57	5.37	5.6	*7.8*	49.0
	HZM 41/41		WB	-	FV	-	A4	2.63	3.36	1.80	7.34	9.37	3.15	4.54	4.48	5.31	5.6	*7.8*	47.0
	HM 41/22		WB	SV	FV	-	A4	1.86	2.38	0.85	1.28	5.56	1.05	2.69	1.59	3.37	5.6	*7.8*	15.0
	HZM 41/22		WB	-	FV	-	A4	1.83	2.33	0.84	1.26	5.48	1.03	2.66	1.56	3.32	5.6	*7.8*	14.0
	HM 41/83 ④		WB	SV	FV	-	-	4.29	5.47	3.84	43.82	17.22	9.91	8.34	13.73	9.38	5.6	*7.8*	148.0
	HM 41/62 ④		WB	SV	FV	-	-	3.48	4.44	2.83	20.96	13.34	6.21	6.46	8.63	7.38	5.6	*7.8*	92.0
	HM 41/41 D ④		WB	-	FV	-	A4	5.34	6.81	4.13	37.60	18.88	9.10	9.14	12.42	10.75	5.6	*7.8*	49.0
	HZM 41/41 D ④		WB	-	FV	-	A4	5.27	6.71	4.13	36.45	18.73	8.83	9.07	12.09	10.63	5.6	*7.8*	47.0
	HM 41/22 D ④		WB	-	FV	-	A4	3.73	4.75	2.07	6.02	11.11	2.91	5.38	4.06	6.75	5.6	*7.8*	15.0
	HZM 41/22 D ④		⑤	-	FV	-	A4	3.58	4.65	2.07	5.83	10.97	2.82	5.31	3.92	6.63	5.6	*7.8*	14.0
	HM 41/62 D ④		WB	-	⑤	-	A4	6.97	8.88	6.20	112.88	26.68	18.21	12.92	25.10	14.76	5.6	*7.8*	92.0
	HM 36/36		WB	-	FV	-	A4	2.20	2.80	1.53	4.54	5.89	2.19	3.27	3.19	3.85	4.4	*6.2*	44.0
	HM 38/17		WB	-	FV	A2	A4	1.78	2.27	0.70	0.84	4.13	0.80	2.20	1.21	2.82	4.8	*6.7*	11.0
	HM 315 (C30)		WB	-	FV	-	-	0.77	0.98	0.58	0.30	1.26	0.32	0.84	0.47	1.03	1.66	*2.32*	17.7
	HM 28/28		WB	SV	FV	-	A4	1.36	1.73	1.22	1.70	2.01	1.08	1.49	1.54	1.77	3.0	*4.20*	31.0
	HM 28/15		WB	-	FV	A2	A4	1.09	1.39	0.64	0.41	1.45	0.46	1.03	0.67	1.31	3.90	*5.50*	8.2
	HM 20/12		WB	-	FV	A2	-	0.52	0.66	0.48	0.12	0.36	0.16	0.36	0.25	0.45	2.24	*3.14*	5.8

① Observe the minimum distance a_e between the channel end and the load point (HALFEN Bolt, locking plate):
heavy and medium duty framing systems: $a_e \geq 30$ mm,
light duty framing systems: $a_e \geq 20$ mm.

② Do not exceed the bolt load capacity or the max. channel load bearing capacity.

③ For maximum point-load capacity:
Fz = max. load bearing capacity of the channel lips.

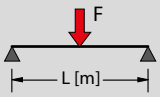
④ Take constructive measures to prevent failure caused by bulging, tilting and buckling.

⑤ On request.

HALFEN Framing Channels, Cold-Rolled, Non-Slotted – Bending Load Capacities

Material: steel, type WB, FV, SV E= 210.000 N/mm²

Bending load capacity at span L (single span element) ②



F [kN]

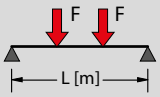
allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
4.3	*6.1*	2.2	*3.0*	1.2	*1.7*
2.6	*3.6*	1.3	*1.8*	0.6	*0.9*
6.8	*9.5*	3.4	*4.7*	2.3	*3.2*
3.3	*4.6*	1.7	*2.3*	0.9	*1.2*
1.8	*2.5*	0.9	*1.2*	0.4	*0.5*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
5.6	*7.8*	2.8	*3.9*	1.9	*2.6*
5.5	*7.7*	2.7	*3.8*	1.8	*2.6*
1.9	*2.7*	0.9	*1.2*	0.4	*0.5*
1.9	*2.7*	0.8	*1.2*	0.4	*0.5*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
8.4	*11.7*	4.2	*5.9*	2.8	*3.9*
5.3	*7.4*	2.6	*3.7*	1.6	*2.2*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**1.50 m**		**2.00 m**	
7.6	*10.6*	5.1	*7.1*	3.8	*5.3*
7.4	*10.3*	4.9	*6.9*	3.7	*5.2*
2.5	*3.5*	1.7	*2.3*	1.0	*1.4*
2.4	*3.4*	1.6	*2.2*	1.0	*1.4*
15.3	*21.4*	10.2	*14.3*	7.7	*10.7*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
3.9	*5.5*	1.9	*2.7*	1.3	*1.8*
1.5	*2.1*	0.6	*0.8*	0.3	*0.4*
0.6	*0.8*	0.2	*0.3*	0.1	*0.1*
1.9	*2.6*	0.9	*1.3*	0.5	*0.7*
0.8	*1.2*	0.3	*0.4*	0.12	*0.17*
0.3	*0.42*	0.08	*0.11*	0.03	*0.05*



F [kN]

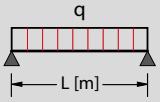
allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
3.3	*4.6*	1.6	*2.3*	0.7	*1.0*
1.9	*2.7*	0.8	*1.1*	0.4	*0.5*
5.1	*7.1*	2.5	*3.5*	1.5	*2.1*
2.5	*3.5*	1.2	*1.6*	0.5	*0.7*
1.3	*1.9*	0.5	*0.7*	0.2	*0.3*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
4.2	*5.9*	2.1	*2.9*	1.3	*1.8*
4.1	*5.7*	2.1	*2.9*	1.3	*1.8*
1.5	*2.0*	0.5	*0.7*	0.2	*0.3*
1.4	*2.0*	0.5	*0.7*	0.2	*0.3*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
6.3	*8.8*	3.1	*4.4*	1.9	*2.7*
3.9	*5.5*	2.0	*2.8*	0.9	*1.3*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**1.50 m**		**2.00 m**	
5.7	*8.0*	3.8	*5.3*	2.8	*4.0*
5.5	*7.7*	3.7	*5.2*	2.8	*3.9*
1.9	*2.6*	1.1	*1.5*	0.6	*0.8*
1.8	*2.5*	1.0	*1.4*	0.6	*0.8*
11.5	*16.1*	7.7	*10.7*	5.7	*8.0*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
2.9	*4.1*	1.5	*2.0*	0.8	*1.1*
1.1	*1.6*	0.3	*0.5*	0.15	*0.2*
0.4	*0.6*	0.12	*0.16*	0.05	*0.07*
1.4	*2.0*	0.7	*0.9*	0.3	*0.4*
0.6	*0.9*	0.16	*0.2*	0.07	*0.1*
0.18	*0.26*	0.05	*0.06*	0.02	*0.03*



q [kN/m]

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
17.4	*24.3*	4.3	*6.1*	1.3	*1.9*
10.3	*14.5*	2.2	*3.1*	0.7	*0.9*
27.0	*37.8*	6.8	*9.5*	2.8	*3.9*
13.2	*18.5*	3.2	*4.5*	0.9	*1.3*
7.1	*10.0*	1.4	*1.9*	0.4	*0.6*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
22.3	*31.2*	5.6	*7.8*	2.4	*3.3*
21.9	*30.6*	5.5	*7.7*	2.3	*3.3*
7.8	*10.9*	1.4	*1.9*	0.4	*0.6*
7.6	*10.6*	1.4	*1.9*	0.4	*0.6*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
16.8	*23.5*	4.2	*5.9*	1.7	*2.4*
10.5	*14.7*	2.6	*3.7*	0.8	*1.2*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
1.00 m		**1.50 m**		**2.00m**	
15.2	*21.2*	6.7	*9.4*	3.8	*5.3*
14.8	*20.7*	6.6	*9.2*	3.7	*5.2*
5.0	*6.9*	1.9	*2.7*	0.8	*1.1*
4.8	*6.7*	1.9	*2.6*	0.8	*1.1*
30.6	*42.9*	13.6	*19.1*	7.7	*10.7*

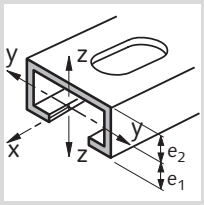
allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
15.6	*21.8*	3.9	*5.5*	1.4	*2.0*
5.9	*8.3*	0.9	*1.3*	0.3	*0.4*
2.3	*3.2*	0.3	*0.4*	0.1	*0.1*
7.5	*10.5*	1.8	*2.6*	0.5	*0.8*
3.3	*4.6*	0.4	*0.6*	0.13	*0.2*
1.0	*1.40*	0.12	*0.17*	0.04	*0.05*

All load capacities were calculated using the elastic-plastic method acc. to EN 1993-1,
partial safety factor γ_F = 1,4; deflection ≤ l / 150.

Determination of the allowable value
allow. F_z = F_{Rd} / 1.4

Note: For stainless steel framing channels the bending deflection value must be verified separately using the valid E-modulus of elasticity.

HALFEN Framing Channels, Cold-Rolled, Slotted – Bending Load Capacities

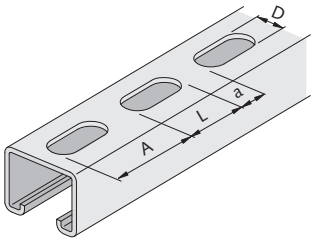


			Materials/coatings					Channel weight	Cross section area	Centroid	Moment of inertia		Elastic/plastic section modulus			Max. point-load bearing capacity ①		
								G [kg/m]	A [cm²]	e_2 [cm]	I_y [cm4]	I_z [cm4]	$W_{y,el}$ [cm³]	$W_{z,el}$ [cm³]	$W_{y,pl}$ [cm³]	zul. F_z [kN]	$F_{z,Rd}$ [kN]	e_w [cm]
	HL 50/40		WB	-	FV	-	A4	3.15	3.73	1.95	7.14	15.36	3.65	6.27	4.68	5.4	*7.6*	53.0
	HZL 63/63		-	-	FV	-	-	6.35	7.09	3.29	33.07	42.95	10.06	13.63	13.51	5.6	*7.8*	134.0
	HL 41/41		WB	SV	FV	-	A4	2.46	2.98	1.99	6.07	9.16	2.84	4.43	3.82	5.6	*7.8*	42.0
	HL 41/22		WB	SV	FV	-	A4	1.57	1.95	0.96	0.99	5.27	0.89	2.55	1.27	5.6	*7.8*	12.0
	HZL 41/41		WB	-	FV	-	A4	2.46	2.90	1.95	5.87	9.04	2.69	4.38	3.70	5.6	*7.8*	41.0
	HZL 41/22		WB	-	FV	-	A4	1.57	1.87	0.94	0.97	5.15	0.86	2.49	1.23	5.6	*7.8*	12.0
	HL 41/83 ④		WB	⑤	FV	-	-	3.93	5.02	4.07	37.07	16.93	8.85	8.20	12.03	5.6	*7.8*	133.0
	HL 41/62 ④		WB	⑤	FV	-	-	3.14	3.99	3.04	17.27	13.03	5.47	6.31	7.35	5.6	*7.8*	81.0
	HL 36/36		WB	-	FV	-	A4	2.00	2.42	1.75	3.65	5.78	1.97	3.21	2.64	4.4	*6.2*	36.0
	HL 28/28		WB	SV	FV	-	A4	1.22	1.48	1.41	1.33	1.98	0.95	1.47	1.25	3.0	*4.2*	25.5
	HL 28/15		WB	-	FV	A2	A4	0.86	1.16	0.71	0.32	1.35	0.40	0.98	0.55	3.9	*5.5*	7.0
	HL 20/12		WB	-	FV	A2	-	0.45	0.53	0.59	0.09	0.35	0.14	0.36	0.19	2.2	*3.1*	4.6

Cold-rolled

HL/HZL channel dimensions/holes and spacings

Profile HL/HZL	D [mm]	L [mm]	A [mm]	a [mm]
50/40	18	40	60	20
63/63	14	28	250	222
41/41	14	28	50	22
41/22	14	28	50	22
41/83	14	28	50	22
41/62	14	28	50	22
36/36	15	40	60	20
28/28	12.5	25	40	15
26/26	12.5	25	40	15
28/15	9	25	40	15
20/12	9	25	40	15

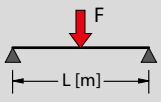


Other hole sizes and spacings on request

HALFEN Framing Channels, Cold-Rolled, Slotted – Bending Load Capacities

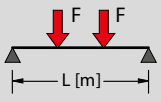
Material: steel, type WB, FV, SV E= 210.000 N/mm²

Bending load capacity at span L (single span element) ②



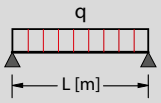
F [kN]

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
5.7	*7.98*	2.9	*4.06*	1.9	*2.66*



F [kN]

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
4.3	*6.02*	2.1	*2.94*	1.3	*1.82*



q[kN/m]

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
22.9	*32.06*	5.7	*7.98*	2.3	*3.22*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
16.5	*23.1*	8.2	*11.5*	5.5	*7.7*
4.7	*6.6*	2.3	*3.2*	1.6	*2.2*
1.6	*2.2*	0.7	*1.0*	0.3	*0.4*
4.5	*6.3*	2.3	*3.2*	1.5	*2.1*
1.5	*2.1*	0.6	*0.8*	0.3	*0.4*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
12.4	*17.4*	6.2	*8.7*	4.1	*5.7*
3.5	*4.9*	1.7	*2.4*	1.1	*1.5*
1.2	*1.7*	0.4	*0.6*	0.17	*0.2*
3.4	*4.8*	1.7	*2.4*	1	*1.4*
1.1	*1.5*	0.4	*0.6*	0.16	*0.2*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
66	*92.4*	16.5	*23.1*	7.3	*10.2*
18.7	*26.2*	4.7	*6.6*	1.9	*2.7*
6.2	*8.7*	1.1	*1.5*	0.3	*0.4*
18.1	*25.3*	4.5	*6.3*	1.9	*2.7*
6	*8.4*	1	*1.4*	0.3	*0.4*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
7.3	*10.2*	3.7	*5.2*	2.4	*3.4*
4.5	*6.3*	2.2	*3.1*	1.3	*1.8*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
1.00m		**2.00 m**		**3.00 m**	
5.5	*7.7*	2.8	*3.9*	1.6	*2.2*
3.4	*4.8*	1.7	*2.4*	0.8	*1.1*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
1.00 m		**2.00 m**		**3.00 m**	
14.7	*20.6*	3.7	*5.2*	1.5	*2.1*
9	*12.6*	2.2	*3.1*	0.7	*1.0*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
3.20	*4.48*	1.60	*2.24*	1.10	*1.54*
1.50	*2.10*	0.80	*1.12*	0.40	*0.56*
0.70	*0.98*	0.22	*0.31*	0.10	*0.14*
0.23	*0.32*	0.06	*0.08*	0.03	*0.04*

allow. F_z	F_{Rd}	allow. F_z	F_{Rd}	allow. F_z	F_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
2.40	*3.36*	1.20	*1.68*	0.60	*0.84*
1.10	*1.54*	0.50	*0.70*	0.23	*0.32*
0.50	*0.70*	0.13	*0.18*	0.06	*0.08*
0.14	*0.20*	0.04	*0.06*	0.02	*0.03*

allow. q_z	q_{Rd}	allow. q_z	q_{Rd}	allow. q_z	q_{Rd}
0.50 m		**1.00 m**		**1.50 m**	
12.90	*18.06*	3.20	*4.48*	1.20	*1.68*
6.10	*8.54*	1.40	*1.96*	0.40	*0.56*
2.70	*3.78*	0.30	*0.42*	0.10	*0.14*
0.80	*1.12*	0.10	*0.14*	0.03	*0.04*

① Observe minimum distance a_e between channel end and load point (HALFEN Bolt, locking plate):
heavy and medium duty framing systems: $a_e \geq 30$ mm,
light duty framing systems: $a_e \geq 20$ mm.

② Do not exceed the bolt load capacity or the max. channel load bearing capacity.

③ For maximum point-load capacity:
F_z = max, load bearing capacity of the channel lips.

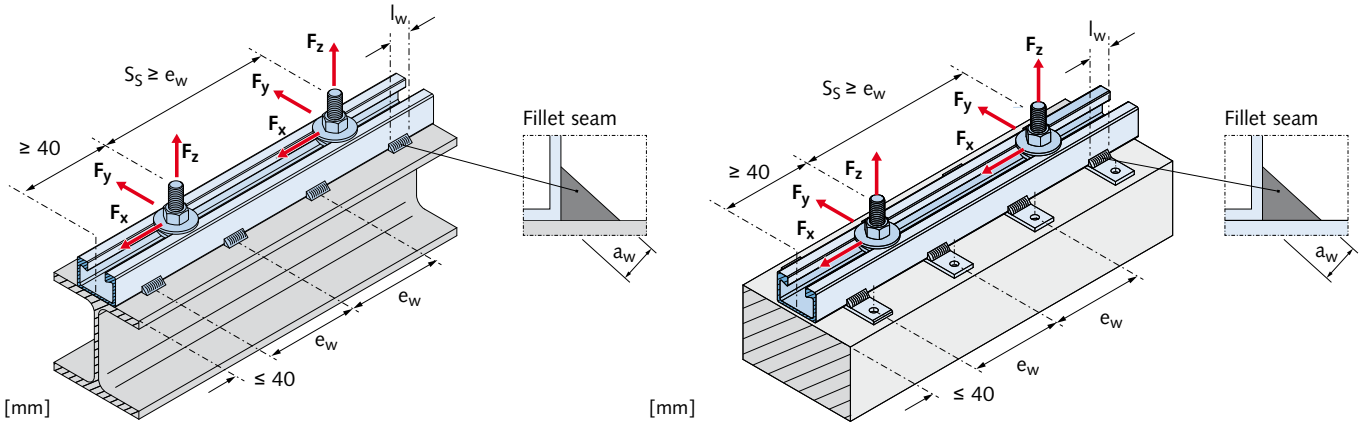
④ Take constructive measures to prevent failure caused by bulging, tilting and buckling.

⑤ On request.

All load capacities were calculated using the elastic-plastic method acc. to EN 1993-1,
partial safety factor $\gamma_F = 1{,}4$; deflection ≤ l / 150.
Determination of the allowable value
allow. F_z = F_{Rd} / 1.4.

Note: For stainless steel framing channels the bending deflection value must be verified separately using the valid E-modulus of elasticity.

Hot-rolled framing channels welded or bolted to structural elements



Load bearing capacities for welded or bolted hot-rolled framing channels

	Profile	Weld seams			Point-load bearing capacity ⑤						HALFEN Bolts	
					allowable load F① [kN]			Design values of resistance F_{Rd} ① [kN]			Bolt size	Spacing
		a_w [mm]	l_w [mm]	e_w [mm]	allow. F_z	allow. F_y	allow. F_x	$F_{z,Rd}$	F_{yRd}	$F_{x,Rd}$	diam. [mm]	S_s
Hot-rolled	HM 72/48	5	50	300	47.0	10.8 ④	②	*65.8*	*15.2* ④	②	M24	$S_s \geq e_w$
	HM 55/42	4	30	250	38.6	17.2		*54.0*	*24.0*		M20	
	HM 52/34	4	30	200	25.9	14.9		*36.3*	*20.9*		M20	
	HM 50/30	4	30	200	14.4	10.0		*20.2*	*14.0*		M20	
	HM 40/22	3	30	150	8.2	4.7		*11.4*	*6.6*		M16	
	HZM 64/44	5	40	250	38.1	12.5	27.0	*53.3*	*17.4*	*37.8*	M24	
	HZM 53/34	4	30	200	30.9	9.3	22.0/19.0③	*43.3*	*13.1*	*30.8/26.6*③	M20	
	HZM 41/27	4	30	200	17.8	4.4	12.0	*25.0*	*6.2*	*16.8*	M16	
	HZM 38/23	4	30	200	12.8	4.2	12.0	*18.0*	*5.9*	*16.8*	M16	
	HZM 29/20	3	30	150	8.0	1.5	8.0	*11.2*	*2.0*	*11.2*	M12	

② Recommended load bearing capacities in channel longitudinal direction for standard (non-serrated) channels can be found on the dedicated product page
③ For stainless steel
④ For this determined value, failure of the A4 bolt is decisive

① In case of simultaneous loading in all directions the following criterion must be met:

$$\frac{F_z}{\text{allow. } F_z} + \frac{F_y}{\text{allow. } F_y} + \frac{F_x}{\text{allow. } F_x} \leq 1$$

resp.

$$\frac{F_{z,Ed}}{F_{z,Rd}} + \frac{F_{y,Ed}}{F_{y,Rd}} + \frac{F_{x,Ed}}{F_{x,Rd}} \leq 1$$

F_x, F_y, F_z = existing load;
allow. F = allowable point-load capacity

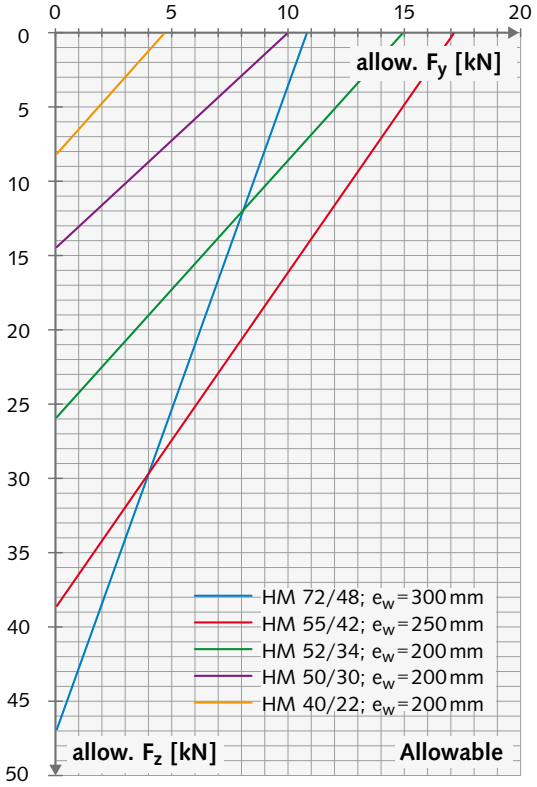
resp.

$F_{x,Ed}$, $F_{y,Ed}$, $F_{z,Ed}$ = Design values of action;
$F_{x,Rd}$, $F_{y,Rd}$, $F_{z,Rd}$ = Design values of resistance

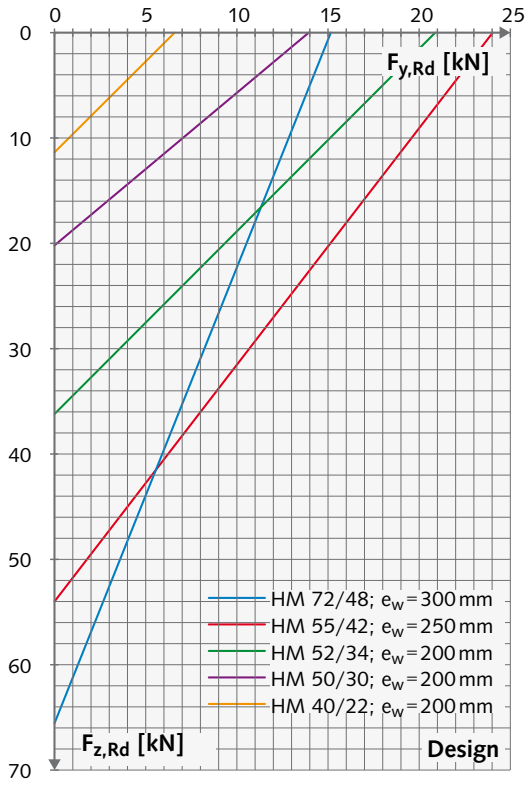
⑤ The bearing capacities are for loads acting on the front edge of the channel. For off-set transverse load (e.g. stand-off installations) the bending moment of the bolt must be considered and superimposed with the tensile load, see page 69.

Framing channels welded or bolted to structural elements

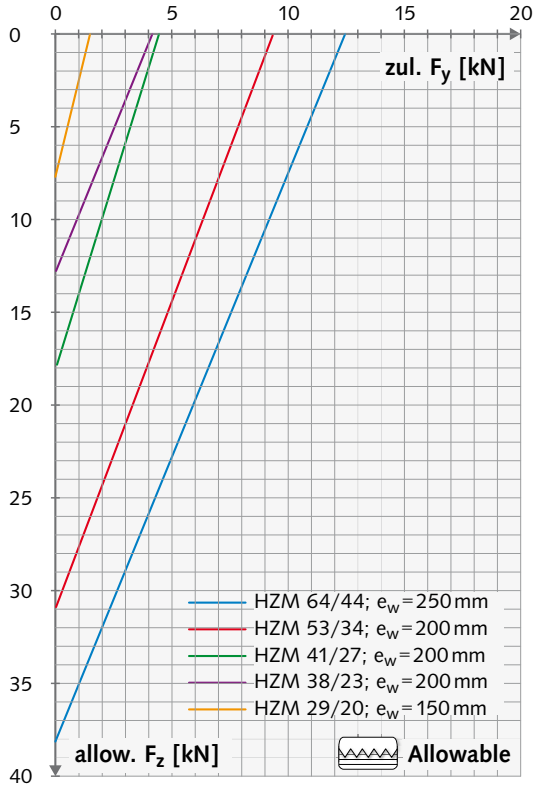
Allowable point-load capacities for HM Channels



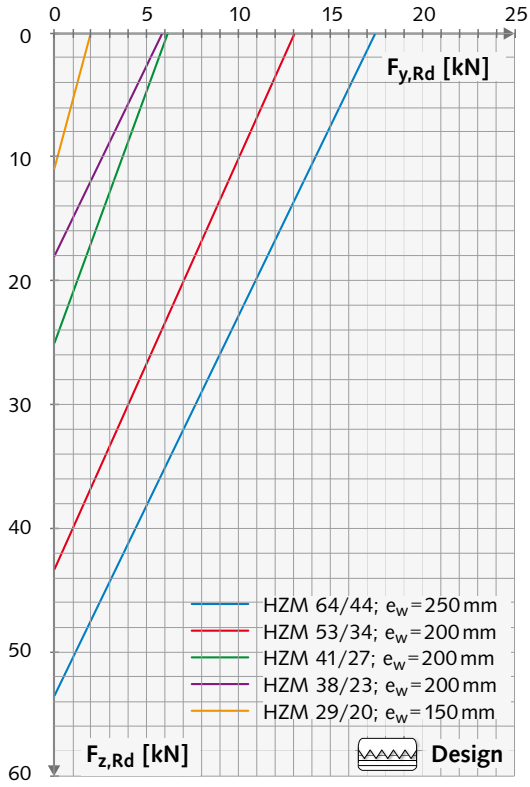
Design point-load for HM Channels



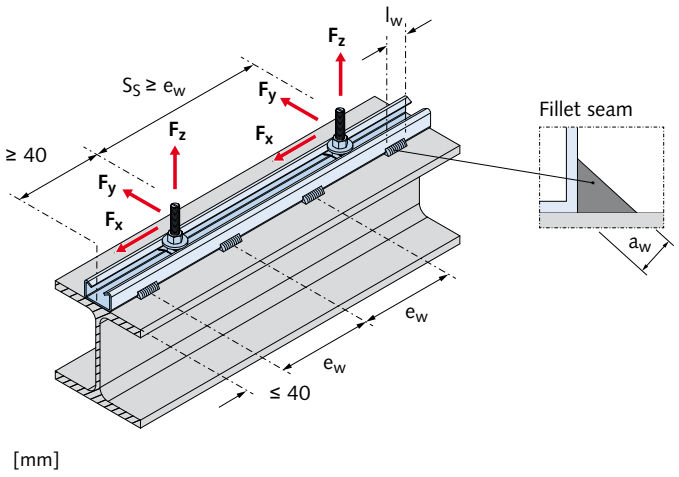
Allowable point-load capacities for HZM Channels



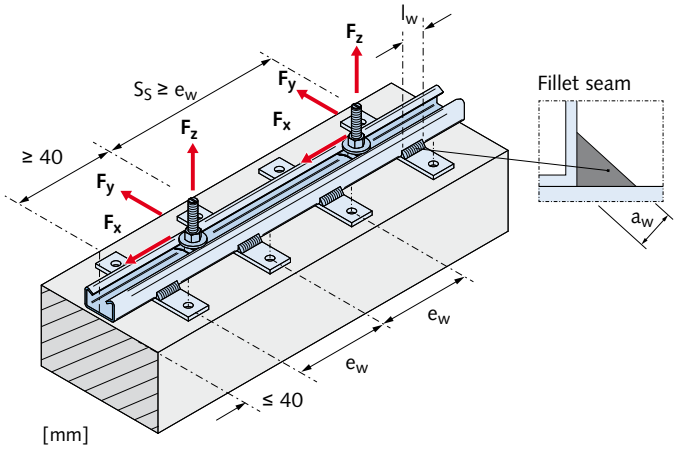
Design point-load for HZM Channels



Cold-rolled framing channels welded or bolted to structural elements



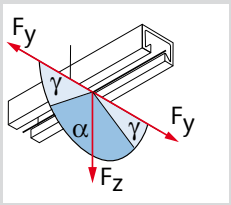
[mm]



[mm]

Load bearing capacities for welded or bolted cold-rolled framing channels

Cold-rolled



Tension area
α ≤ 60°

Transverse tension area
γ < 60°

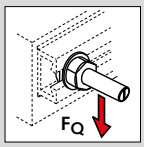
Profil	Weld seams			Point-load bearing capacities ②					
				Tension α ≤ 60° F_z [kN]		Transverse tension γ < 60° F_y [kN]		Longitudinal tension F_x [kN]	
	a_w [mm]	l_w [mm]	e_w [mm]	allow. F_z	$F_{z,Rd}$	allow. F_y	$F_{y,Rd}$	allow. F_x	$F_{x,Rd}$
HM 50/40	3	30	400	5.4	*7.6*	1.9	*2.7*	①	①
HZM 41/41	3	30	300	5.6	*7.8*	1.2	*1.7*	5.0	*7.0*
HZM 41/22	3	30	120	5.6	*7.8*	1.5	*2.1*	5.0	*7.0*
HM 41/41	3	30	300	5.6	*7.8*	1.2	*1.7*		
HM 41/22	3	30	120	5.6	*7.8*	1.5	*2.1*		
HM 36/36	3	30	300	4.4	*6.2*	1.2	*1.7*	①	①
HM 38/17	3	30	100	4.8	*6.7*	2.5	*3.5*		
HM 28/15	3	30	100	2.5	*3.5*	1.2	*1.7*		

① Recommended load bearing capacities in channel longitudinal direction for standard (non-serrated) channels can be found on the dedicated product page

② The bearing capacities are for loads acting on the front edge of the channel. For off-set transverse load (e.g. stand-off installations) the bending moment of the bolt must be considered and superimposed with the tensile stress, see page 69.

Bending moments of HALFEN Bolts

Bending moments of HALFEN Bolts

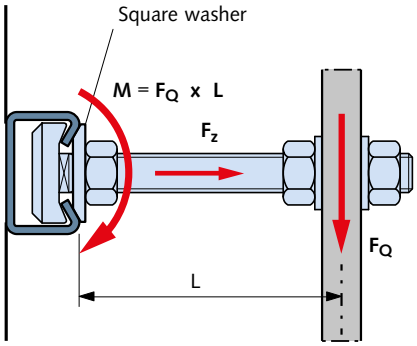


Recommended bolt bending moments from the front edge of the HALFEN Channel

Strength class

Thread Ø	4.6		8.8		A2-50; A4-50		A2-70; A4-70	
	allow. M	M_{Rd} ①	allow. M	M_{Rd} ①	allow. M	M_{Rd} ①	allow. M	M_{Rd} ①
M6	2.0	2.8	-	-	1.8	2.5	3.8	5.3
M8	5.0	7.0	-	-	4.4	6.2	9.4	13.2
M10	10.0	14.0	24.9	34.9	8.7	12.2	18.7	26.2
M12	17.5	24.5	43.7②	61.2②	15.3	21.4	32.8②	45.9②
M16	44.4	62.2	111.0③	155.4③	38.8	54.3	83.3③	116.6③
M20	86.5	121.1	216.4	303.0	75.7	106.0	162.3	227.2
M24	149.7	209.4	374.2	524.0	131.1	183.3	156.2	218.7
M27	221.9	310.7	554.8	776.7	-	-	-	-
M30	299.9	419.9	-	-	-	-	-	-

① Recommended design value of bending moment capability for HALFEN Bolts
② For profile **HM/HL 28/15** bending moment must be reduced to M_{Rd} = 42 Nm resp. allow. M = 30 Nm
③ For profile **HM/HL 38/17** bending moment must be reduced to M_{Rd} = 91 Nm resp. allow. M = 65 Nm



A square washer must always be used with stand-off installations.

In cases of bending with additional centric tension the action loads must be superimposed with the tensile load.

$$F_z \leq \text{allow. } F \cdot \left(1 - \frac{M}{\text{allow. } M}\right)$$

resp.

$$F_{z,Ed} \leq F_{Rd} \cdot \left(1 - \frac{M_{Ed}}{M_{Rd}}\right)$$

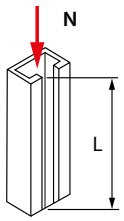
F_z = existing tension load
allow. F_z = allowable load bearing capacity of the bolt
M = existing bending moment of the bolt
allow. M = allowable bending moment of the bolt

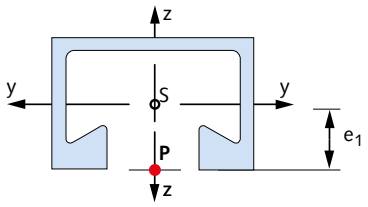
resp.

$F_{z,Ed}$ = Design value for the existing tension load of the bolt
$F_{z,Rd}$ = Design value for the resistance of the bolt
M_{Ed} = Design value for the existing bending moment of the bolt
M_{Rd} = Design value for bending moment resistance of the bolt

HALFEN Framing channels as compression element – hot-rolled

Flexural buckling acc. to EN 1993-1-1
(Point-load applied at P)





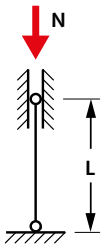


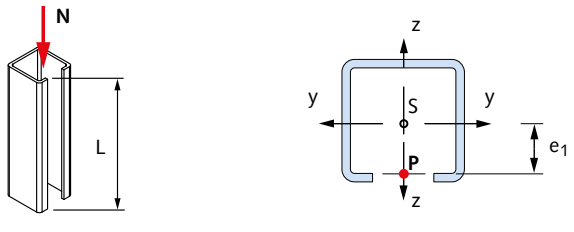
Table footnotes → see page 71

Load bearing capacities – flexural buckling

	Type	Cross-section properties						N [kN] ①,② for element length L [mm]									
		A [cm²]	e_1 [cm]	I_y [cm⁴]	W_y [cm³]	W_{pl} [cm³]		500	1000	1500	2000	2500	3000	3500	4000	4500	5000
								[kN]									
Hot-rolled framing channels	HM 72/48	11.27	2.40	34.97	14.28	18.28	N_{Rd}	*104.6*	*81.6*	*62.0*	*50.0*	*40.0*	*32.2*	*26.4*	*21.8*	*18.4*	*15.6*
							allow. N	74.7	58.3	44.3	35.7	28.6	23.0	18.9	15.6	13.1	11.1
	HM 55/42	8.61	2.21	18.75	8.49	11.73	N_{Rd}	*79.0*	*57.5*	*43.0*	*32.8*	*25.1*	*19.8*	*15.8*	*12.9*	*10.7*	*9.0*
							allow. N	56.4	41.1	30.7	23.4	17.9	14.1	11.3	9.2	7.6	6.4
	HM 52/34	6.34	1.74	9.33	5.35	7.19	N_{Rd}	*50.4*	*34.6*	*25.3*	*18.5*	*13.9*	*10.7*	*8.5*	*6.8*	*5.6*	*4.7*
							allow. N	36.0	24.7	18.1	13.2	9.9	7.6	6.1	4.9	4.0	3.4
	HM 50/30	4.15	1.63	5.26	3.23	4.38	N_{Rd}	*31.8*	*21.4*	*15.3*	*11.0*	*8.2*	*6.3*	*4.9*	*4.0*	*3.2*	*2.7*
							allow. N	22.7	15.3	10.9	7.9	5.8	4.5	3.5	2.8	2.3	1.9
	HM 40/22	2.70	1.25	1.99	1.59	2.17	N_{Rd}	*18.2*	*11.2*	*7.3*	*5.0*	*3.5*	*2.6*	-	-	-	-
							allow. N	13.0	8.0	5.2	3.5	2.5	1.9	-	-	-	-
	HM 72/48 D	22.54	4.85	205.15	42.30	55.20	N_{Rd}	*195.2*	*169.2*	*148.0*	*128.0*	*110.0*	*98.0*	*87.0*	*77.0*	*68.5*	*61.0*
							allow. N	139.4	120.9	105.7	91.4	78.6	70.0	62.1	55.0	48.9	43.6
	HM 55/42 D	17.22	4.20	105.70	25.17	34.27	N_{Rd}	*155.0*	*130.0*	*109.0*	*90.0*	*78.0*	*67.0*	*57.5*	*46.3*	*43.0*	*37.5*
							allow. N	110.7	92.9	77.9	64.3	55.7	47.9	41.1	33.1	30.7	26.8
	HM 52/34 D	12.70	3.35	51.49	15.37	20.42	N_{Rd}	*97.0*	*80.0*	*64.5*	*53.5*	*45.0*	*37.5*	*31.8*	*26.9*	*23.1*	*20.0*
							allow. N	69.3	57.1	46.1	38.2	32.1	26.8	22.7	19.2	16.5	14.3
	HM 50/30 D	8.27	3.00	26.56	8.85	11.52	N_{Rd}	*61.5*	*49.0*	*38.5*	*31.7*	*26.0*	*21.5*	*17.9*	*15.0*	*12.8*	*11.0*
							allow. N	43.9	35.0	27.5	22.6	18.6	15.4	12.8	10.7	9.1	7.9
	HM 40/22 D	5.33	2.30	10.06	4.38	5.73	N_{Rd}	*37.0*	*27.5*	*20.9*	*16.1*	*12.6*	*10.0*	*8.1*	*6.7*	*5.6*	*4.7*
							allow. N	26.4	19.6	14.9	11.5	9.0	7.1	5.8	4.8	4.0	3.4
	HZM 64/44	9.10	2.30	23.83	10.36	13.66	N_{Rd}	*91.0*	*68.0*	*51.0*	*39.5*	*30.5*	*24.3*	*19.5*	*16.0*	*13.3*	*11.2*
							allow. N	65.0	48.6	36.4	28.2	21.8	17.4	13.9	11.4	9.5	8.0
	HZM 53/34	5.88	1.86	9.19	4.95	6.80	N_{Rd}	*51.8*	*35.0*	*25.5*	*18.5*	*13.9*	*10.6*	*8.4*	*6.8*	*5.6*	*4.7*
							allow. N	37.0	25.0	18.2	13.2	9.9	7.6	6.0	4.8	4.0	3.3
	HZM 41/27	4.31	1.51	3.90	2.57	3.74	N_{Rd}	*31.5*	*20.0*	*13.2*	*9.2*	*6.7*	*5.0*	*3.9*	*3.1*	*2.5*	-
							allow. N	22.5	14.3	9.4	6.6	4.8	3.6	2.8	2.2	1.8	-
	HZM 38/23	3.10	1.33	2.11	1.59	2.31	N_{Rd}	*20.7*	*12.5*	*7.9*	*5.3*	*3.8*	*2.8*	*2.2*	-	-	-
							allow. N	14.8	8.9	5.6	3.8	2.7	2.0	1.6	-	-	-
	HZM 29/20	1.99	1.12	1.02	0.91	1.31	N_{Rd}	*12.5*	*7.1*	*4.3*	*2.8*	-	-	-	-	-	-
							allow. N	8.9	5.1	3.1	2.0	-	-	-	-	-	-
	HZM 64/44 D	18.21	4.40	127.94	29.08	38.23	N_{Rd}	*171.0*	*144.5*	*122.0*	*102.0*	*88.5*	*76.5*	*66.0*	*57.5*	*50.0*	*43.9*
							allow. N	122.1	103.2	87.1	72.9	63.2	54.6	47.1	41.1	35.7	31.4
	HZM 53/34 D	11.75	3.40	46.38	13.64	18.14	N_{Rd}	*100.0*	*81.0*	*63.5*	*53.0*	*43.5*	*36.3*	*30.3*	*25.5*	*21.7*	*18.8*
							allow. N	71.4	57.9	45.4	37.9	31.1	25.9	21.6	18.2	15.5	13.4
	HZM 41/27 D	8.62	2.70	19.91	7.37	10.22	N_{Rd}	*65.5*	*49.5*	*38.0*	*29.8*	*23.5*	*18.9*	*15.3*	*12.7*	*10.6*	*9.0*
							allow. N	46.8	35.4	27.1	21.3	16.8	13.5	10.9	9.1	7.6	6.4
	HZM 38/23 D	6.19	2.30	10.04	4.36	6.00	N_{Rd}	*43.6*	*30.9*	*23.4*	*17.5*	*13.5*	*10.6*	*8.5*	*6.9*	*5.8*	*4.9*
							allow. N	31.1	22.1	16.7	12.5	9.6	7.6	6.1	4.9	4.1	3.5
	HZM 29/20 D	3.97	2.00	5.12	2.56	3.49	N_{Rd}	*27.9*	*19.1*	*13.8*	*10.0*	*7.6*	*5.9*	*4.6*	*3.8*	*3.1*	*2.6*
							allow. N	19.9	13.6	9.9	7.1	5.4	4.2	3.3	2.7	2.2	1.8

HALFEN Framing channels as compression elements — cold-rolled

Flexural buckling acc to. EN 1993-1-1
(Point-load applied at P)



Load bearing capacities — Flexural buckling

	Type	Cross-section properties						N [kN] ①,② for element length L [mm]									
		A [cm²]	e_1 [cm]	I_y [cm⁴]	W_y [cm³]	W_{pl} [cm³]		500	1000	1500	2000	2500	3000	3500	4000	4500	5000
								[kN]									
Cold-rolled framing channels	**HM 50/40**	4.26	2.18	8.64	3.96	5.53	N_{Rd}	*33.2*	*24.6*	*18.5*	*14.2*	*11.1*	*8.8*	*7.0*	*5.8*	*4.8*	*4.1*
							allow. N	23.7	17.6	13.2	10.1	7.9	6.3	5.0	4.1	3.5	2.9
	HM 41/41	3.40	2.31	7.47	3.24	4.57	N_{Rd}	*26.3*	*19.7*	*15.0*	*11.7*	*9.2*	*7.3*	*6.0*	*4.9*	*4.1*	*3.5*
							allow. N	18.8	14.1	10.7	8.4	6.6	5.2	4.3	3.5	2.9	2.5
	HM 36/36	2.80	2.07	4.54	2.19	3.19	N_{Rd}	*19.7*	*14.1*	*10.6*	*8.0*	*6.1*	*4.8*	*3.9*	*3.2*	*2.6*	*2.2*
							allow. N	14.1	10.1	7.5	5.7	4.4	3.4	2.8	2.3	1.9	1.6
	HM 28/28	1.73	1.58	1.70	1.08	1.54	N_{Rd}	*11.4*	*7.5*	*5.2*	*3.7*	*2.7*	-	-	-	-	-
							allow. N	8.1	5.4	3.7	2.6	2.0	-	-	-	-	-
	HZM 41/41	3.36	2.33	7.34	3.15	4.48	N_{Rd}	*25.5*	*19.3*	*14.6*	*11.4*	*9.0*	*7.2*	*5.8*	*4.8*	*4.0*	*3.4*
							allow. N	18.2	13.8	10.4	8.1	6.4	5.1	4.1	3.4	2.9	2.4
	HZM 41/41 D	6.71	4.13	36.45	8.83	12.09	N_{Rd}	*49.0*	*41.5*	*35.0*	*29.1*	*25.3*	*21.8*	*18.8*	*16.3*	*14.2*	*12.5*
							allow. N	35.0	29.6	25.0	20.8	18.1	15.6	13.4	11.6	10.1	8.9
	HL 50/40	3.73	1.95	7.14	3.65	4.68	N_{Rd}	*31.5*	*22.8*	*16.9*	*12.8*	*9.8*	*7.7*	*6.1*	*5.0*	*4.1*	*3.5*
							allow. N	22.5	16.3	12.1	9.1	7.0	5.5	4.4	3.6	2.9	2.5
	HL 41/41	2.98	2.14	6.07	2.84	3.82	N_{Rd}	*23.8*	*17.5*	*13.2*	*10.1*	*7.9*	*6.2*	*5.0*	*4.1*	*3.4*	*2.9*
							allow. N	17.0	12.5	9.4	7.2	5.6	4.4	3.6	2.9	2.4	2.0
	HL 36/36	2.42	1.85	3.65	1.97	2.64	N_{Rd}	*18.3*	*12.7*	*9.4*	*7.0*	*5.3*	*4.1*	*3.2*	*2.6*	-	-
							allow. N	13.1	9.1	6.7	5.0	3.8	2.9	2.3	1.9	-	-
	HL 28/28	1.48	1.39	1.33	0.95	1.25	N_{Rd}	*10.4*	*6.7*	*4.5*	*3.1*	*2.3*	-	-	-	-	-
							allow. N	7.4	4.8	3.2	2.2	1.6	-	-	-	-	-
	HZL 63/63 ③	7.09	3.01	33.07	10.06	13.51	N_{Rd}	*65.0*	*53.2*	*43.3*	*35.4*	*29.7*	*24.8*	*20.9*	*17.7*	*15.2*	*13.1*
							allow. N	46.4	38.0	30.9	25.3	21.2	17.7	14.9	12.6	10.9	9.4
	HZL 41/41	2.90	2.18	5.87	2.69	3.70	N_{Rd}	*22.5*	*16.7*	*12.6*	*9.7*	*7.5*	*6.0*	*4.8*	*4.0*	*3.3*	*2.8*
							allow. N	16.1	11.9	9.0	6.9	5.4	4.3	3.4	2.8	2.3	2.0

① N_{Rd} = Design value of resistance
allow. N = allowable load

② allow. N = N_{Rd} / 1.4; E = 170 000 N/mm²

③ allow. N = N_{Rd} / 1.4; E = 210 000 N/mm²

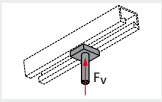
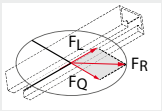
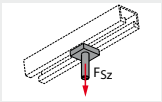
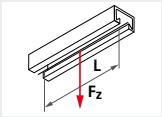
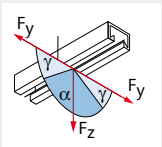
Note:
For higher excentricity "e > e_1" a flexural buckling analysis acc. to Eurocode 3 is necessary.

Information on dimensioning

When designing an adjustable assembly system the external load F_i must be less or equal to the minimum permissible load of the bolt F_s and to the maximum point-load capacity and respectively to the bending load capacity of the HALFEN Framing channel F_z.
$F_i \leq MIN\ (F_s; F_z)$ (→ see page 49)
$F_i \leq MIN\ (F_{Bolt}; F_{Channel})$; $F_{Channel}$ → see page 59 ff.

Design value of the resistance:	**$F_{R,d} = 1.4 \times F$ (Forces)**
Design value of the moment resistance:	**$M_{R,d} = 1.4 \times M$ (Moments)**

All following load specifications are allowable loads.

Symbols and definitions used for mechanical engineering — steel construction industry			
HALFEN Bolts	**F_v**		**Preloading force, bolt** The preloading force of the bolt occurs by applying a torque on the bolt and is calculated according to VDI 2230 guidelines.
	F_R		**Resulting force** The resulting force **F_R** is the vector addition of the external loads F_L in the longitudinal channel direction and the external load FQ transverse to the longitudinal channel direction; the resulting force is frictionally connected to the channel. $F_R = \sqrt{(F_L^2 + F_Q^2)}$
	F_{Sz}		**Force in the longitudinal bolt direction** The force **F_{SZ}** is an external load through the screws longitudinal axis, perpendicular to the channel surface and is transferred positive-locked to the channel.
HALFEN Framing channels	**F_z**		**Maximum point-load-carrying capacity — centric load** The load carrying capacity of the channel lips is decisive. Load figures are only valid for continuous welded channels or intermittent welds according to the table on page 66 ff. In all other cases the suitability of the welding seam must be checked.
	F_y		**Load capacity of the channels under transverse load angle y < 60°** Permissible load for a defined angle to the welded or bolted channels.
	F_z		**Load capacity of the channels under transverse load angle α ≤ 60°** Permissible load for a defined load angle to the welded or bolted channels.

The force F_{sz} along the screw longitudinal axis must be less or equal to the maximum point-load capacity of the framing channel **F_Z**.

$F_{Sz} \leq F_Z$

The force **F_Q** transverse to the longitudinal channel direction must be less or equal to the load capacity transverse to the longitudinal channel direction of the framing channel **F_y**.

$F_Q \leq F_y$

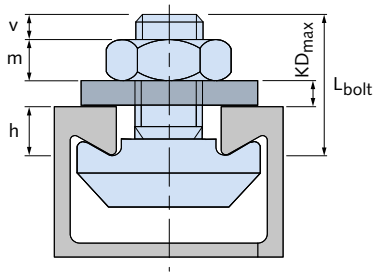
Required bolt length L_{bolt}

The required bolt length L_{bolt} is the sum of the clamp thickness KD and the minimum required supplement L_{sup}.

The thread protrusion v has to extend pass the nut at least 0.5 x the nut height m (DIN EN 24032 regulation for nuts).

$$L_{bolt} = KD + L_{sup}$$
$$L_{sup} = h + m + v$$

Minimum required supplement L_{sup} according to the table below



Minimum required supplement for HALFEN Bolts (heavy duty framing systems) [mm]

Thread	HM 72/48	HM 55/42	HM 52/34	HM 50/30	HM 49/30	HM 40/22	HM 40/25	HM 422	HZM 64/44	HZM 53/34	HZM 41/27	HZM 38/23	HZM 29/20	HM 50/40	HM 486
M6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M8	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-
M10	-	25	24	20	20	18	18	18	-	-	18	17	15	-	-
M12	-	29	27	24	23	22	22	22	-	-	21	21	16	19	18
M16	-	35	33	30	29	28	28	28	-	28	27	27	20	23	22
M20	42	39	38	34	34	-	-	-	34	32	-	-	-	29	28
M24	47	-	-	-	-	-	-	-	40	-	-	-	-	33	32
M27	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M30	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Minimum required supplement for HALFEN Bolts (medium duty framing systems) [mm]

Thread	HZL 63/63	HM 41/41	HM 41/22	HM 41/62	HM 41/83	HLL 41/41	HLL 41/22
M6	-	-	-	-	-	-	-
M8	-	18	18	18	18	18	18
M10	-	19	19	19	19	19	19
M12	19	23	23	23	23	23	23
M16	23	29	29	29	29	29	29
M20	29	-	-	-	-	-	-
M24	33	-	-	-	-	-	-

Minimum required supplement for HALFEN Bolts (light duty framing systems) [mm]

Thread	HM 36/36	HM 38/17	HM 28/28	HM 26/26	HM 28/15	HM 315	HM 20/12
M6	-	-	-	-	-	-	-
M8	-	-	10	9	10	9	9
M10	15	15	13	12	13	12	12
M12	18	19	14	13	14	14	-
M16	24	25	18	17	18	17	-

Static and dynamic tension tests

The transferability of static and dynamic loads for adjustable assembly systems was intensely studied in cooperation with the State Material Testing Institute at the TU Darmstadt (**T**echnical **U**niversity Darmstadt).

Following VDI guideline 2230, the data acquired from bolt tightening tests, static and dynamic traction tests form the basis of algorithms used for calculating adjustable assembly systems.

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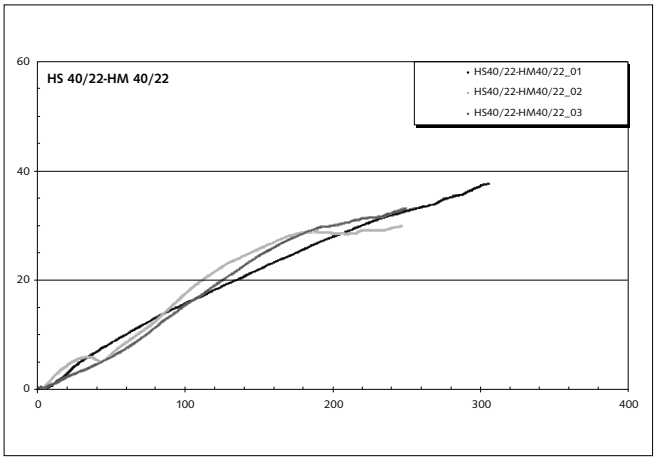
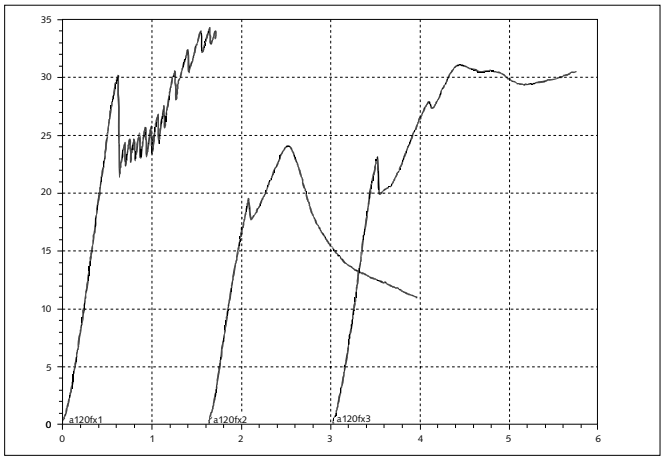
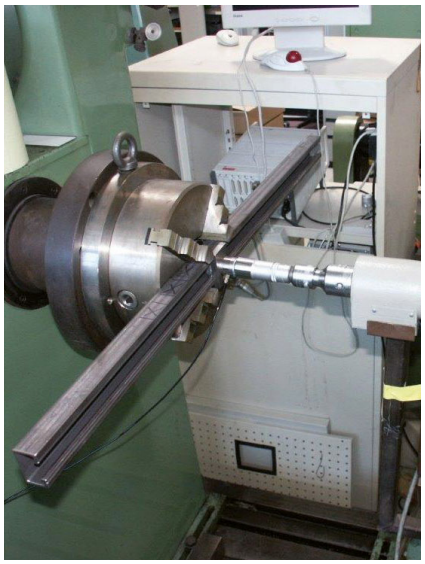


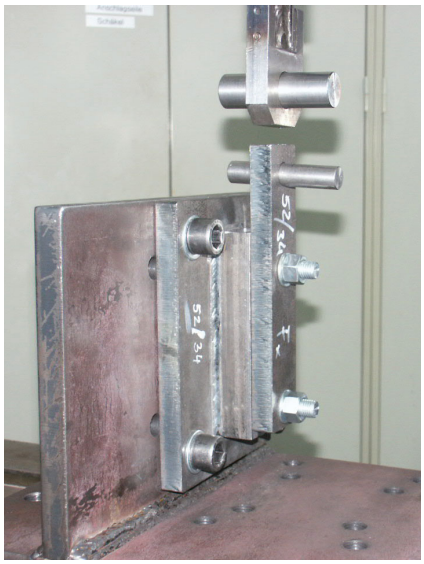
Graph; tightening test results



Graph, tension test results



Tightening test



Tension test

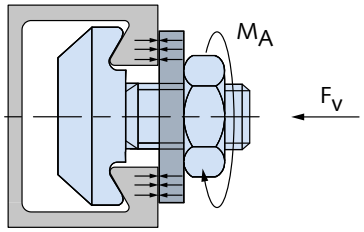
Fatigue test

Generating the preloading force F_V

During assembly of bolt connections the torque M_A induces a preloading force F_v in the bolt, which results in clamping the component to the framing channel. The preloading force F_v depends on the torque M_A, the friction coefficients μ_G of the bolt thread and μK on the nut contact surface.

The preloading forces for stainless steel bolts 50/70 and for HALFEN Bolts in steel, strength class 4.6 and 8.8 are specified in the following tables (ref. Rohloff-Matek).
The data listed for the torque M_A are recommended values. Standard delivery condition for HALFEN Bolts is non-lubricated, installation ready.

The friction coefficients μ_G and μ_K are 0.24.



Preload force F_V, strength class 4.6 [kN]

	M_A [Nm]	Friction coefficient $\mu_G = \mu_K$												
		0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36
M6	3	3.0	2.6	2.3	2.1	1.9	1.8	**1.6**	1.5	1.4	1.3	1.2	1.2	1.1
M8	8	6.1	5.3	4.7	4.3	3.9	3.5	**3.3**	3.0	2.8	2.7	2.5	2.4	2.2
M10	15	9.2	8.0	7.1	6.4	5.8	5.3	**4.9**	4.6	4.3	4.0	3.8	3.6	3.4
M12	25	12.9	11.3	10.0	9.0	8.2	7.5	**6.9**	6.4	6.0	5.6	5.3	5.0	4.7
M16	65	25.6	22.3	19.8	17.8	16.1	14.8	**13.6**	12.6	11.8	11.0	10.4	9.8	9.2
M20	130	40.8	35.6	31.6	28.4	25.7	23.6	**21.7**	20.1	18.8	17.6	16.5	15.6	14.8
M24	230	60.5	52.8	46.8	42.0	38.2	34.9	**32.2**	29.9	27.8	26.1	24.5	23.1	21.9
M27	340	79.8	69.5	61.5	55.2	50.0	45.8	**42.1**	39.1	36.4	34.1	32.0	30.2	28.6
M30	460	96.7	84.2	74.6	67.0	60.7	55.6	**51.2**	47.5	44.2	41.4	38.9	36.7	34.8

Preload force F_V, strength class 8.8 [kN]

	M_A [Nm]	Friction coefficient $\mu_G = \mu_K$												
		0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36
M8	20	15.2	13.3	11.8	10.6	9.7	8.9	**8.2**	7.6	7.1	6.6	6.2	5.9	5.6
M10	40	24.4	21.4	19.0	17.1	15.5	14.2	**13.1**	12.2	11.4	10.7	10.0	9.5	9.0
M12	70	36.1	31.6	28.1	25.2	22.9	21.0	**19.4**	18.0	16.8	15.7	14.8	14.0	13.2
M16	180	70.8	61.8	54.8	49.2	44.6	40.9	**37.7**	34.9	32.6	30.5	28.7	27.1	25.6
M20	360	113.1	98.6	87.5	78.5	71.3	65.2	**60.1**	55.8	52.0	48.7	45.8	43.2	40.9
M24	620	163.1	142.3	126.2	113.3	102.8	94.1	**86.8**	80.5	75.0	70.3	66.1	62.3	59.0
M27	900	211.2	183.9	162.8	146.1	132.5	121.1	**111.6**	103.5	96.4	90.2	84.8	80.0	75.7
M30	1200	252.1	219.7	194.7	174.7	158.5	145.0	**133.6**	123.8	115.4	108.1	101.6	95.8	90.7

Preload force F_V, strength class 50

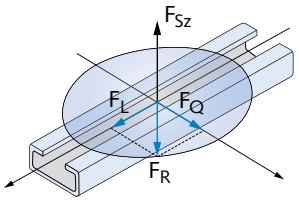
	M_A [Nm]	Friction coefficient $\mu_G = \mu_K$												
		0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36
M6	3	3.0	2.6	2.3	2.1	1.9	1.8	**1.6**	1.5	1.4	1.3	1.2	1.2	1.1
M8	7	5.3	4.6	4.1	3.7	3.4	3.1	**2.9**	2.7	2.5	2.3	2.2	2.1	2.0
M10	14	8.6	7.5	6.7	6.0	5.4	5.0	**4.6**	4.3	4.0	3.7	3.5	3.3	3.1
M12	25	12.9	11.3	10.0	9.0	8.2	7.5	**6.9**	6.4	6.0	5.6	5.3	5.0	4.7
M16	60	23.6	20.6	18.3	16.4	14.9	13.6	**12.6**	11.6	10.9	10.2	9.6	9.0	8.5
M20	120	37.7	32.9	29.2	26.2	23.8	21.7	**20.0**	18.6	17.3	16.2	15.3	14.4	13.6
M24	200	52.6	45.9	40.7	36.6	33.2	30.4	**28.0**	26.0	24.2	22.7	21.3	20.1	19.0

Preload force F_V, strength class 70

	M_A [Nm]	Friction coefficient $\mu_G = \mu_K$												
		0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36
M6	7	7.0	6.2	5.5	4.9	4.5	4.1	**3.8**	3.5	3.3	3.1	2.9	2.7	2.6
M8	15	11.4	10.0	8.9	8.0	7.2	6.6	**6.1**	5.7	5.3	5.0	4.7	4.4	4.2
M10	30	18.3	16.0	14.3	12.8	11.7	10.7	**9.9**	9.2	8.5	8.0	7.5	7.1	6.7
M12	50	25.8	22.6	20.0	18.0	16.4	15.0	**13.8**	12.9	12.0	11.2	10.6	10.0	9.4
M16	125	49.2	42.9	38.0	34.2	31.0	28.4	**26.2**	24.3	22.6	21.2	19.9	18.8	17.8
M20	245	76.9	67.1	59.5	53.5	48.5	44.4	**40.9**	38.0	35.4	33.1	31.2	29.4	27.8
M24	420	110.5	96.4	85.5	76.8	69.7	63.8	**58.8**	54.5	50.8	47.6	44.8	42.2	40.0

Transfer of static loads

External loads F_L, F_Q and F_{Sz} acting on the building component are transferred to the bolt connection by clamping.



Force F_{Sz} acts positively in the bolt longitudinal axis.

Force F_L acting in and F_Q acting transverse to the longitudinal channel direction are transferred through the component-channel surface frictionally and are added to the resulting force F_R:

$$F_R = \sqrt{F_L^2 + F_Q^2}$$

Transfer of the friction force F_R requires a normal force F_N acting in the bolt longitudinal axis:

$$F_N = \frac{F_R}{\mu_T}$$

The minimum required clamping force $F_{K,req}$ is a result of the two forces F_N and F_{Sz} acting in the bolt longitudinal axis:

$$F_{K\,req} = F_N + F_{Sz} = \frac{F_R}{\mu_T} + F_{Sz}$$

When designing the bolt connection the bolt tightening procedure and the bolt setting behavior must be considered in accordance with VDI guideline 2230. The setting factor S_{set} is intended as a safety factor because the setting force loss for adjustable bolt connections is difficult to calculate using VDI 2230. Therefore the minimum necessary assembly preloading strength $F_{M\,min}$ is:

$$F_{M\,min} = S_{set} \times F_{K\,req}$$

Taking the bolt tightening procedure into consideration with the tightening factor α_A the maximum necessary assembly preloading force $F_{M\,max}$ calculates at:

$$F_{M\,max} = \alpha_A \times F_{M\,min} = \alpha_A \times S_{set} \times \left(\frac{F_R}{\mu_T} + F_{Sz}\right)$$

The maximum required assembly preloading force $F_{M\,max}$ must be smaller than the preloading force F_V produced by the bolt tightening procedure moment M_A:

$$F_{M\,max} \leq F_V$$

The permissible loads for channel assembly systems are shown as for **delivery condition ($\mu_G = \mu_K = 0.24$)** and for **lubricated bolts ($\mu_G = \mu_K = 0.14$)** in the tables on page 77.
The values for F_R apply only to transverse force requirements ($F_{Sz} = 0$), the values for F_{Sz} for pure traction force requirement ($F_R = 0$).

When overlaying the transverse force F_R and longitudinal force F_{Sz} apply the formulas listed right for the maximum assembly preloading force $F_{M\,max}$.

Allowable loads F_R and F_{Sz}– channel bolt connection

Strength class 4.6

Thread	M_A [Nm]	Delivery condition $\mu_G = \mu_K = 0.24$ F_v [kN]	F_R [kN]	F_Z [kN]	Lubricated $\mu_G = \mu_K = 0.14$ F_v [kN]	F_R [kN]	F_Z [kN]
M6	3	1.6	0.2	0.7	2.6	0.3	1.1
M8	8	3.3	0.3	1.4	5.3	0.6	2.2
M10	15	4.9	0.5	2.1	8.0	0.8	3.3
M12	25	6.9	0.7	2.9	11.3	1.2	4.7
M16	65	13.6	1.4	5.7	22.3	2.3	9.3
M20	130	21.7	2.3	9.0	35.6	3.7	14.8
M24	230	32.2	3.4	13.4	52.8	5.5	22.0
M27	340	42.1	4.4	17.6	69.5	7.2	28.9
M30	460	51.2	5.3	21.3	84.2	8.8	35.1

Allowable loads F_R and F_{Sz} – channel bolt connection

Strength class 8.8

Thread	M_A [Nm]	Delivery condition $\mu_G = \mu_K = 0.24$ F_v [kN]	F_R [kN]	F_Z [kN]	Lubricated $\mu_G = \mu_K = 0.14$ F_v [kN]	F_R [kN]	F_Z [kN]
M10	40	13.1	1.4	5.5	21.4	2.2	8.9
M12	70	19.4	2.0	8.1	31.6	3.3	13.2
M16	180	37.7	3.9	15.7	61.8	6.4	25.7
M20	360	60.1	6.3	25.1	98.6	10.3	41.1
M24	620	86.8	9.0	36.2	142.3	14.8	59.3
M27	900	111.6	11.6	46.5	183.9	19.2	76.6

Allowable loads F_R and F_{Sz} – channel bolt connection

Strength class 50

Thread	M_A [Nm]	Delivery condition $\mu_G = \mu_K = 0.24$ F_v [kN]	F_R [kN]	F_Z [kN]	Lubricated $\mu_G = \mu_K = 0.14$ F_v [kN]	F_R [kN]	F_Z [kN]
M8	7	2.9	0.3	1.4	4.6	0.6	2.2
M10	14	4.6	0.5	2.1	7.5	0.8	3.4
M12	25	6.9	0.7	2.9	11.3	1.2	4.7
M16	60	12.6	1.3	5.3	20.6	2.2	8.6
M20	120	20.0	2.1	8.4	32.9	3.4	13.8
M24	200	28.0	2.9	11.7	45.9	4.8	19.2

Allowable loads F_R and F_{Sz} – channel bolt connection

Strength class 70

Thread	M_A [Nm]	Delivery condition $\mu_G = \mu_K = 0.24$ F_v [kN]	F_R [kN]	F_Z [kN]	Lubricated $\mu G = \mu K = 0.14$ F_v [kN]	F_R [kN]	F_Z [kN]
M8	15	6.1	0.6	2.6	10.0	1.0	4.2
M10	30	9.9	1.0	4.1	16.0	1.7	6.7
M12	50	13.8	0.9	5.8	22.6	1.4	9.4
M16	125	26.2	2.7	10.9	42.9	4.5	17.9
M20	245	40.9	4.3	17.1	67.1	7.0	28.0
M24	420	58.8	6.1	24.5	96.4	10.0	40.2

The given data is based on the following failure modes and values:

Failure mode for transverse force load F_R: component slippage
Failure mode for longitudinal force load F_{Sz}: component separation
Friction coefficient in connection: $\mu_T = 0.25$
Tightening factor (electrical-audible torque wrench): $\alpha_A = 2.0$
Safety factor setting of bolt connection: $S_{set} = 1.2$

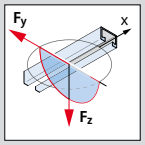
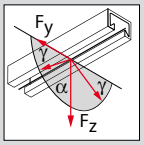
The force F_Q transverse to the longitudinal channel direction must be smaller or equal to the load capacity transverse to the longitudinal channel direction of the HALFEN Framing channel F_y (→ see table on page 78).

$$F_Q \leq F_y$$

The force in the longitudinal bolt direction F_{Sz} must be smaller or equal to the maximum point-load capacity of the HALFEN Framing channel F_z (→ see table on page 78).

$$F_{Sz} \leq F_Z$$

Point-load capacity of the HALFEN Framing channel

	Point-load capacities for hot-rolled, welded or bolted HALFEN Framing channels				Point-load capacities for cold-rolled, welded or bolted HALFEN Framing channels		
							
	Profile	allow. F_z [kN]	allow. F_y [kN]		Profile	tension $\alpha \le 60°$ allow. F_z [kN]	transverse tension $\gamma < 60°$ allow. F_y [kN]
Hot-rolled	HM 72/48	47.0	10.8	Cold-rolled	HM 50/40	5.4	1.9
	HM 55/42	38.6	17.2		HZM 41/41	5.6	1.2
	HM 52/34	25.9	14.9		HZM 41/22	5.6	1.5
	HM 50/30	14.4	10.0		HM 41/41	5.6	1.2
	HM 40/22	8.2	4.7		HM 41/22	5.6	1.5
	HZM 64/44	38.1	12.5		HM 36/36	4.4	1.2
	HZM 53/34	30.9	9.3		HM 38/17	4.8	2.5
	HZM 41/27	17.8	4.4		HM 28/15	2.5	1.2
	HZM 38/23	12.8	4.2		-	-	-
	HZM 29/20	8.0	1.5		-	-	-

The table notes on pages 66 and 68 must be observed!

Example:

Specified:	external load in longitudinal channel direction	F_L = 1.5 kN
	external load transverse to the longitudinal channel direction	F_Q = 0.5 kN
	external load in longitudinal bolt direction	F_{Sz} = 2.0 kN
	friction between component – channel	μ_T = 0.25
	setting factor	S_{set} = 1.2
	tightening factor	α_A = 2

Selected framing channel HM 50/30

Resulting load F_R	1.58 kN
Minimum required assembly preloading force $F_{M\ min}$	10 kN
Maximum required assembly preloading force $F_{M\ max}$	20 kN
Selected HALFEN Bolt 50/30, 4.6 in delivery condition	M 20
Preloading F_v	21.7 kN

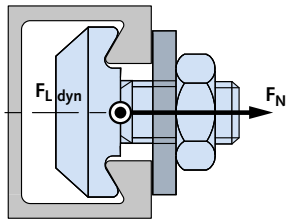
Comparison of external loads with permissible load of channel HM 50/30 with values in table above

F_z = 14.4 kN > F_{Sz} ✓
F_y = 10.0 kN > F_Q ✓

Result:
Selected framing channel: HM 50/30
Selected HALFEN Bolt: HS 50/30 – M20 - scl. 4.6 in standard delivery condition

Transfer of dynamic loads

Hot-rolled assembly channels are suitable for the transfer of dynamic loads when used in conjunction with nibbed HALFEN Bolts (type HSR) or serrated HALFEN Bolts (type HZS).
The dynamic load $F_{L\ dyn}$ acting on the building component in the longitudinal channel direction, is transferred frictionally via the channel/bolt contact surface to the channel.



A clamping force $F_{K\ req}$ acting in the bolt longitudinal axis is necessary for friction transfer $F_{L\ dyn}$:

$$F_{K\ req} = \frac{F_{L\ dyn}}{\mu_T}$$

According to VDI guideline 2230 when designing the bolt connection, the bolt tightening procedure and the bolt setting behavior must be considered.
The setting factor S_{set} is intended as a safety factor because the setting force loss for adjustable bolt connections is difficult to calculate using VDI 2230.

$$F_{M\ min} = S_{Set} \times F_{K\ req}$$

Therefore the minimum necessary assembly preloading strength $F_{M\ min}$ is:

Taking the bolt tightening procedure into consideration with the tightening factor α_A the maximum necessary assembly preloading force $F_{M\ max}$ is calculated at:

$$F_{M\ max} = \alpha_A \times S_{Set} \times \frac{F_{L\ dyn}}{\mu_T}$$

The calculated maximum assembly preloading force $F_{M\ max}$ must be smaller or equal to the preloading force F_v of the bolt (see table):

$$F_{M\ max} \leq F_V$$

The permissible dynamic loads for channel assembly systems are shown as for **delivery condition ($\mu_G = \mu_K = 0.24$)** and for a lubricated condition **($\mu_G = \mu_K = 0.14$)** in the following table.
The values are valid for **pure alternating stress with a transverse force in the longitudinal channel direction.**
The stress ratio is R = −1 and the maximum load changes value is N = 10^6.

Allowable dynamic loads $F_{L\ dyn}$ – channel-bolt connection

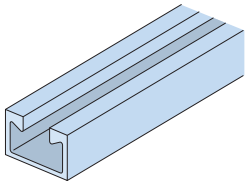
HALFEN Bolts HSR and HZS, strength class 8.8							
		Delivery condition			Lubricated		
		$\mu_G = \mu_K = 0.24$			$\mu_G = \mu_K = 0.14$		
Thread	M_A [Nm]	F_V [kN]	$F_{L\ dyn}$ [kN]	Typ	F_V [kN]	$F_{L\ dyn}$ [kN]	Type
M12	80	22.3	2.3	HZS	36.2	3.8	HZS
M16	120	25.2	2.6	HZS	41.3	4.3	HZS
M16	200	42.1	4.4	HSR	68.8	7.2	HSR
M20	400	67.2	7.0	HSR	109.9	11.4	HSR

This data is based on the following failure modes and values:
Failure mode for transverse force load $F_{L\ dyn}$: component slippage
Friction coefficient in connection: μ_T = 0.25
Tightening factor (electrical-audible torque wrench): α_A = 2.0
Safety factor setting of bolt joint: S_{set} = 1.2
Individual calculation of bolted connections is achieved using the formulas and tables listed above.

Invitation to tender – examples for HALFEN Framing channels and cantilevers

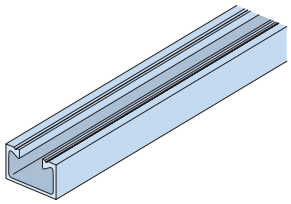
HM 52/34 - black steel - 6070

HALFEN - Framing channel HM 52/34 profile, hot-rolled, black steel, with CE-marking in accordance with DIN EN 1090, for the flexible linking of framing constructions using system-compliant HALFEN Bolt connections.
Required framing channel length pursuant to structural requirements.
Nominal profile dimensions (width x height): 52 mm x 34 mm
Length (mm): .....
- 6.070
- Fixed length (fixed length surcharge)
Deliver, cut to the required extent (if not fixed length) and assemble.
Please note information provided by the manufacturer regarding assembly and use.



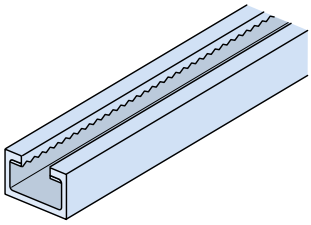
HM 50/30 - HDG - 6070

HALFEN - Framing channel HM 50/30 profile, hot-rolled, hot-dip galvanised (hdg), with CE-marking in accordance with DIN EN 1090, for the flexible linking of framing constructions using system-compliant HALFEN Bolt connections.
Required framing channel length pursuant to structural requirements.
Nominal profile dimensions (width x height): 50 mm x 30 mm
Length (mm): .....
- 6.070
- Fixed length (fixed length surcharge)
Deliver, cut to the required extent (if not fixed length) and assemble.
Please note information provided by the manufacturer regarding assembly and use.



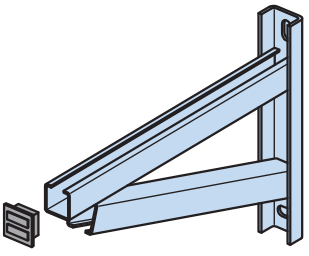
HZM 53/34 - A4 - 6070

HALFEN - Framing channel HZM 53/34 profile, hot-rolled and toothed, A4, with CE-marking in accordance with DIN EN 1090, for the flexible linking of framing constructions using system-compliant HALFEN Bolt connections.
Required framing channel length pursuant to structural requirements.
Nominal profile dimensions (width x height): 53 mm x 34 mm
Length (mm): .....
- 6.070
- Fixed length (fixed length surcharge)
Deliver, cut to the required extent (if not fixed length) and assemble.
Please note information provided by the manufacturer regarding assembly and use.



HALFEN Cantilever KON 36/2, hot-dip galvanised

HALFEN - cantilever, KON 36/2, hot-dip galvanized (hdg), with CE-marking in accordance with DIN EN 1090, for the flexible linking of framing constructions using system-compliant HALFEN Bolt connections.
Required cantilever length pursuant to structural requirements.
Length (mm): .....
Deliver and assemble.
Please note information provided by the manufacturer regarding assembly and use.



Further tender specifications at : www.halfen.de/Service/Tender texts

HALFEN POWERCLICK SYSTEM

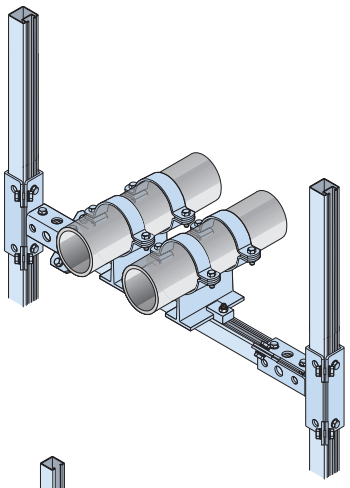
The Innovation in Pipeline Construction

The multi-functional system for any project

POWERCLICK SYSTEM 63

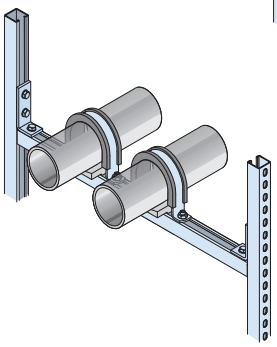
Suitable for pipes with nominal diameters up to DN 150 mm or with separate verification up to 400 mm
→ Catalogue PC 63

TESTED ACC. TO EN 13480 (TYPE TESTING) BY TÜV POWERCLICK SYSTEM 63



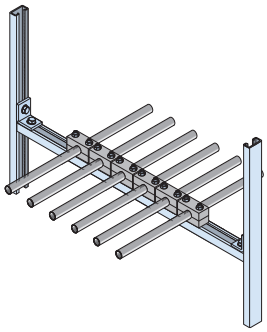
POWERCLICK SYSTEM 41

Suitable for pipes with nominal diameters up to 80 mm or with short spans up to 150 mm with separate verifications
→ Catalogue PC 41



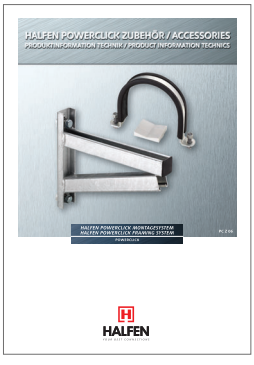
POWERCLICK SYSTEM 22

Suitable for pipes with nominal diameters up to 25 mm
→ Catalogue PC 41



POWERCLICK ACCESSORIES

Cantilever brackets, pipe clamps, sliding supports
→ Catalogue PC Z



Product information on the internet. Catalogues and tender texts available at: **halfen.de/Products/Powerclick.** Or simply scan the code, select the required document and download the PDF.

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