Installation Technical Manual

Technical data

MIQ System

Version 1.1 I February 2016

Terms of common cooperation / Legal disclaimer

The product loading capacities published in these Technical Data Sheets are only valid for the mentioned codes or technical data generation methods and the defined application conditions (e.g. ambient temperature load capacity not valid in case of fire, data not valid in support structures when mixed with third party products), assuming sufficient fastener, base material and building structure strength. Additional calculations, checks and releases by the responsible structural engineer might be needed to clarify the capacity of base material and building structure.
Suitability of structures combining different products for specific applications needs to be verified by conducting a system design and calculation, using for example Hilti PROFIS software. In addition, it is crucial to fully respect the Instructions for Use and to assure clean, unaltered and undamaged state of all products at any time in order to achieve this loading capacity (e.g. misuse, modification, overload, corrosion).
As products but also technical data generation methodologies evolve over time, technical data might change at any time without prior notice. We recommend to use the latest technical data sheets published by Hilti.

In any case the suitability of structures combining different products for specific applications need to be checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for any specific facility. This book only serves as an aid to interpret the suitability of structures combining different products for specific applications without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application. User must take all necessary and reasonable steps to prevent or limit damage. The suitability of structures combining different products for specific applications are only recommendations that need to be confirmed with a professional designer and/or structural engineers to ensure compliance with User`s specific jurisdiction and project requirements.

Contents and overview of this manual

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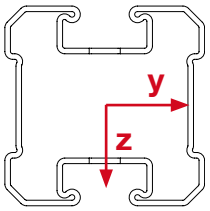
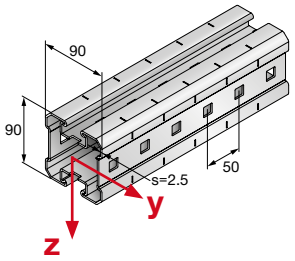
MIQ-90 girder (channel)

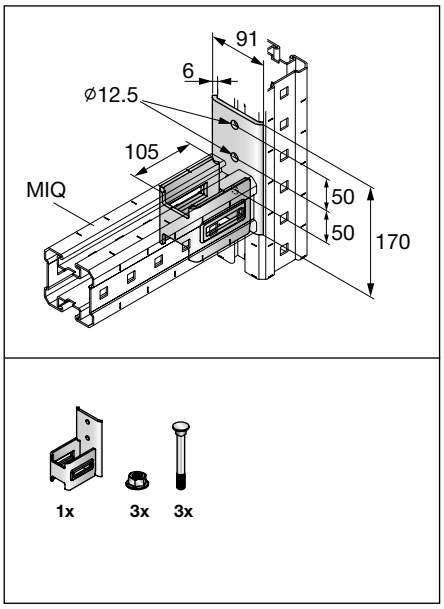
Designation	Item number
MIQ-90 3 m	**2119866**
MIQ-90 6 m	**2119867**

Technical Data			**MIQ 90**
for girder MIQ / cross-section values including torsion			
Channel wall thickness	t	[mm]	2.5
Cross-sectional area	A	[mm^2]	1093.51
Channel weight		[kg/m]	8.58
Material			
Yield strength	$f_{y,k}$	[N/mm^2]	275
Permissible stress*	σ_{Zul}	[N/mm^2]	196.4
Thrust-modulus		[N/mm^2]	81000
Surface			
Hot-dip galvanised		[µm]	65
Cross-section values Y-axis			
Axis of gravity	e_y	[mm]	45
Moment of Inertia	I_y	[cm^4]	121.65
Section modulus	W_y	[cm^3]	27.03
Radius of gyration	i_y	[cm]	3.34
Cross-section values Z-axis			
Axis of gravity	e_z	[mm]	45
Moment of Inertia	I_z	[cm^4]	101.29
Section modulus	W_z	[cm^3]	22.51
Radius of gyration	i_z	[cm]	3.04
Data to the torsion			
Torsional moment of inertia	Σ It	[cm^4]	54.35
Torsional resistance moment	$W_t = 2 \times A_{Bredt}$ [1)]	9.1	

[1)] The permissible tension results out of $f_{y,k}/Y_{G/Q}$ with y=1.4

MIQC-90-HS angle connector

Designation	Item number
MIQC-90-HS angle connector	**2123880**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

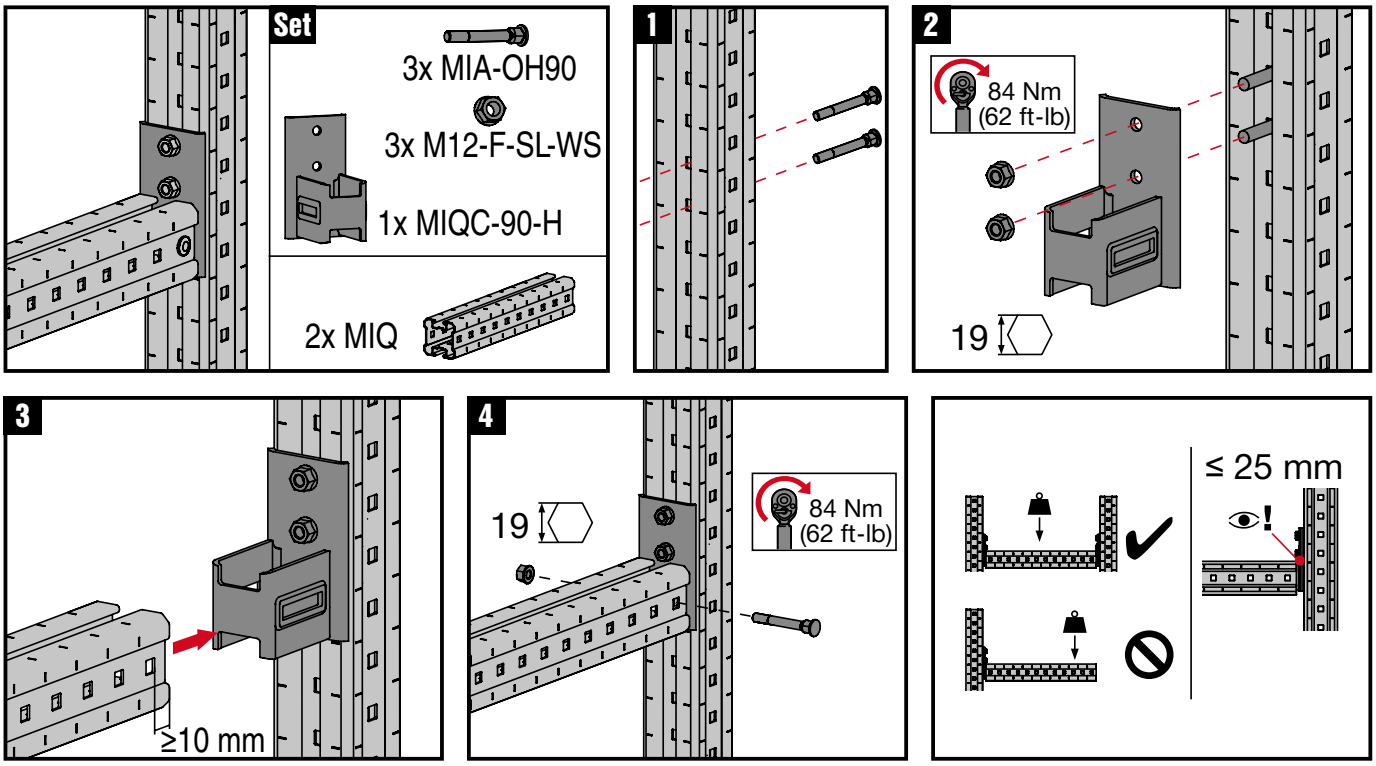
Weight:
1457.1g connector (1802g incl. accessories)

Submittal text:
Hilti angle, 90°, MIQ system, MIQC-90-HS, Hot dipped galvanized, angle typically used for connection of two perpendicular Hilti MIQ girders, angle connector with two hole base plate fitted for connection on surface of other MIQ girder through bolted by two MIA-OH 90 (included in the pack) from back side of the girder and secured by two self locking nuts. The connected girder is stuck on connectivity part of the angle and through boltetd by 1 piece of MIA-OH and self locking nut in teh first hole closest to the end of the girder, material weight 1802 grams incl. all connectivity material.

Material properties:

Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

Instruction For Use



MIQC-90-HS angle connector

Possible loading cases		
Standard		
		

Design criteria used for loading capacity

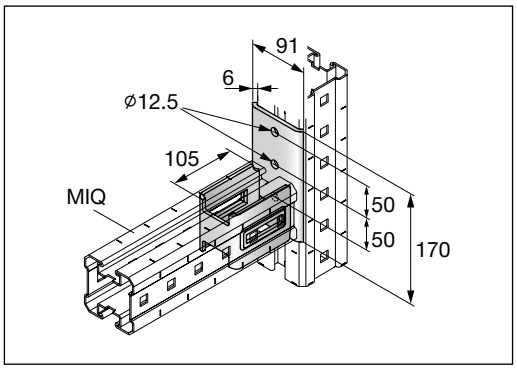
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-90-HS angle connector

Standard		
		

Loading case: Standard

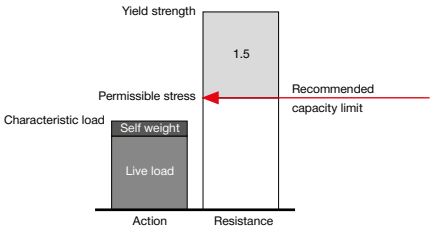
BOM:
Angle incl. all connectivity material
1x MIQC-90-HS 2123880

Combinations covered by loading case

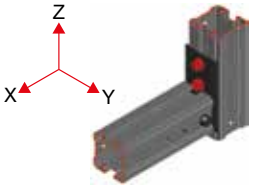
Connector used for fixing
H-MIQ girder on grooved section
of V-MIQ girder

Recommended loading capacity - simplified for most common applications

Method



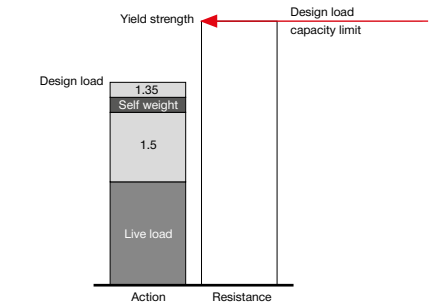
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
0.7	5.4	+10.2
		-18.7

Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-90-H (taken into account bolt on horizontal channel)

2. 2x Bolt MIA-OH90 on vertical channel

MIQC-90-HS angle connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

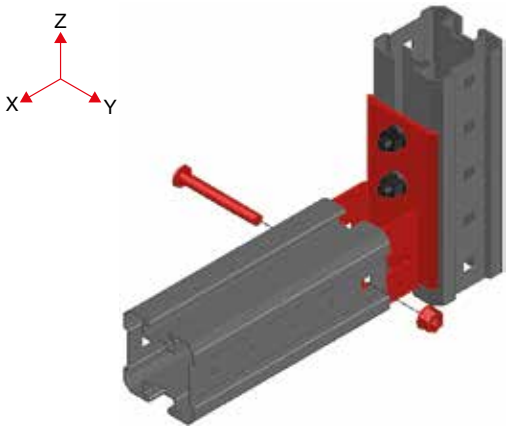
Standard		
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-90-H (taken into account bolt on horizontal channel and welds)

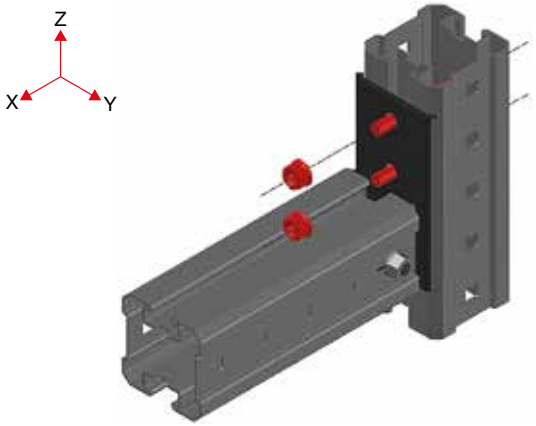


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
1.06	1.06	8.12	8.12	15.36	33.38
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.10	1.10	1.57	0.24	0.27	0.27

Interaction:

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

2. 2x Bolt MIA-OH90 on vertical channel (NOTE: interaction is not necessary)

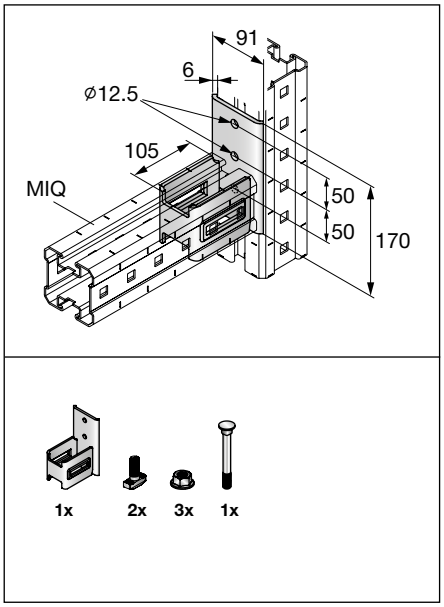


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
*	*	*	*	28.0	28.0
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.55	0.55	*	*	*	*

* not decisive

MIQC-90-HT angle connector

Designation	Item number
MIQC-90-HT angle connector	**2123881**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

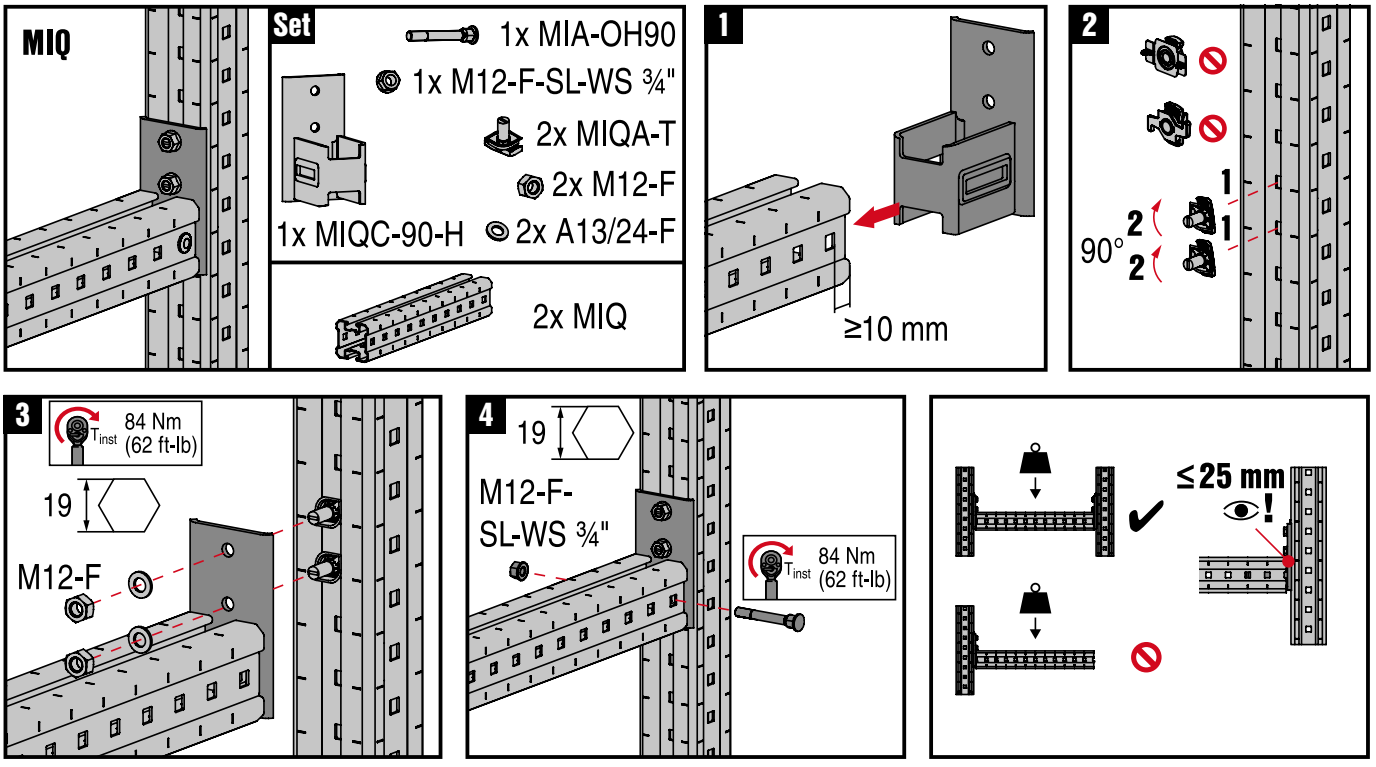
Weight:
1457.1g connector (1732g incl. accessories)

Submittal text:
Hilti angle, 90°, MIQ system, MIQC-90-HT, hot dipped galvanized, angle typically used for connection of two perpendicular Hilti MIQ girders, angle connector with two hole base plate fitted for connection in groove of other MIQ girder with two t-bolts and self locking nuts (both included in the pack). The connected girder is slid onto connection interface of the angle and through bolted by 1 piece of MIA-OH and self locking nut (both included in the pack) in the first hole closest to the end of the girder, material weight 1732 grams incl. all connectivity material.

Material properties:

Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

Instruction For Use



MIQC-90-HT angle connector

Possible loading cases		
Standard		
		

Design criteria used for loading capacity

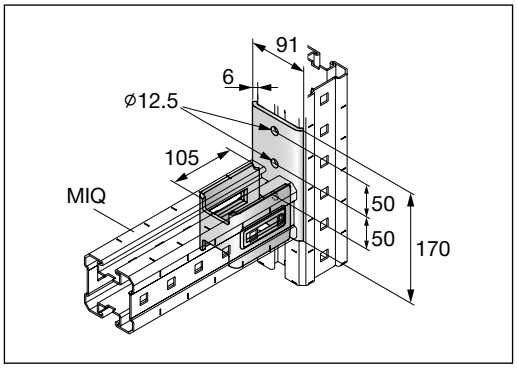
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-90-HT angle connector

Standard		
		

Loading case: Standard

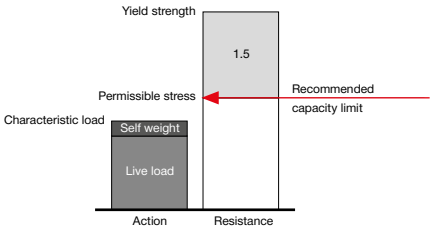
BOM:
Angle incl. all connectivity material
1x MIQC-90-HT 2123881

Combinations covered by loading case

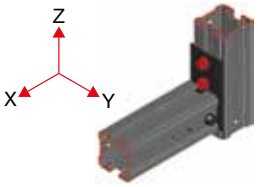
Connector used for fixing
H-MIQ girder on grooved section
of V-MIQ girder

Recommended loading capacity - simplified for most common applications

Method



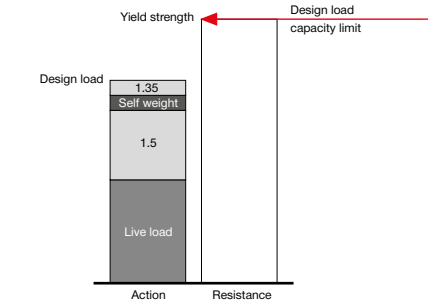
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
0.7	5.4	-12.4
		+10.2

Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-90-H (taken into account bolt on horizontal channel)

2. HT set with 2x MIQA-T on vertical channel

MIQC-90-HT angle connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

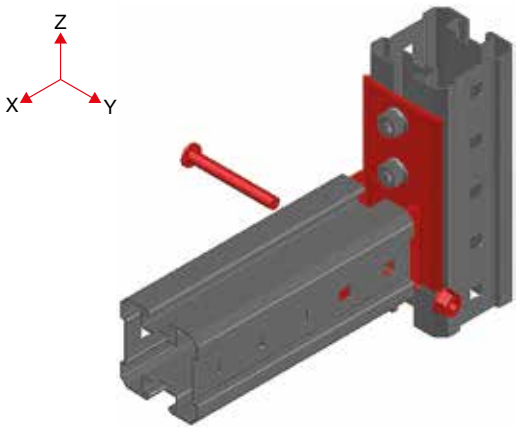
Standard		
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-90-H (taken into account bolt on horizontal channel and welds)

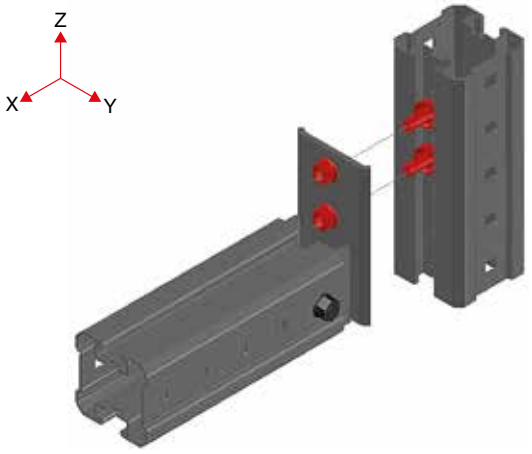


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
1.06	1.06	8.12	8.12	15.36	33.38
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.10	1.10	1.57	0.24	0.27	0.27

Interaction:

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

2. HT set with 2x MIQA-T on vertical channel (NOTE: interaction is not necessary)

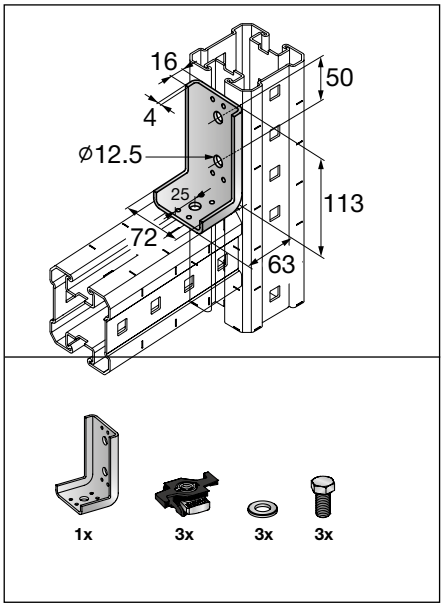


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
*	*	*	*	18.58	18.58
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
*	*	*	*	*	*

* not decisive

MIQC-90-L angle connector

Designation	Item number
MIQC-90-L angle connector	**2119868**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

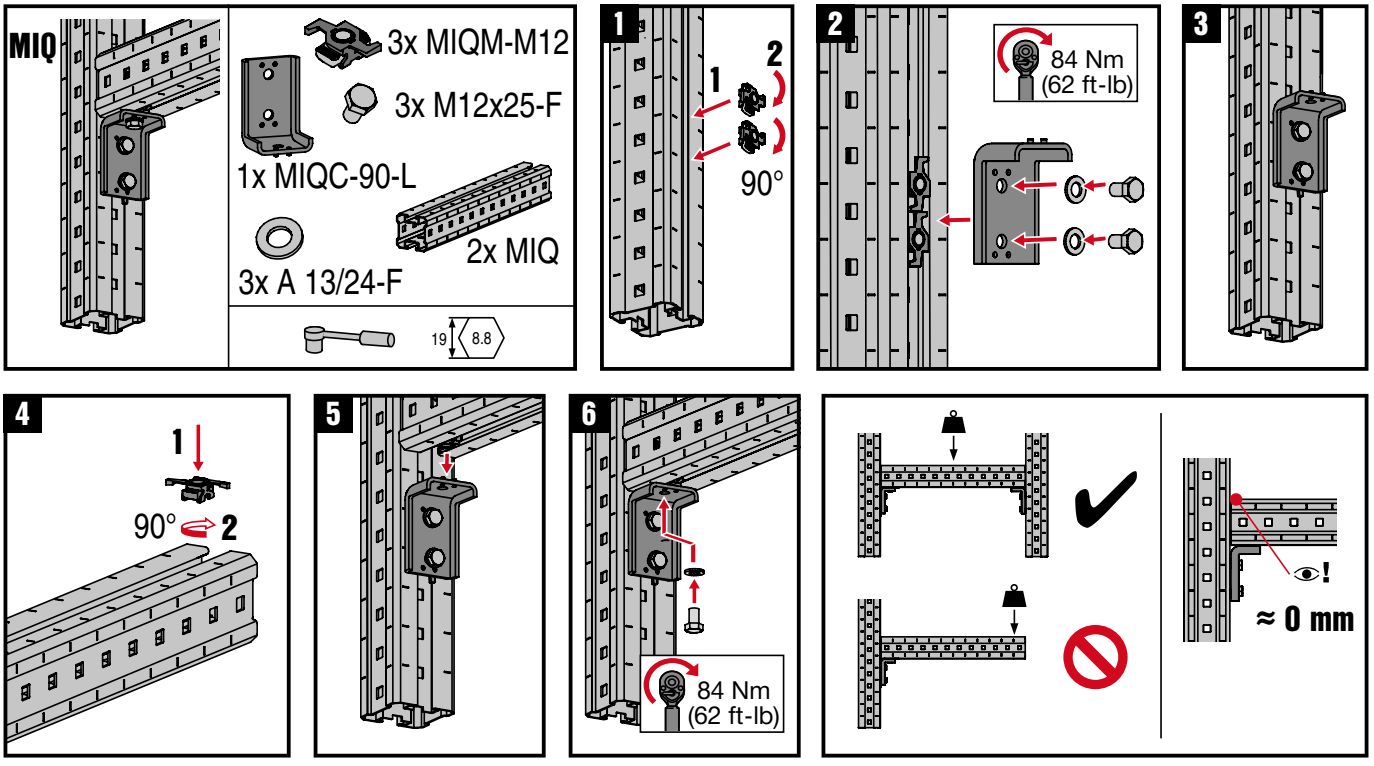
Weight:
450g connector (648g incl. accessories)

Submittal text:
Hilti angle, 90°, MIQ system, MIQC-90-L, Hot dipped galvanized, angle typically used for connection of two perpendicular Hilti MIQ girders, angle connector with two hole base plate fitted for connection in groove of other MIQ girder with two wing nuts, washers and self locking nuts (both included in the pack) on one side and with one hole fixed the same way on the other side, material weight 648 grams incl. all connectivity material.

Material properties:

Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

Instruction For Use



MIQC-90-L angle connector

Possible loading cases		
Standard		
		

Design criteria used for loading capacity

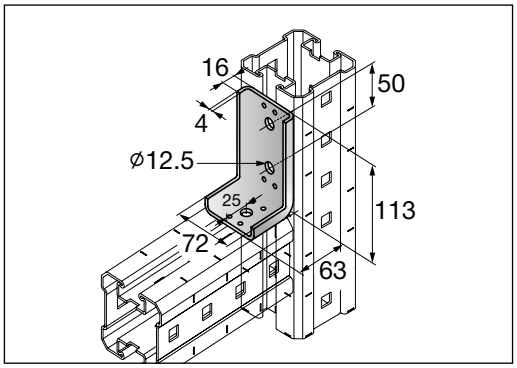
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



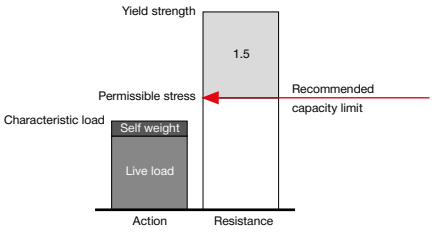
MIQC-90-L angle connector

Standard		
		

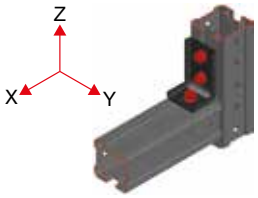
Loading case: Standard	Combinations covered by loading case	
BOM: Angle incl. all connectivity material 1x MIQC-90-L 2119868 	Connector used for fixing H-MIQ girder on grooved section of V-MIQ girder from top 	Connector used for fixing H-MIQ girder on grooved section of V-MIQ girder from bottom 

Recommended loading capacity - simplified for most common applications

Method



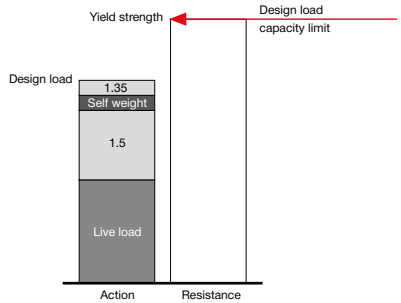
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
3.5	3.5	6.2

Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector angle MIQC-90-L

2. Wing nut on horizontal channel

3. Wing nuts on vertical channel

MIQC-90-L angle connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

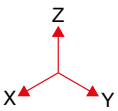
Standard		
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector angle MIQC-90-L

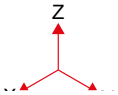


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
10.72	14.85	5.75	5.75	14.07	9.32
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.3	0.3	0.19	0.18	0.08	0.08

Interaction:

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

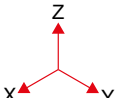
2. Wing nut on horizontal channel (Note: Interaction is not necessary.)



+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
5.21	5.21	5.20	5.20	*	12.89
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
*	*	*	*	*	*

* not decisive

3. Wing nuts on vertical channel (Note: Interaction is not necessary.)

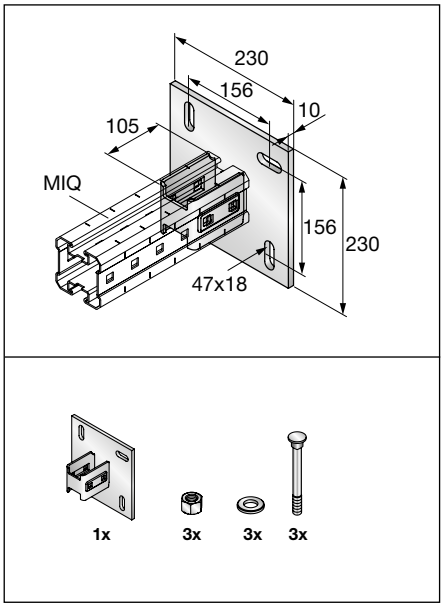


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
6.52	*	*	*	9.93	9.93
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
*	*	*	*	*	*

* not decisive

MIQC-C90 base material connector

Designation	Item number
MIQC-C90 base material connector	**2120144**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

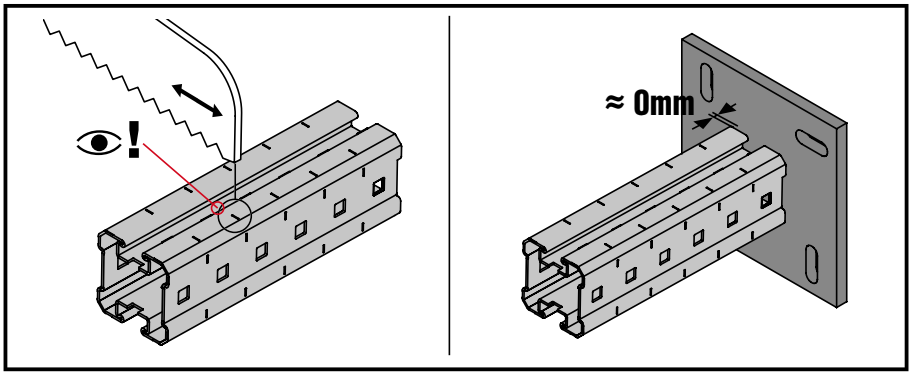
Weight:
4698g connector (4928g incl. accessories)

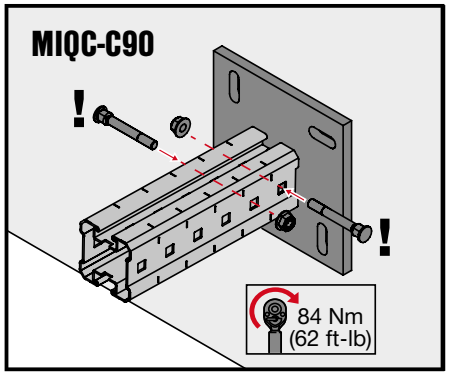
Submittal text:
Hilti base material connector, 90°, MIQ system, MIQC-C90, Hot dipped galvanized, base material connector typically used for connection of perpendicular Hilti MIQ girder to concrete, The connected girder is slid onto connection interface of the connector and through bolted by 2 pieces of MIA-OH and self locking nut (both included in the pack) in the first and second hole closest to the end of the girder, the base plate is connected to concrete by Hilti anchor 4x HST M16 (not in pack) material weight 4928 grams incl. all connectivity material.

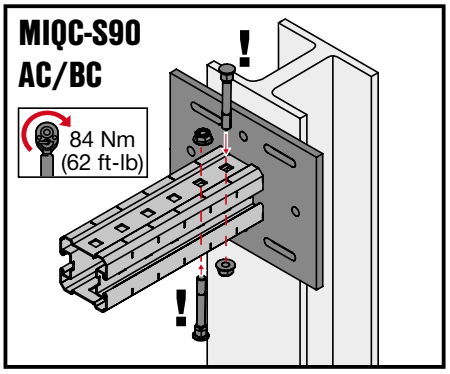
Material properties:

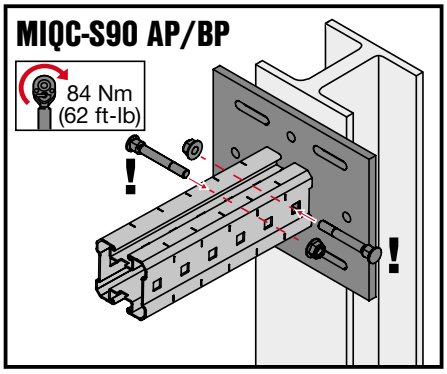
Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

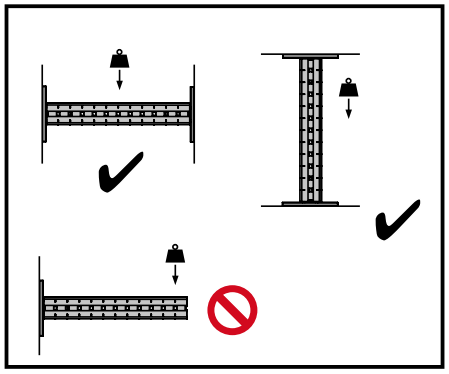
Instruction For Use











MIQC-C90 base material connector

Possible loading cases		
Standard		
		

Design criteria used for loading capacity

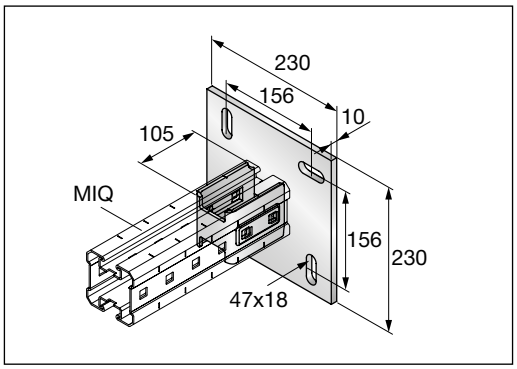
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-C90 base material connector

Standard		
		

Loading case: Standard

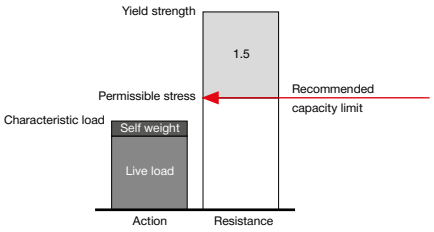
BOM:
Angle incl. all connectivity material
1x MIQC-C90 2120144
4x HST-R M16x130/10 2085454

Combinations covered by loading case

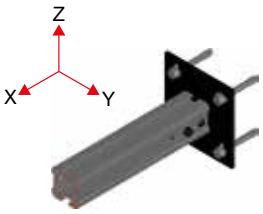
Connector used for fixing
H-MIQ girder,
perpendicularly
to concrete

Recommended loading capacity - simplified for most common applications

Method



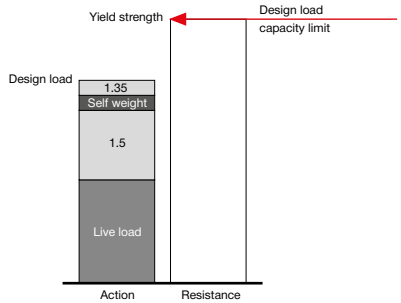
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
24.4	8.8	38.9

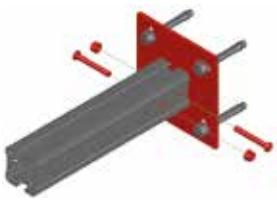
Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-C90



2. Anchors 4x HST M16

MIQC-C90 base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

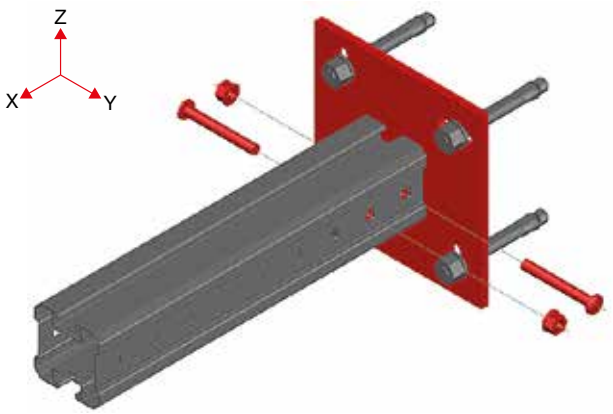
Standard		
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-C90 (Including screws MIA-OH90 connecting channel and connector and welds)

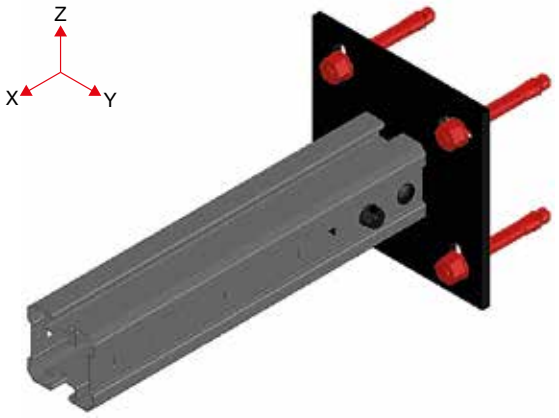


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
36.64	36.64	13.18	13.18	58.37	58.37
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.55	1.55	1.67	1.67	1.08	1.08

Interaction:

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

2. Anchors 4x HST M16



+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
47.50	*	66.00	66.00	66.00	66.00
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
7.30	7.30	4.70	4.70	4.70	4.70

Interaction:

$$\frac{F_{y.Ed}}{F_{y.Rd}} + \frac{F_{z.Ed}}{F_{z.Rd}} + \frac{M_{x.Ed}}{M_{x.Rd}} = \beta_V \leq 1$$

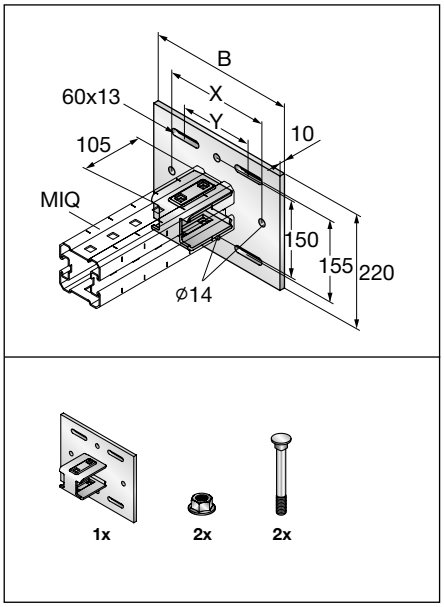
$$\frac{F_{x.Ed}}{F_{x.Rd}} + \frac{M_{y.Ed}}{M_{y.Rd}} + \frac{M_{z.Ed}}{M_{z.Rd}} = \beta_N \leq 1$$

$$\beta_N + \beta_V \leq 1.2$$

* not decisive

MIQC-S90-AC base material connector

Designation	Item number
MIQC-S90-AC base material connector	**2120270**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

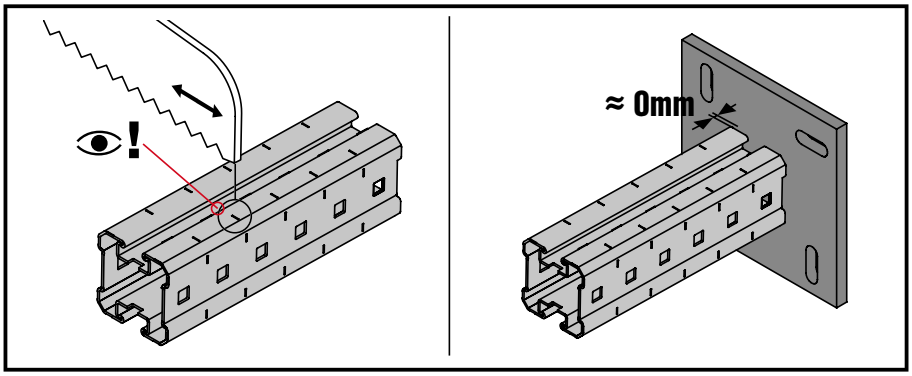
Weight:
5343g connector (5573g incl. accessories)

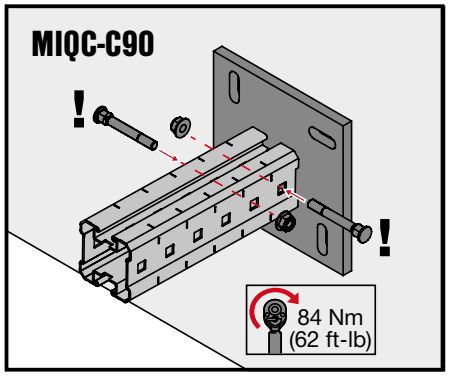
Submittal text:
Hilti base material connector, 90°, MIQ system, MIQC-S90-AC, Hot dipped galvanized, base material connector typically used for connection of perpendicular Hilti MIQ girder to structural steel with open section perpendicular to structural steel beam, The connected girder is slid onto connection interface of the connector and through bolted by 2 pieces of MIA-OH and self locking nut (both included in the pack) in the first and second hole closest to the end of the girder, the connection to structural steel could be done either by 4 pcs of Hilti MI-SGC M12(not in pack) beam clamps to flange (width 75-165mm width) of I-beam or by boxing any structural steel profile (width 75-165mm) using Hilti backing plate MIQB-SA (not in pack) and 4x M12 Hilti threaded rods and 4x M12-F-SL WS3/4 self locking nuts (both not in pack) material weight 5573 grams incl. all connectivity material.

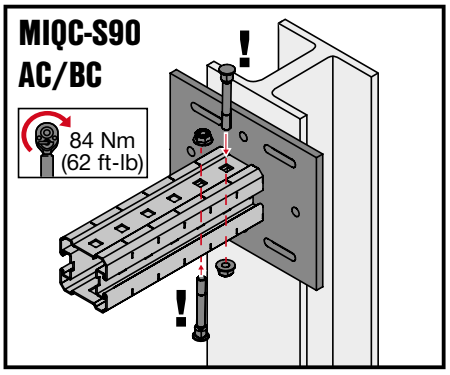
Material properties:

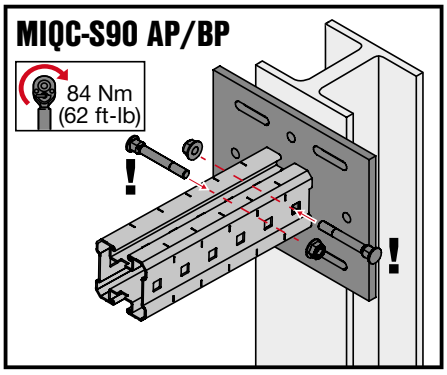
Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

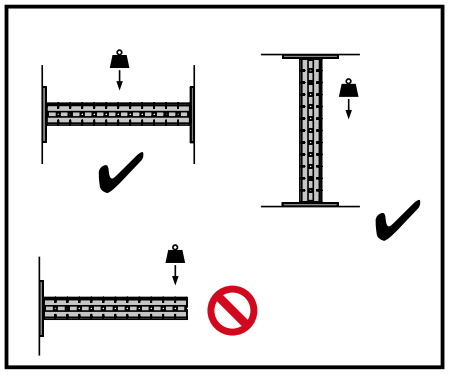
Instruction For Use











MIQC-S90-AC base material connector

Possible loading cases		
Clamped	Boxed	
		

Design criteria used for loading capacity

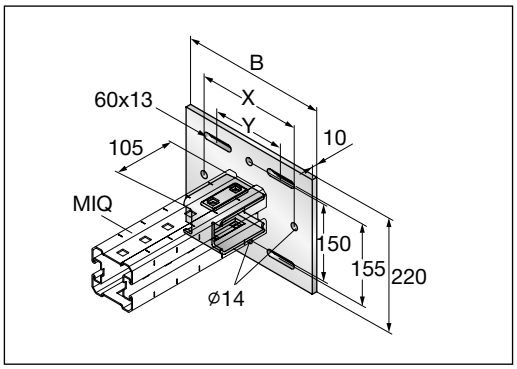
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

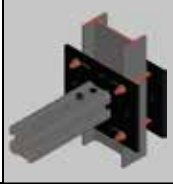
Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-S90-AC base material connector

Clamped	Boxed	
		

Loading case: Clamped

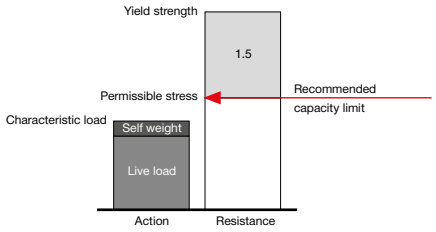
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-AC 2120270
Beam clamp
4x MI-SGC M12 233859

Combinations covered by loading case

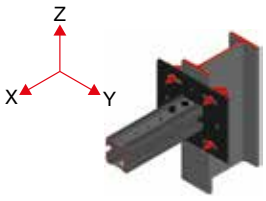
Connector used for fixing MIQ girder, perpendicularly to flange (width of 75-165mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



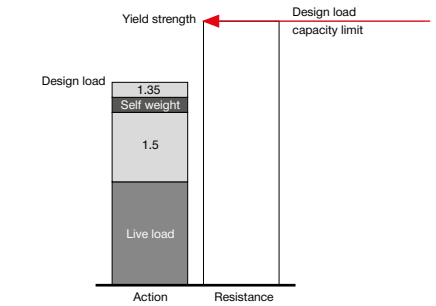
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
23.2	6.0	6.0

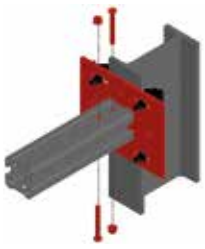
Design loading capacity - 3D 1/2

Method

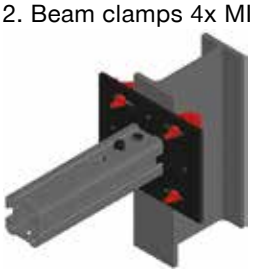


Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-AC



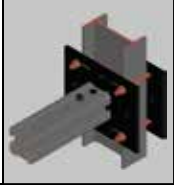
2. Beam clamps 4x MI-SGC M12



MIQC-S90-AC base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

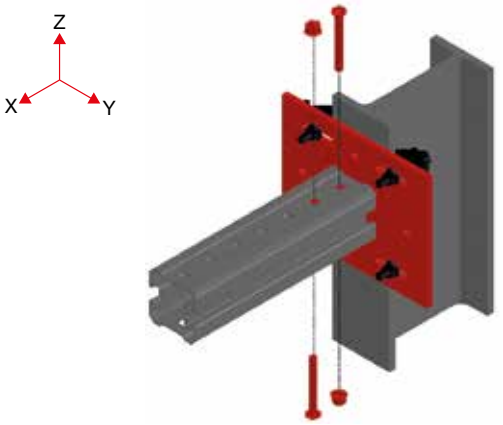
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-AC (Including screws MIA-OH90 connecting channel and connector and welds)

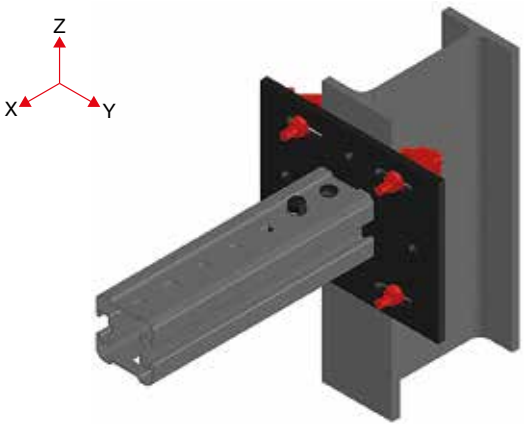


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
36.64	36.64	57.03	57.03	13.18	13.18
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	0.84	0.84	0.70	0.70

Interaction:

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

2. Clamps 4x MI-SGC M12



+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
34.80	*	9.00	9.00	9.00	9.00
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.81	0.81	2.09	2.09	1.39	1.39

Interaction:

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

* not decisive

MIQC-S90-AC base material connector

Clamped	Boxed	
		

Loading case: Boxed

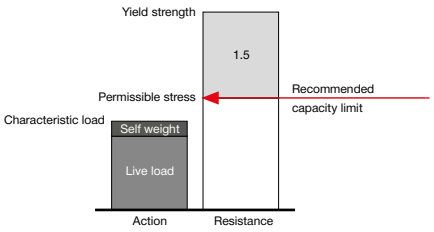
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-AC 2120270
Back (base) plate
1x MIQB-SA 2123565
Threaded rods
4x AM12x1000 8.8 HDG…m 419103
Self-locking nut
8x M12-F-SL WS3/4 382897

Combinations covered by loading case

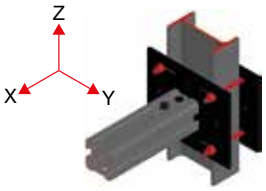
Connector used for fixing MIQ girder, perpendicularly to flange (width of 75-165mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



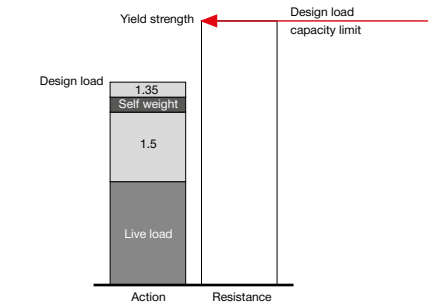
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
23.2	5.0	5.0

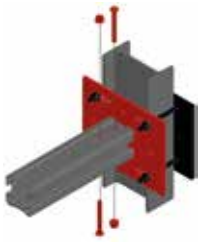
Design loading capacity - 3D 1/2

Method

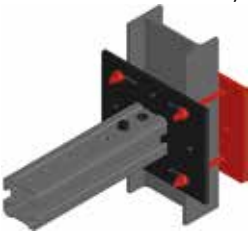


Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-AC



2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



MIQC-S90-AC base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

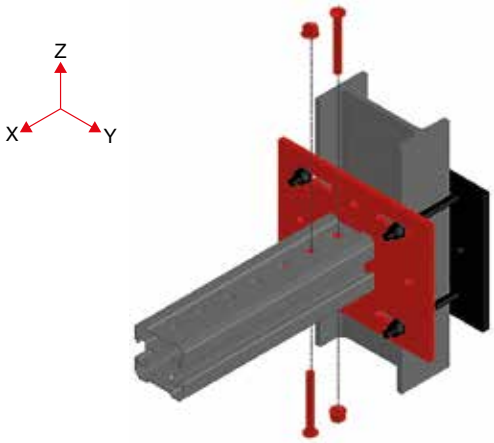
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-AC (Including screws MIA-OH90 connecting channel and connector and welds)

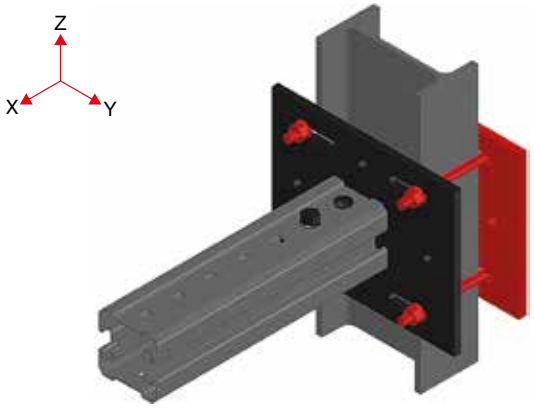


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
36.64	36.64	57.03	57.03	13.18	13.18
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	0.84	0.84	0.70	0.70

Interaction:

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

2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



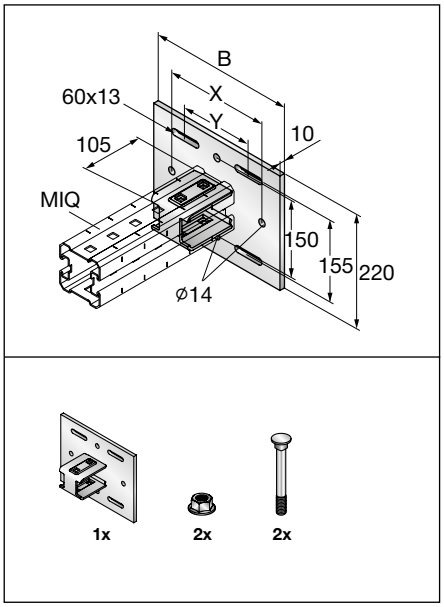
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
194.23	35.97	7.42	7.42	7.42	7.42
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.67	0.67	11.65	11.65	7.77	7.77

Interaction:

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

MIQC-S90-BC base material connector

Designation	Item number
MIQC-S90-BC base material connector	**2120272**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

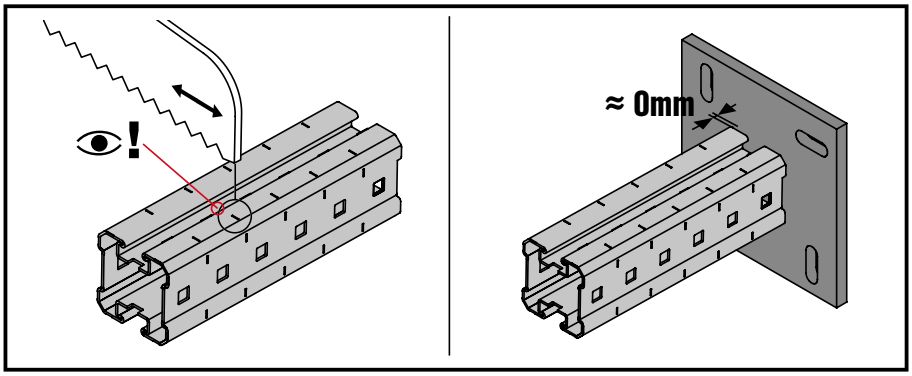
Weight:
6552g connector (6782g incl. accessories)

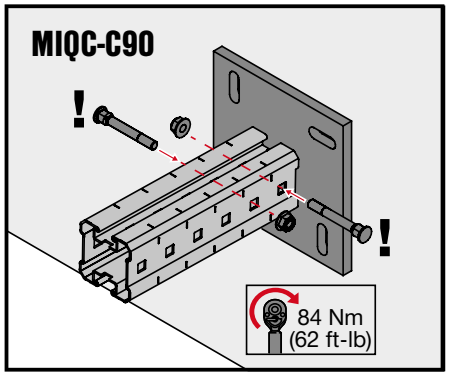
Submittal text:
Hilti base material connector, 90°, MIQ system, MIQC-S90-BC, Hot dipped galvanized, base material connector typically used for connection of perpendicular Hilti MIQ girder to structural steel with open section perpendicular to structural steel beam. The connected girder is slid onto connection interface of the connector and through bolted by 2 pieces of MIA-OH and self locking nut (both included in the pack) in the first and second hole closest to the end of the girder, the connection to structural steel could be done either by 4 pcs of Hilti MI-SGC M12 (not in pack) beam clamps to flange (width 165-235mm width) of I-beam or by boxing any structural steel profile (width 165-235mm) using Hilti backing plate MIQB-SB (not in pack) and 4x M12 Hilti threaded rods and 4x M12-F-SL WS3/4 self locking nuts (both not in pack) material weight 6782 grams incl. all connectivity material.

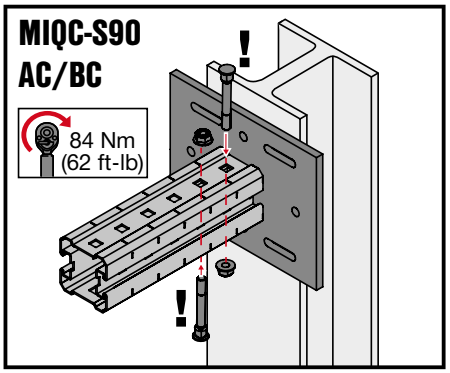
Material properties:

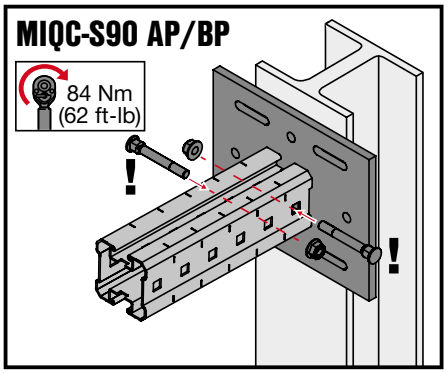
Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

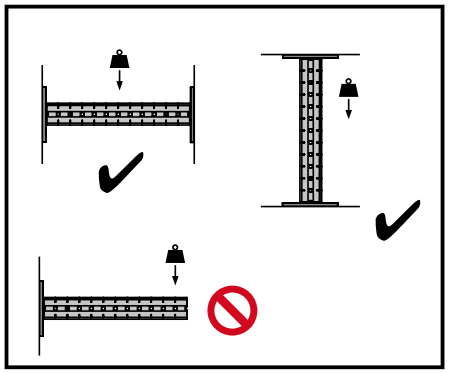
Instruction For Use











MIQC-S90-BC base material connector

Possible loading cases		
Clamped	Boxed	
		

Design criteria used for loading capacity

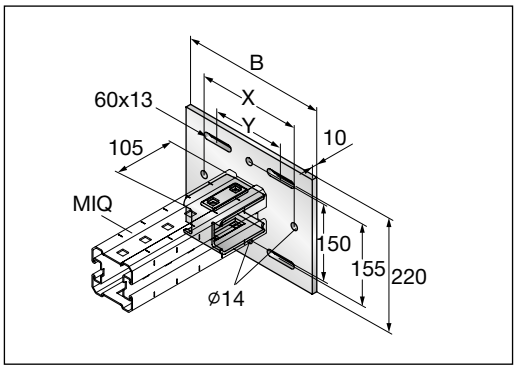
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

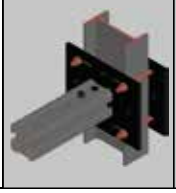
Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-S90-BC base material connector

Clamped	Boxed	
		

Loading case: Clamped

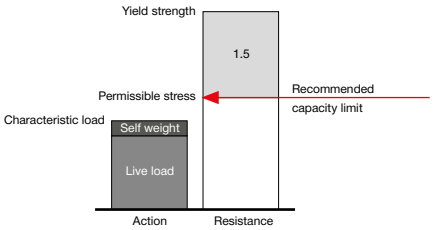
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-BC 2120272
Beam clamp
4x MI-SGC M12 233859

Combinations covered by loading case

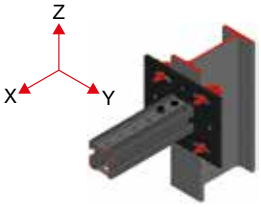
Connector used for fixing MIQ girder, perpendicularly to flange (width of 165-235mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



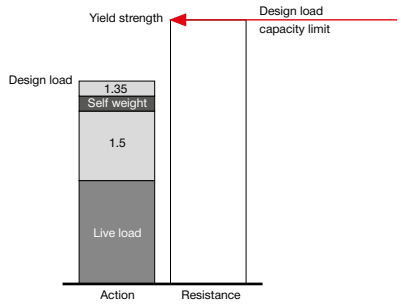
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
17.3	6.0	6.0

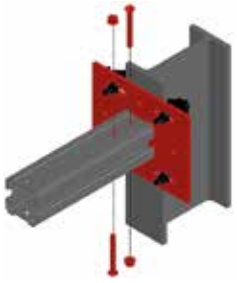
Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-BC

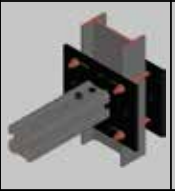


2. Beam clamps 4x MI-SGC M12

MIQC-S90-BC base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

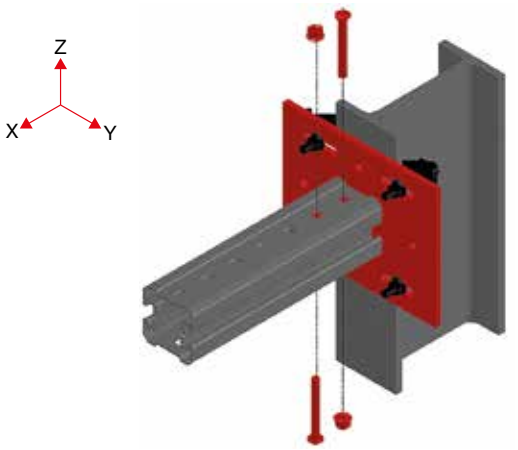
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-BC (Including screws MIA-OH90 connecting channel and connector and welds)

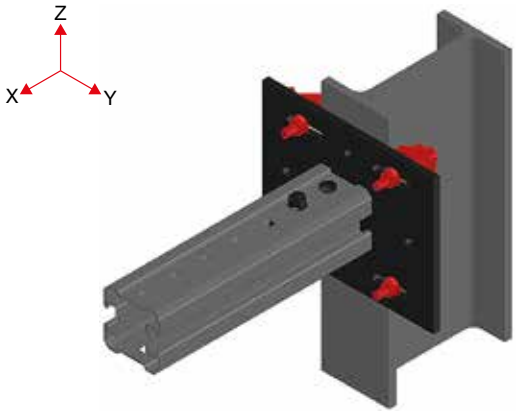


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
26.00	36.40	46.95	46.95	13.18	13.18
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	0.84	0.84	0.70	0.70

Interaction:

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

2. Clamps 4x MI-SGC M12



+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
34.80	*	9.00	9.00	9.00	9.00
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.06	1.06	2.09	2.09	2.09	2.09

Interaction:

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

* not decisive

MIQC-S90-BC base material connector

Clamped	Boxed	
		

Loading case: Boxed

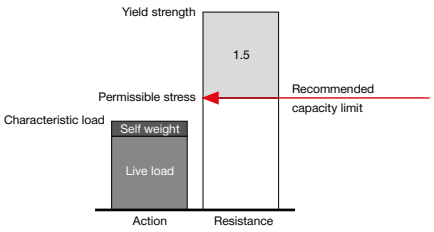
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-BC 2120272
Back (base) plate
1x MIQB-SB 2123566
Threaded rods
4x AM12x1000 8.8 HDG...m 419103
Self-locking nut
8x M12-F-SL WS3/4 382897

Combinations covered by loading case

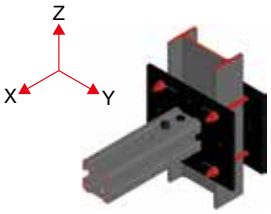
Connector used for fixing MIQ girder, perpendicularly to flange (width of 165-235mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



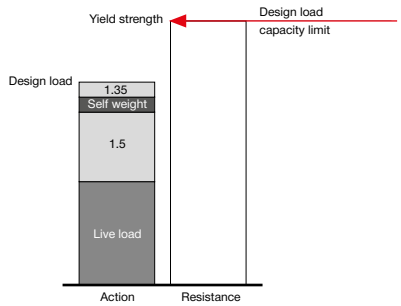
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
17.3	5.0	5.0

Design loading capacity - 3D 1/2

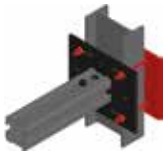
Method



Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-BC

2. Threated rods M12 / 8.8 in connection with MIQB-SB plate



MIQC-S90-BC base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

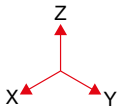
Clamped	Boxed	
		

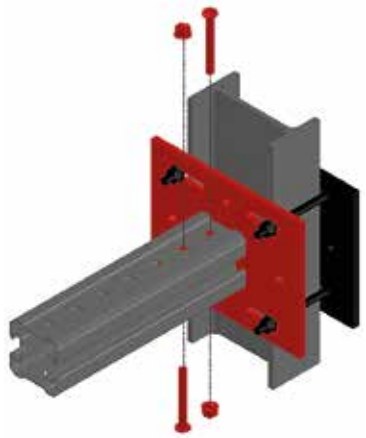
Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-BC (Including screws MIA-OH90 connecting channel and connector and welds)



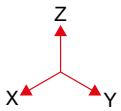


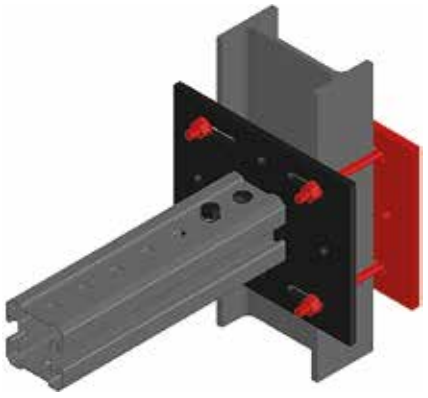
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
26.00	36.40	46.95	46.95	13.18	13.18
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	0.84	0.84	0.70	0.70

Interaction:

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

2. Threated rods M12 / 8.8 in connection with MIQB-SB plate





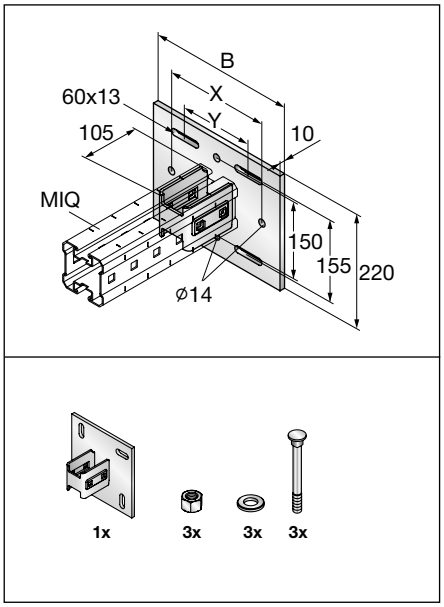
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
194.23	34.23	7.42	7.42	7.42	7.42
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.87	0.87	11.65	11.65	11.65	11.65

Interaction:

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

MIQC-S90-AP base material connector

Designation	Item number
MIQC-S90-AP base material connector	**2120271**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

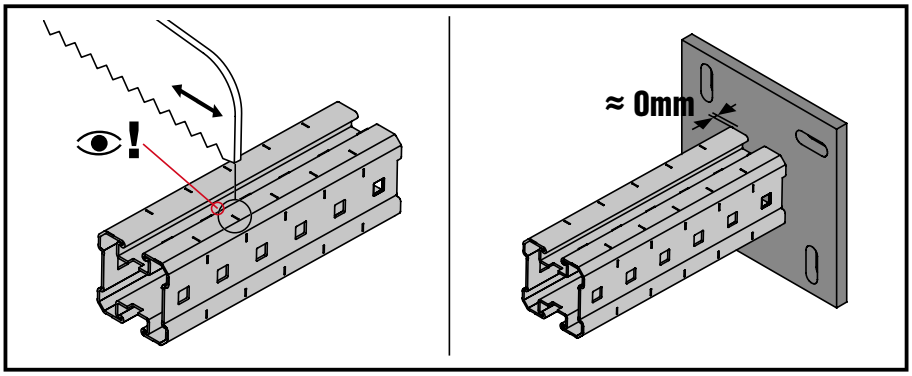
Weight:
5343g connector (5699g incl. accessories)

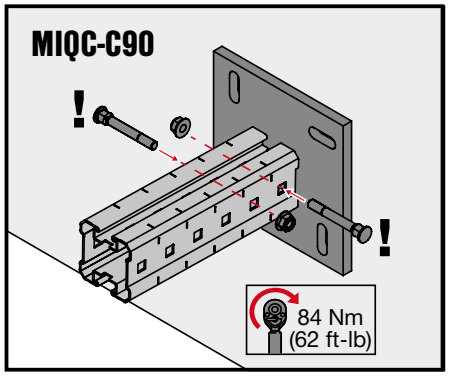
Submittal text:
Hilti base material connector, 90°, MIQ system, MIQC-S90-AP, Hot dipped galvanized, base material connector typically used for connection of perpendicular Hilti MIQ girder to structural steel with open section parallel to structural steel beam. The connected girder is slid onto connection interface of the connector and through bolted by 2 pieces of MIA-OH and self locking nut (both included in the pack) in the first and second hole closest to the end of the girder, the connection to structural steel could be done either by 4 pcs of Hilti MI-SGC M12 (not in pack) beam clamps to flange (75-165mm width) of I-beam or by boxing any structural steel profile (width 75-165mm) using Hilti backing plate MIQB-SA (not in pack) and 4x M12 Hilti threaded rods and 4x M12-F-SL WS3/4 self locking nuts (both not in pack), material weight 5699 grams incl. all connectivity material.

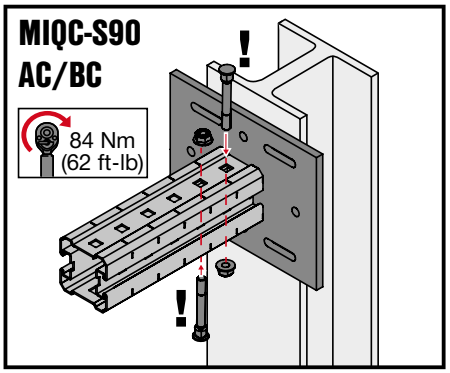
Material properties:

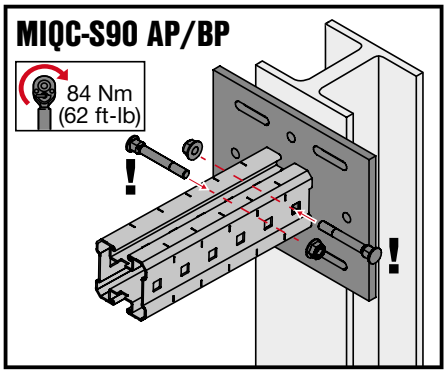
Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

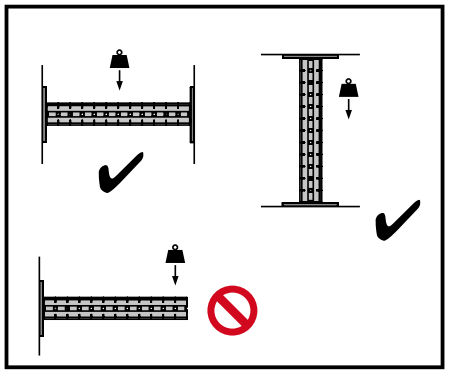
Instruction For Use



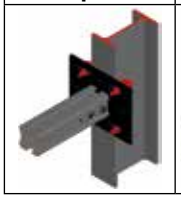








MIQC-S90-AP base material connector

Possible loading cases		
Clamped	Boxed	
		

Design criteria used for loading capacity

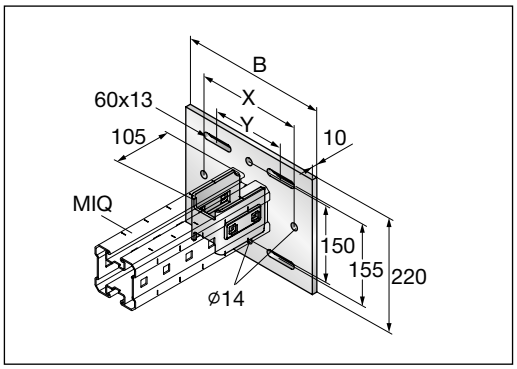
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

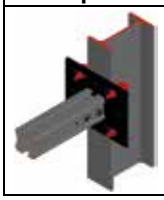
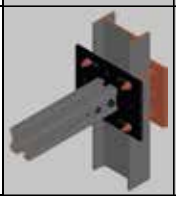
Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-S90-AP base material connector

Clamped	Boxed	
		

Loading case: Clamped

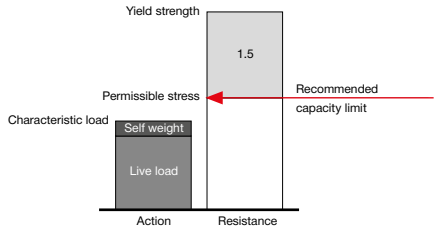
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-AP 2120271
Beam clamp
4x MI-SGC M12 233859

Combinations covered by loading case

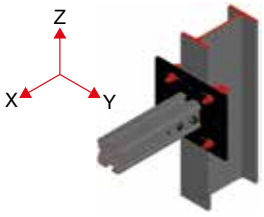
Connector used for fixing MIQ girder, perpendicularly to flange (width of 75-165mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



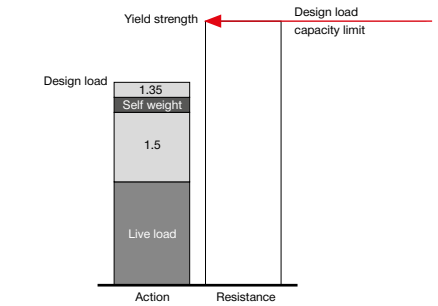
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
23.2	6.0	6.0

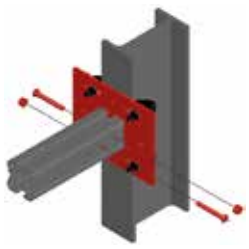
Design loading capacity - 3D 1/2

Method

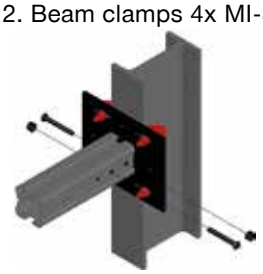


Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-AP



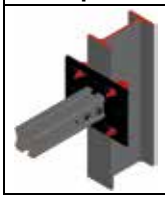
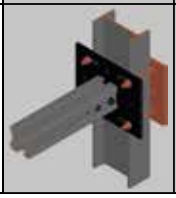
2. Beam clamps 4x MI-SGC M12



MIQC-S90-AP base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

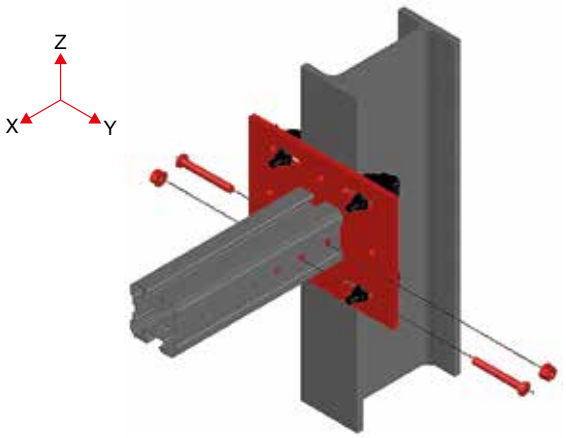
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-AP (Including screws MIA-OH90 connecting channel and connector and welds)

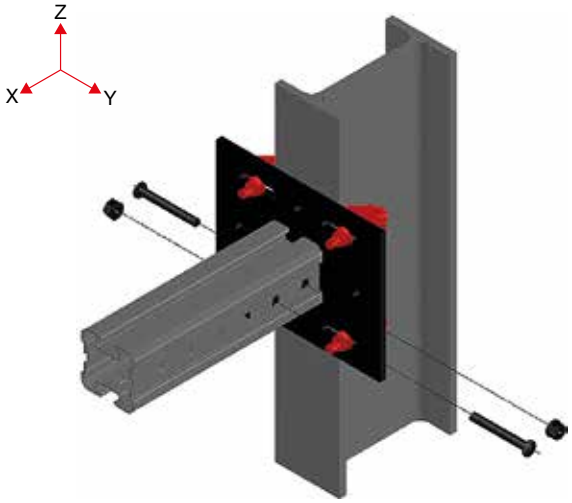


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
36.64	36.64	13.18	13.18	57.03	57.03
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	2.21	2.21	0.84	0.84

Interaction:

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

2. Clamps 4x MI-SGC M12



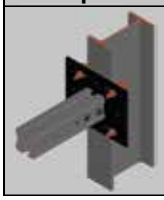
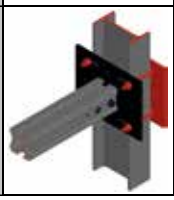
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
34.80	*	9.00	9.00	9.00	9.00
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.06	1.06	2.09	2.09	1.39	1.39

Interaction:

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

* not decisive

MIQC-S90-AP base material connector

Clamped	Boxed	
		

Loading case: Boxed

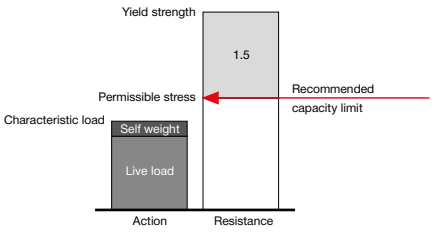
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-AP 2120271
Back (base) plate
1x MIQB-SB 2123566
Threaded rods
4x AM12x1000 8.8 HDG...m 419103
Self-locking nut
8x M12-F-SL WS3/4 382897

Combinations covered by loading case

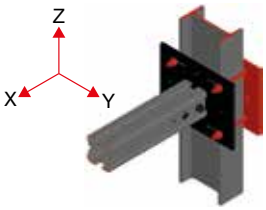
Connector used for fixing MIQ girder, perpendicularly to flange (width of 75-165mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



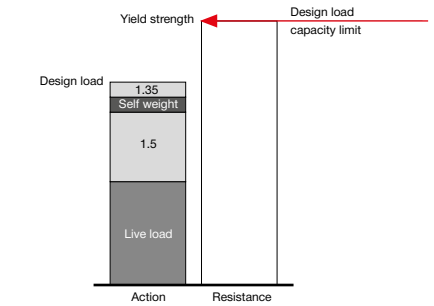
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
23.2	5.0	5.0

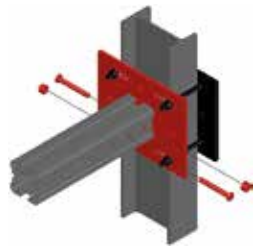
Design loading capacity - 3D 1/2

Method

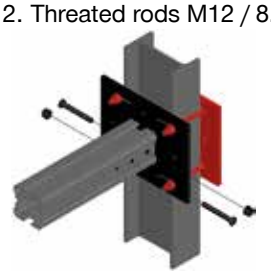


Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-AP



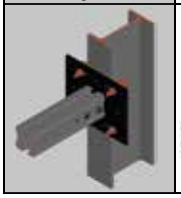
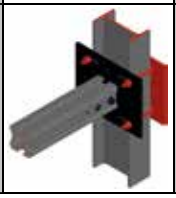
2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



MIQC-S90-AP base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

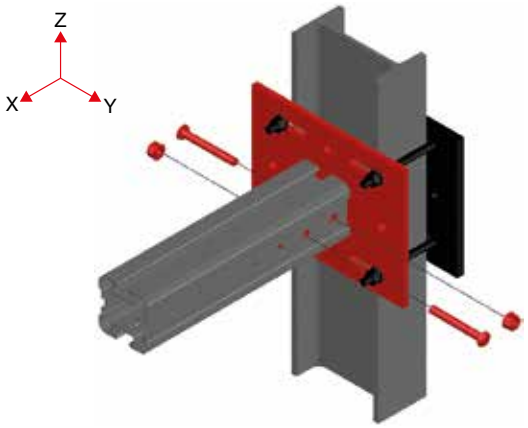
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-AP (Including screws MIA-OH90 connecting channel and connector and welds)

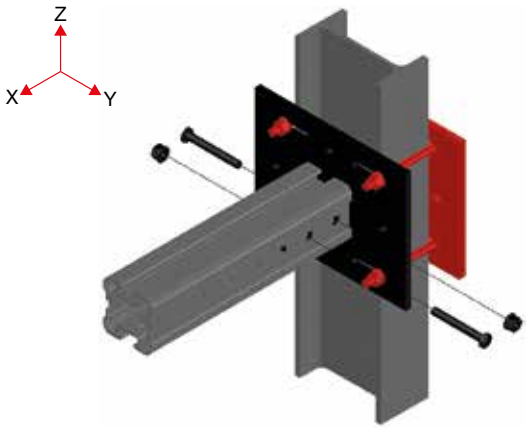


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
36.64	36.64	13.18	13.18	57.03	57.03
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	2.21	2.21	0.84	0.84

Interaction:

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

2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



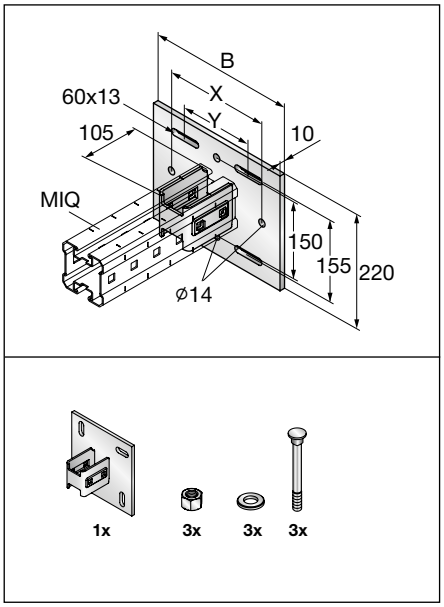
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
194.23	35.97	7.42	7.42	7.42	7.42
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.67	0.67	11.65	11.65	7.77	7.77

Interaction:

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

MIQC-S90-BP base material connector

Designation	Item number
MIQC-S90-BP base material connector	**2120273**



Corrosion protection:
Hot dipped galvanized as per DIN EN ISO 1462, thickness 55 microns

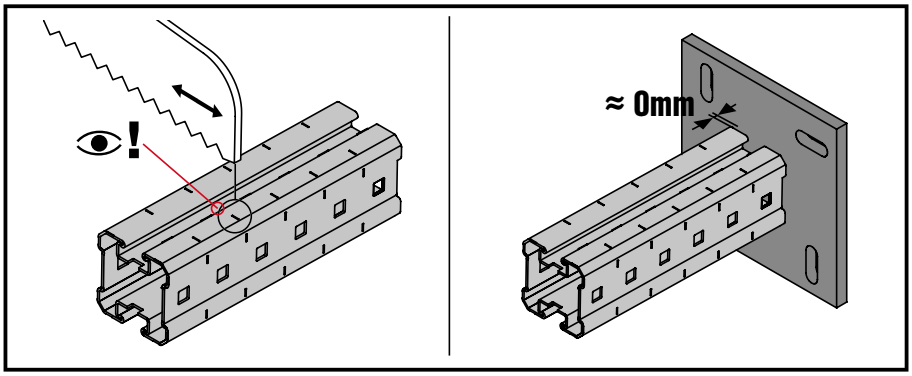
Weight:
6552g connector (6782g incl. accessories)

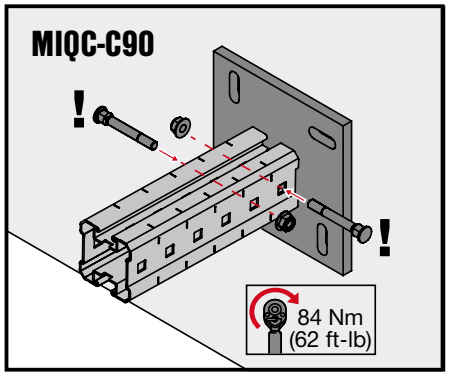
Submittal text:
Hilti base material connector, 90°, MIQ system, MIQC-S90-BP, hot dipped galvanized, base material connector typically used for connection of perpendicular Hilti MIQ girder to structural steel with open section parallel to structural steel beam. The connected girder is slid onto connection interface of the connector and through bolted by 2 pieces of MIA-OH and self locking nut (both included in the pack) in the first and second hole closest to the end of the girder, the connection to structural steel could be done either by 4 pcs of Hilti MI-SGC M12 (not in pack) beam clamps to flange (width165-235mm width) of I-beam or by boxing any structural steel profile (width 165-235mm) using Hilti backing plate MIQB-SB (not in pack) and 4x M12 Hilti threaded rods and 4x M12-F-SL WS3/4 self locking nuts (both not in pack), material weight 6782 grams incl. all connectivity material.

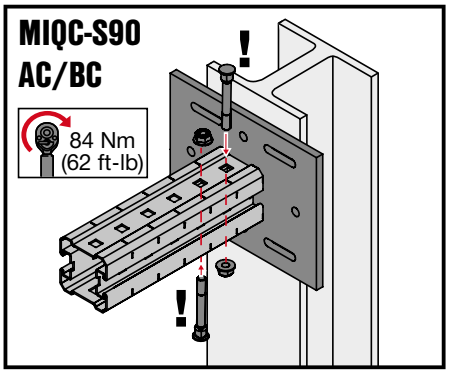
Material properties:

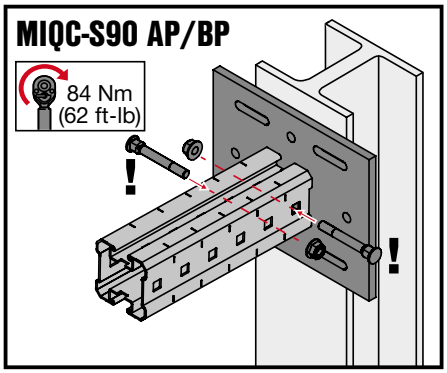
Material	Yield strength	Ultimate strength	E-modulus	Shear modulus
S235JR - DIN EN 10025	$f_y = 235 \frac{N}{mm^2}$	$f_u = 360 \frac{N}{mm^2}$	$E = 210000 \frac{N}{mm^2}$	$G = 80769 \frac{N}{mm^2}$

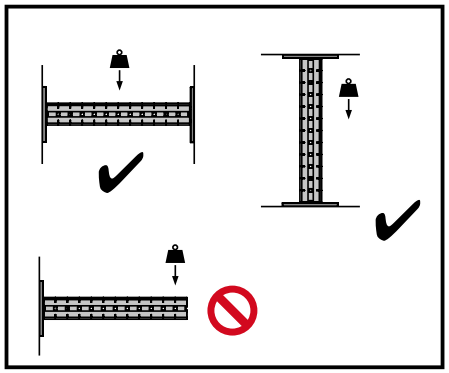
Instruction For Use



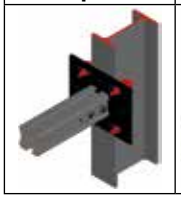








MIQC-S90-BP base material connector

Possible loading cases		
Clamped	Boxed	
		

Design criteria used for loading capacity

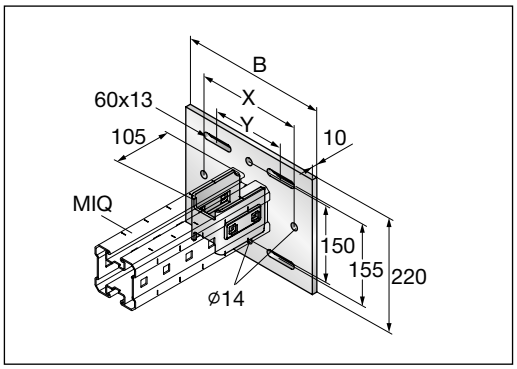
Methodology:
- Finite element analysis
- Hardware tests

Standards, codes:
- EN 1990 Basics of structural design 03.2003
- EN 1991-1-1 Eurocode 1: Actions on structures – Part 1-1: General actions– densities, self-weight, imposed loads for buildings 09.2011
- EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings 03.2012
- EN 1993-1-3 Eurocode 3: Design of steel structures – Part 1-3: General rules- Supplementary rules for cold-formed members and sheeting 03.2012
- EN 1993-1-5 Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements 03.2012
- EN 1993-1-8 Eurocode 3: Design of steel structures – Part 1-8: Design of joints 03.2012
- EN 10025-2 Hot rolled products of structural steels- Part 2: technical delivery conditions for non-alloy structural steels 02.2005
- RAL-GZ 655 Pipe Supports 04.2008

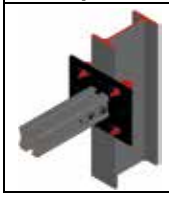
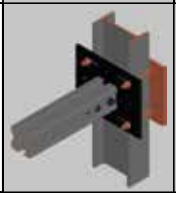
Software:
- Ansys 16.0
- Microsoft Excel

Environmental conditions:
- static loads
- no fatigue loads

Simplified drawing:



MIQC-S90-BP base material connector

Clamped	Boxed	
		

Loading case: Clamped

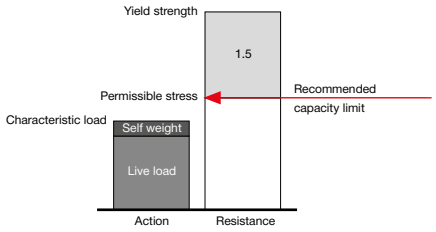
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-BP 2120273
Beam clamp
4x MI-SGC M12 233859

Combinations covered by loading case

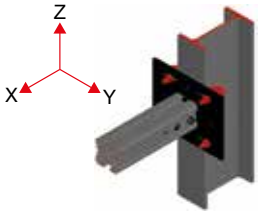
Connector used for fixing MIQ girder, perpendicularly to flange (width of 75-165mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



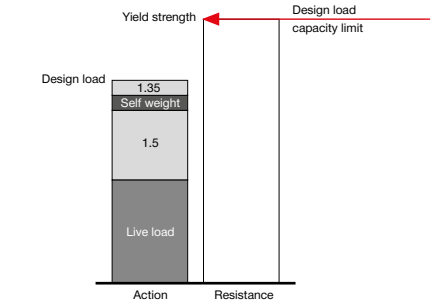
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
17.3	6.0	6.0

Design loading capacity - 3D 1/2

Method



Limiting components of capacity evaluated in following data tables:

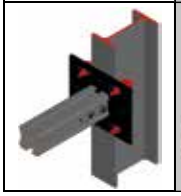
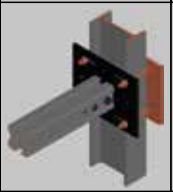
1. Steel connector MIQC-S90-BP

2. Beam clamps 4x MI-SGC M12

MIQC-S90-BP base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

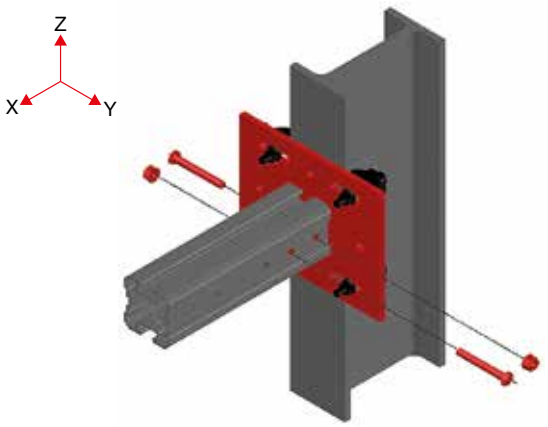
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-BP (Including screws MIA-OH90 connecting channel and connector and welds)

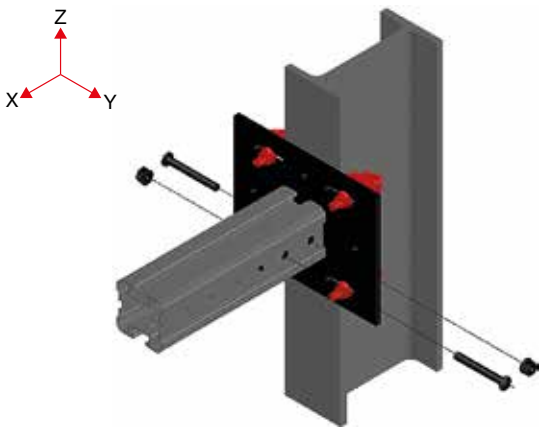


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
26.00	36.64	13.18	13.18	46.95	46.95
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	2.21	2.21	0.84	0.84

Interaction:

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

2. Clamps 4x MI-SGC M12



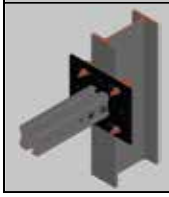
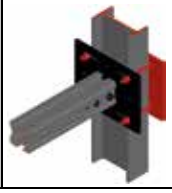
+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
34.80	*	9.00	9.00	9.00	9.00
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.06	1.06	2.09	2.09	2.09	2.09

Interaction:

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

* not decisive

MIQC-S90-AP base material connector

Clamped	Boxed	
		

Loading case: Boxed

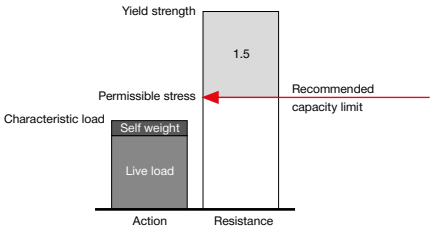
BOM:
Base material connector incl. all connectivity material
1x MIQC-S90-BP 2120273
Back (base) plate
1x MIQB-SB 2123566
Threaded rods
4x AM12x1000 8.8 HDG...m 419103
Self-locking nut
8x M12-F-SL WS3/4 382897

Combinations covered by loading case

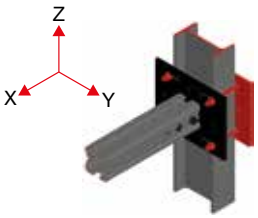
Connector used for fixing MIQ girder, perpendicularly to flange (width of 165-235mm) of structural steel open section, perpendicularly to structural steel beam

Recommended loading capacity - simplified for most common applications

Method



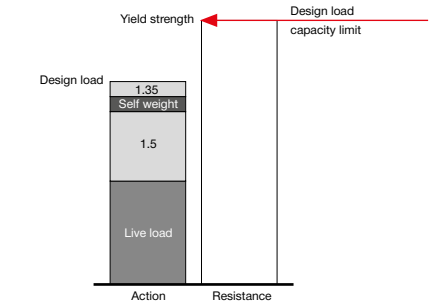
Shown load values are characteristic values. The partial safety factor for the actions is 1.5



± Fx, rec. [kN]	± Fy, rec. [kN]	± Fz, rec. [kN]
17.3	5.0	5.0

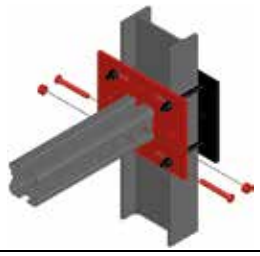
Design loading capacity - 3D 1/2

Method

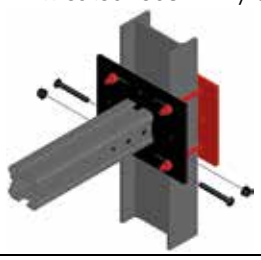


Limiting components of capacity evaluated in following data tables:

1. Steel connector MIQC-S90-BP



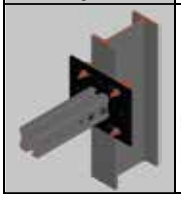
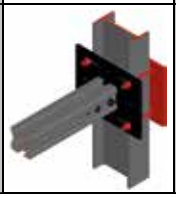
2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



MIQC-S90-BP base material connector

Conditions of the loading capacity tables:

- Just for static loads
- No fatigue loads, no seismic loads
- No low (<-10°C) temperatures, no high (> 100°C)

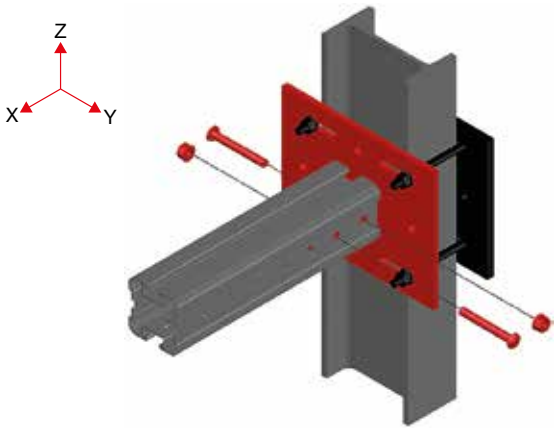
Clamped	Boxed	
		

Design loading capacity - 3D 2/2

Summary of design loads*

NOTE: all values in interaction formulas should be used in absolute values! The values below are referred to the coordinate system shown in the drawing.

1. Steel connector MIQC-S90-BP (Including screws MIA-OH90 connecting channel and connector and welds)

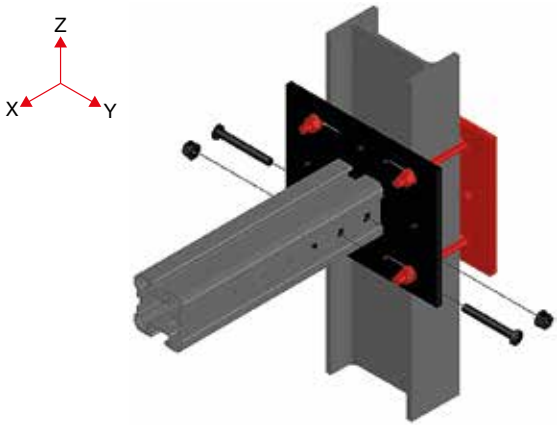


+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
26.00	36.64	13.18	13.18	46.95	46.95
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
1.37	1.37	2.21	2.21	0.84	0.84

Interaction:

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

2. Threated rods M12 / 8.8 in connection with MIQB-SA plate



+Fx,Rd [kN]	-Fx,Rd [kN]	+Fy,Rd [kN]	-Fy,Rd [kN]	+Fz,Rd [kN]	-Fz,Rd [kN]
194.23	34.23	7.42	7.42	7.42	7.42
+Mx,Rd [kNm]	-Mx,Rd [kNm]	+My,Rd [kNm]	-My,Rd [kNm]	+Mz,Rd [kNm]	-Mz,Rd [kNm]
0.87	0.87	11.65	11.65	11.65	11.65

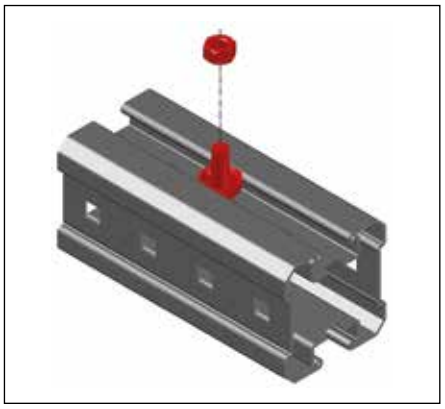
Interaction:

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

MIQA-T T-head bolt - accessories

Designation | Item number

MIQA-T T-head bolt | **2120142**



Recommended loading capacity

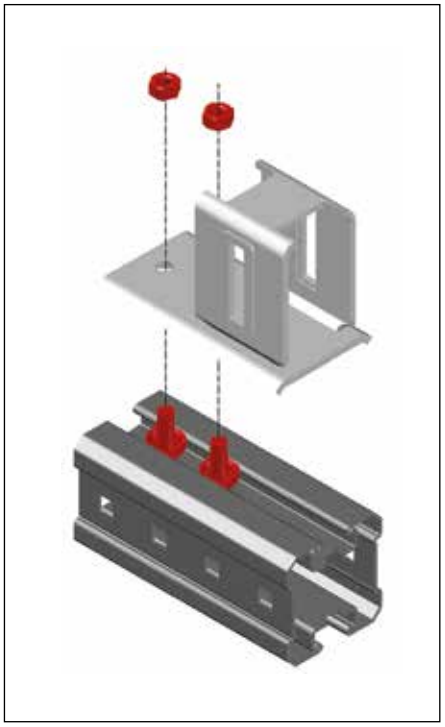
± Fx, rec. [kN]	± Fz, rec. [kN]
6.2	11.7

Design loading capacity - 3D

± Fx,Rd [kN]	± Fz,Rd [kN]
9.3	17.55

Designation | Item number

2x MIQA-T T-head bolt | **2120142**



Recommended loading capacity

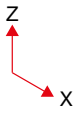
± Fx, rec. [kN]	± Fz, rec. [kN]
11.2	23.4

Design loading capacity - 3D

± Fx,Rd [kN]	± Fz,Rd [kN]
16.8	35.1

MIQM-M wing nut - accessories

Designation	Item number
MIQM-M10	**2120274**
MIQM-M12	**2120275**
MIQM-M16	**2120276**



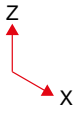
Recommended loading capacity

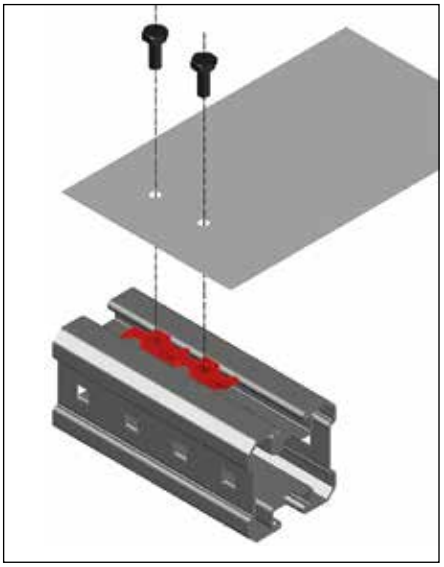
	± Fx, rec. [kN]	± Fz, rec. [kN]
M10	3.0	8.5
M12	3.5	8.5
M16	3.5	8.5

Design loading capacity - 3D

	± Fx, rec. [kN]	± Fz, rec. [kN]
M10	4.5	12.75
M12	5.25	12.75
M16	5.25	12.75

Designation	Item number
2x MIQM-M10	**2120274**
2x MIQM-M12	**2120275**
2x MIQM-M16	**2120276**





Recommended loading capacity

	± Fx, rec. [kN]	± Fz, rec. [kN]
M10	5.4	17.0
M12	6.3	17.0
M16	6.3	17.0

Design loading capacity - 3D

	± Fx, rec. [kN]	± Fz, rec. [kN]
M10	8.1	25.5
M12	9.45	25.5
M16	9.45	25.5

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