Deutsches Institut für Bautechnik

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Bautechnisches Prüfamt

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European Technical Assessment ETA-18/0144 of 14 January 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Hilti rail support MQP-21-72
Product family to which the construction product belongs	Products related to installation systems supporting technical equipment for building services such as pipes, conduits, ducts and cables
Manufacturer	Hilti AG Feldkircherstraße 100 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	L 1038621
This European Technical Assessment contains	12 pages including 8 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 280016-00-0602

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Specific Part

1 Technical description of the product

Object of this European Technical Assessment is the Hilti rail support MQP-21-72. The rail support MQP-21-72 consists of a steel plate with two elongated holes and a welded steel profile in U-shape. The elongated holes in the steel plate are arranged centrally on their longitudinal axis. The U-profile is arranged between the elongated holes facing the open side of the profile on the short side of the base plate. The rail support MQP-21-72 is suitable for mounting installation channels, which are fastened by means of channel connectors to the openings provided in the U-profile. Per each wall of the U-profile, two of these openings are arranged one above the other.

Annex A describes the dimensions and materials of the Hilti rail support MQP-21-72.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

The performance given in Section 3 can only be assumed if the Hilti rail support MQP-21-72 is used in compliance with the specifications and under boundary conditions set out in the Annexes. The test and assessment methods on which this European Technical Assessment is based lead to an assumption of a working life of the Hilti rail support MQP-21-72 of at least 50 years in final use under ambient temperatures in indoor areas. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

In accordance with the European Assessment Document EAD 280016-00-0602, the product is intended to be used in

a) installations for the support of sprinkler kits;
b) installations for the support of other building service elements such as pipes, conduits, ducts and cables.

3 Performance of the product and references to the methods used for its assessment

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.2 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Form	see Annex A
Dimensions	see Annex A
Materials	see Annex A
Characteristic resistance at ambient temperature	see Annex C

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 280016-00-0602, the following legal bases apply:

- In case of intended use a) specified in Section 2:
  Decision of the commission N° 1996/577/EC:
  System 1 applies for the assessment and verification of constancy of performance (AVCP).
- In case of intended use b) specified in Section 2:
  Decision of the commission N° 1999/472/EC:
  System 3 applies for the assessment and verification of constancy of performance (AVCP).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

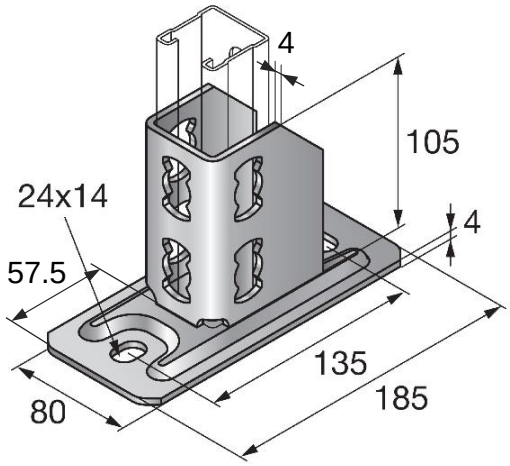
The technical details necessary for the implementation of the system for the assessment and verification of constancy of performance are laid down in the control plan (confidential part of this European Technical Assessment) deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 14 January 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Häßler

Table A1: Dimensions and material of rail support MQP-21-72

Illustration [Dimensions in mm]	**Designation**	**Item number**	**Material**
	MQP-21-72	369651	S235JR in accordance with EN 10025-2, zinc coated

Hilti rail support MQP-21-72	Annex A
Description of product Dimensions und material	

- Hilti rail support MQP-21-72 is used to transfer building services component loads such as ducts and equipment for sprinklers, water, heating, cooling, ventilation, electrical and other systems. Hilti rail support MQP-21-72 is performing this loadbearing function at ambient temperature under the conditions described in Section 2 of this European Technical Assessment.

- The resistance at ambient temperature applies for static actions in the main axes X,Y,Z. The point of intersection of the axes X,Y,Z is located in the centroid position of the cross section of the installed channel and the Z axis is centered on the surface of the base plate facing the welded U-profile according to Figures B1.1 and B1.2.

- The resistance at ambient temperature applies in connection with the installation channels MQ 41/3 or MQ-41/3 LL as per Tables B2.1 and B3 with the installation condition according to Figure B1.3. The installation channels are cut to length centrally between the longholes or the roundholes at the marking. The cut channel lies within a range of 2 mm from both sides of the marking. The installation channel must be mounted as accurately as possible in the U-profile of the rail support without direct contact with the base plate. The distance between the installation channel and the base plate is maximum 5 mm in the vertical direction.

- The fastening of the installation channels MQ-41/3 or MQ-41/3 LL to the rail support is carried out with two MQN-B channel connectors as per Table B2.2, which are arranged opposite the open side of the U-profile of the rail support. The nuts and the plates on the channel connectors are firmly connected to the installation channel and the U-profile of the rail support by tightening the screw.

- Prior to installation, it must be ensured that the component to be supported by the rail support, the anchoring to the base material and the base material itself are suitable to withstand the resistance values of the rail support as well as of the installation system and that they have a fireproof certificate.

- Installation must be carried out by trained personnel and under the supervision of the site manager. The general installation instructions of the manufacturer are to be observed.

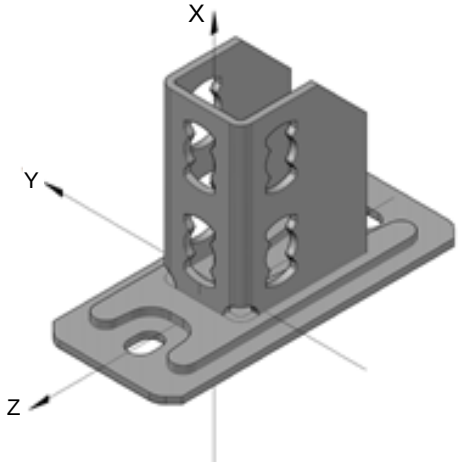


Figure B1.1: Coordinate system for the resistance

Dimensions in mm

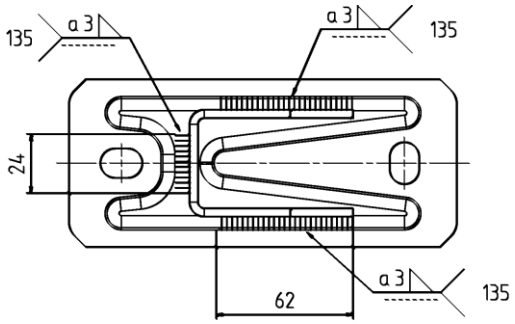


Figure B1.2: Welded connection

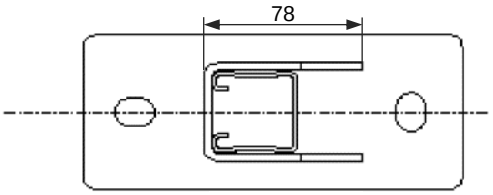


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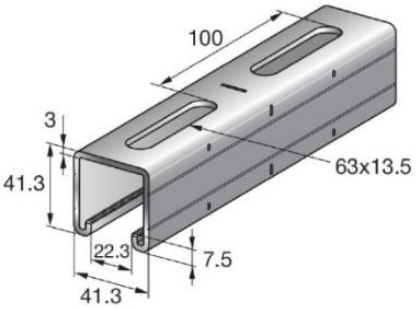
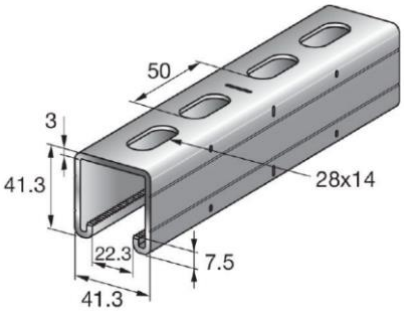
Figure B1.3: Installation condition of the channel in the rail support

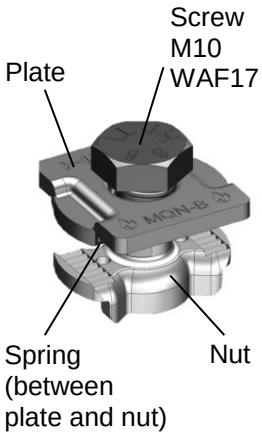
Hilti rail support MQP-21-72	Annex B1
Voraussetzungen für die Leistungsbewertung	

Table B2.1: Dimensions und material of installation channels MQ-41/3 and MQ-41/3 LL[1)]

Illustration [Dimensions in mm]	**Item number**	**Designation**	**Length [m]**	**Material**
	369596	MQ-41/3 3M	3	S250GD+Z275-M-A-C in accordance with EN 10346
	369597	MQ-41/3 6M	6	
	2048102	MQ-41/3 3M LL	3	S250GD+Z275-M-A-C in accordance with EN 10346
	2048103	MQ-41/3 6M LL	6	

[1)] Installation channels MQ-41/3 and MQ-41/3 LL see ETA-18/0119

Table B2.2: Materials of the components of the channel connector MQN-B[2)]

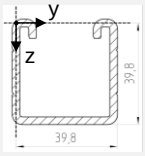
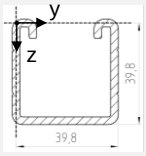
Illustration	**Item number**	**Designation**	**Material**
	2184853	MQN-B	Plate: DD11 in accordance with EN 10111[3)], zinc coated Nut: S355MC in accordance with EN 10149-2, zinc coated Screw: strength class 8.8 in accordance with EN ISO 898-1, zinc coated Spring element: X10CrNi18-8 in accordance with EN 10270-3

[2)] Channel connector MQN-B see ETA-18/0078

[3)] with 235 N/mm^2 ≤ R_{eL} ≤ 340 N/mm^2, Method of deoxidation: fully killed

Hilti rail support MQP-21-72	Annex B2
Requirements for performance assessment	

Table B3: Cross-section properties of installation channels MQ-41/3 and MQ-41/3 LL

Description	**Symbol**	**MQ-41/3** 	**MQ-41/3 LL** 	**Unit**
Classification cross section in accordance with EN 1993-1-1	-	3	3	-
Cross section areas	A	375.88	379.93	mm^2
	A_{tot}	375.88	379.93	mm^2
Shear areas	A_y	48.69	54.43	mm^2
	A_z	195.47	194.59	mm^2
Centroid position	$y_{C,0}$	19.15	19.15	mm
	$z_{C,0}$	20.57	20.76	mm
Moments of inertia	I_y	76963.50	78224.80	mm^4
	I_z	107949.00	108011.00	mm^4
Inclination of principal axes	α	90.00	90.00	°
Polar moments of inertia	I_p	184913.00	186236.00	mm^4
	$I_{p,M}$	778900.00	780561.00	mm^4
Radii of gyration	i_y	14.31	14.35	mm
	i_z	16.95	16.86	mm
Polar radii of gyration	i_p	22.18	22.14	mm
	$i_{p,M}$	45.52	45.33	mm
Warping radius of gyration	$i_{\omega,M}$	7.02	7.02	mm
Torsional constant	J	848.88	856.29	mm^4
Secondary torsional constant	J_s	105319.00	105394.00	mm^4
Location of the shear center	$y_{M,0}$	19.15	19.15	mm
	$z_{M,0}$	60.32	60.31	mm
	y_M	0.00	0.00	mm
	z_M	39.75	39.55	mm
Warping constants	$I_{\omega,C}$	2.09277E+08	2.07678E+08	mm^6
	$I_{\omega,M}$	38387600	38417600.00	mm^6
	$r_{\omega,M}$	0.00	0.00	-
Section moduli	$S_{y,max}$	4002.48	4108.45	mm^3
	$S_{y,min}$	-3487.10	-3514.15	mm^3
	$S_{z,max}$	5227.58	5230.56	mm^3
	$S_{z,min}$	-5277.58	-5230.56	mm^3
Torsional section modulus	S_t	282.96	285.43	mm^3
Max. plastic bending moment	$M_{pl,y,k}$	NPA [4)]	NPA	kNm
	$M_{pl,z,k}$	NPA	NPA	kNm
Max. plastic section moduli	Z_y	NPA	NPA	mm^3
	Z_z	NPA	NPA	mm^3
Plastic shear areas	$A_{pl,y}$	NPA	NPA	mm^2
	$A_{pl,z}$	NPA	NPA	mm^2
Area bisecting axis position	$f_{y,0}$	NPA	NPA	mm
	$f_{z,0}$	NPA	NPA	mm
Plastic shear forces	$V_{pl,y,k}$	NPA	NPA	kN
	$V_{pl,z,k}$	NPA	NPA	kN
Plastic axial force	$N_{pl,k}$	NPA	NPA	kN
Buckling curves	BC_y	c	c	-
	BC_z	c	c	-

[4)] NPA: no performance assessed

Table C1: Characteristic resistance of the rail support MQP-21-72[5)] in connection with two channel connectors MQN-B for the fastening of installation channels according to the coordinate system in Figure B1.1

$+F_{X,Rk}$ [kN]	$-F_{X,Rk}$ [kN]	$+F_{Y,Rk}$ [kN]	$-F_{Y,Rk}$ [kN]	$+F_{Z,Rk}$ [kN]	$-F_{Z,Rk}$ [kN]
12.60	12.60	2.50	2.50	7.34	7.34
$M_{X,Rk}$ [kNcm]	$M_{Y,Rk}$ [kNcm]	$M_{Z,Rk}$ [kNcm]			
18.16	38.55	9.17			

[5)] The resistance values in Table C1 correspond to the smallest values of the individual resistance given in Annex D1 of the rail support for the verification of the connection to the installation channels with two channel connectors as well as for the verification of the welded connection to the base plate.
The load carrying capacity of the installation channels MQ-41/3 and MQ-41/3 LL is to be verified separately (see ETA-18/0119).

Hilti rail support MQP-21-72	Annex C
Characteristic resistance at ambient temperature	

Table D1.1: Characteristic resistance: Steel components of the rail support MQP-21-72 according to the coordinate system in Figure B1.1

$+F_{X,Rk}$ [kN]	$-F_{X,Rk}$ [kN]	$+F_{Y,Rk}$ [kN]	$-F_{Y,Rk}$ [kN]	$+F_{Z,Rk}$ [kN]	$-F_{Z,Rk}$ [kN]
12.60	12.60	2.50	2.50	7.34	7.34
$M_{X,Rk}$ [kNcm]	**$M_{Y,Rk}$ [kNcm]**	**$M_{Z,Rk}$ [kNcm]**			
18.16	38.55	13.44			

Table D1.2: Characteristic resistance: Two channel connectors MQN-B in connection with the installation channel MQ-41/3 or MQ-41/3 LL according to the coordinate system in Figure B1.1

$+F_{X,Rk}$ [kN]	$-F_{X,Rk}$ [kN]	$+F_{Y,Rk}$ [kN]	$-F_{Y,Rk}$ [kN]	$+F_{Z,Rk}$ [kN]	$-F_{Z,Rk}$ [kN]
18.38	18.38	3.67	3.67	32.66	32.66
$M_{X,Rk}$ [kNcm]	**$M_{Y,Rk}$ [kNcm]**	**$M_{Z,Rk}$ [kNcm]**			
52.61	115.08	9.17			

Table D1.3: Characteristic resistance: Welded connection of the rail support MQP-21-72 according to the coordinate system in Figure B1.1

$+F_{X,Rk}$ [kN]	$-F_{X,Rk}$ [kN]	$+F_{Y,Rk}$ [kN]	$-F_{Y,Rk}$ [kN]	$+F_{Z,Rk}$ [kN]	$-F_{Z,Rk}$ [kN]
24.82	24.82	20.26	20.26	30.16	30.16
$M_{X,Rk}$ [kNcm]	**$M_{Y,Rk}$ [kNcm]**	**$M_{Z,Rk}$ [kNcm]**			
265.16	201.85	272.95			

- In case of more than one force acting simultaneous on the rail support at ambient temperature, the following interaction formula can be used for the design of the rail support MQP-21-72 in connection with two channel connectors MQN-B according to the coordinate system in Figure B1.1:

$$\frac{F_{X.Ed}}{F_{X.Rd}} + \frac{F_{Y.Ed}}{F_{Y.Rd}} + \frac{F_{Z.Ed}}{F_{Z.Rd}} + \frac{M_{X.Ed}}{M_{X.Rd}} + \frac{M_{Y.Ed}}{M_{Y.Rd}} + \frac{M_{Z.Ed}}{M_{Z.Rd}} \leq 1.0$$

  Where the shear force is equal to or exceeds half the plastic shear resistance ($V_{Ed} \geq 0{,}50\ V_{pl,Rd}$), the reduced moment resistance should be taken using a reduced yield strength in accordance with EN 1993-1-1, section 6.2.8.

  The proof of stability is to be provided with the proof given above.

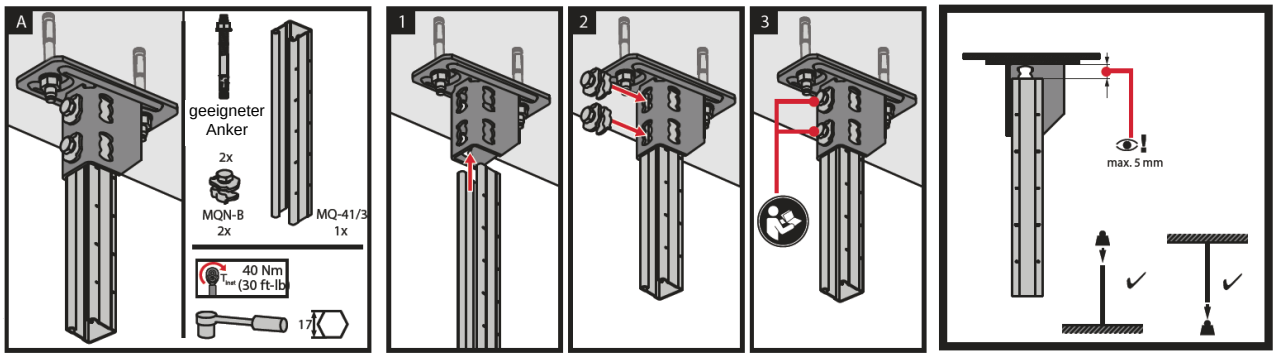
- Partial safety coefficients, provided that no other national regulations apply:

  Steel: $\gamma_{M0} = 1.0$; $\gamma_{M1} = 1.1$; $\gamma_{M2} = 1.25$

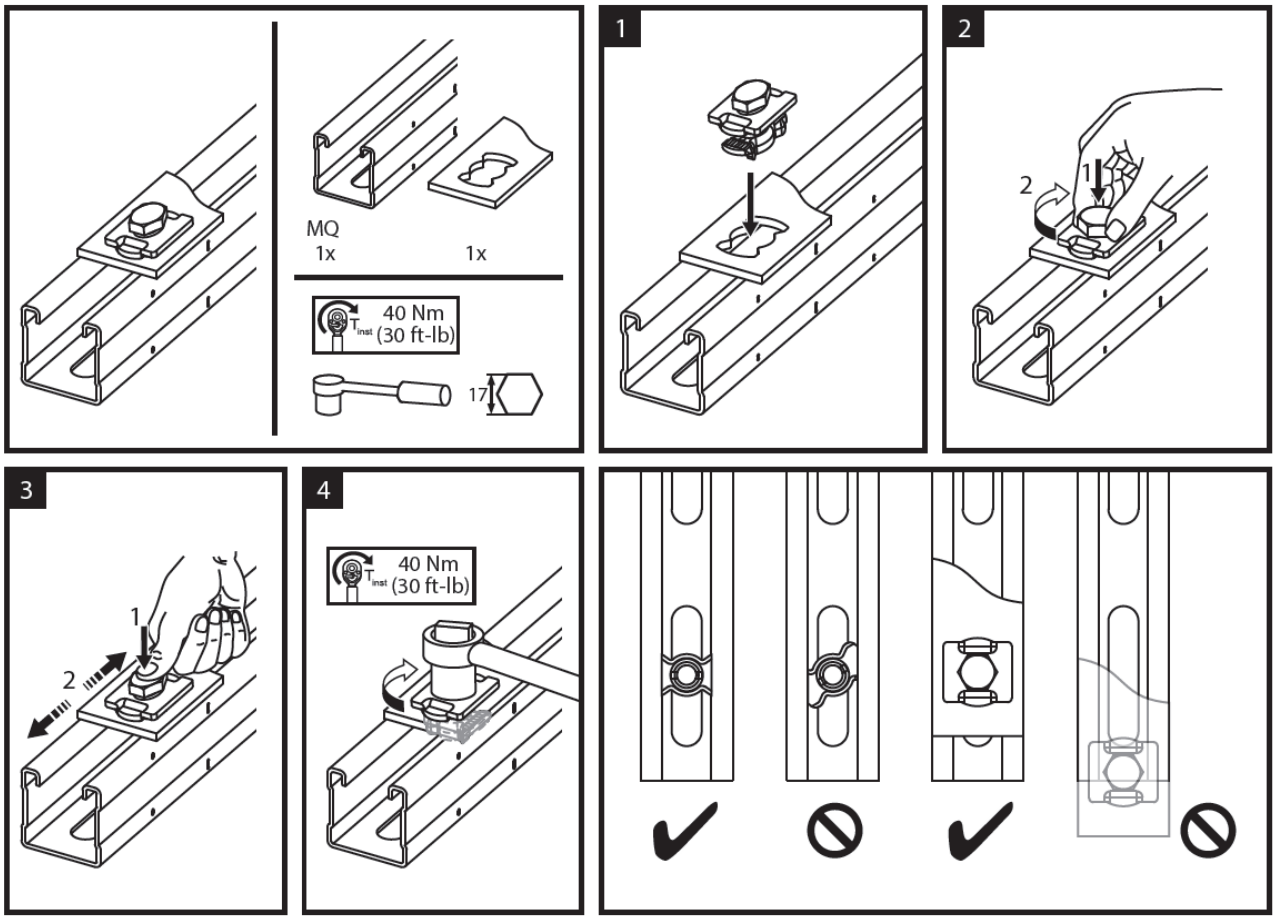
  Concrete: $\gamma_C = 1.5$; $\gamma_S = 1.15$

Hilti rail support MQP-21-72	Annex D2 (informative)
Interaction formulae and partial safety coefficients	

- The following general assembly instructions are to be observed:



The anchoring of the rail support to the base material and the base material itself must be suitable to withstand the resistance values of the rail support and of the installation systems as well as that they have a fireproof certificate.



The longitudinal axes of the MQN-B nut and the channel are perpendicular to each other after assembly with centric position of the screw between the parallel flanges of the channel.

Hilti rail support MQP-21-72	Annex D3 (informative)
General assembly instructions	