

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-18/0133
of 3 July 2018

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 trapeze frame

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

L1000511, L1038621, L1008864, L1005049, L106663
L1000405, L1000485, L1000446

This European Technical Assessment
contains

18 pages including 14 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

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

Object of this European Technical Assessment is the Hilti trapeze frame. The Hilti trapeze frame consists of three installation channels made of thin-walled steel profiles. A horizontally aligned MQ-41 D channel is positioned between two vertically aligned MQ-41/3 or MQ-41/3 LL channels and force-fitted to the corners of one another by means of an MQW-S/2 connection bracket and four MQN-B channel connectors each. The MQ-41 D channel consists of two profiles, which are connected in the area of the holes in the back of the channels in a shape-fitting and force-fitting way as a kind of riveted connection. The vertical channels are attached on the upper side to MQP-21-72 rail supports and force-fitted to these by two MQN-B channel connectors each. The suspension height is a maximum of 600 mm and corresponds to the length of the vertical MQ-41/3 or MQ-41/3 LL. The span width corresponds to the clear distance between the vertical channels and can be 700 mm, 1000 mm or 1250 mm. The load is applied centrally to the horizontal MQ-41 D channel by means of an M12 threaded rod, which is fastened to the channel by MQZ-L13 drilled plates arranged in pairs and M12 hexagonal nuts.

Annex A describes the dimensions and materials of the Hilti trapeze frame.

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 trapeze frame is used in compliance with the specifications and under boundary conditions set out in Annex B. The test and assessment methods on which this European Technical Assessment is based lead to an assumption of a working life of the Hilti trapeze frame 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
Shape	see Annex A
Dimensions	see Annex A
Material	see Annex A
Resistance and deformation at elevated temperatures determined for trapeze frame kits without pipe clamps	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).

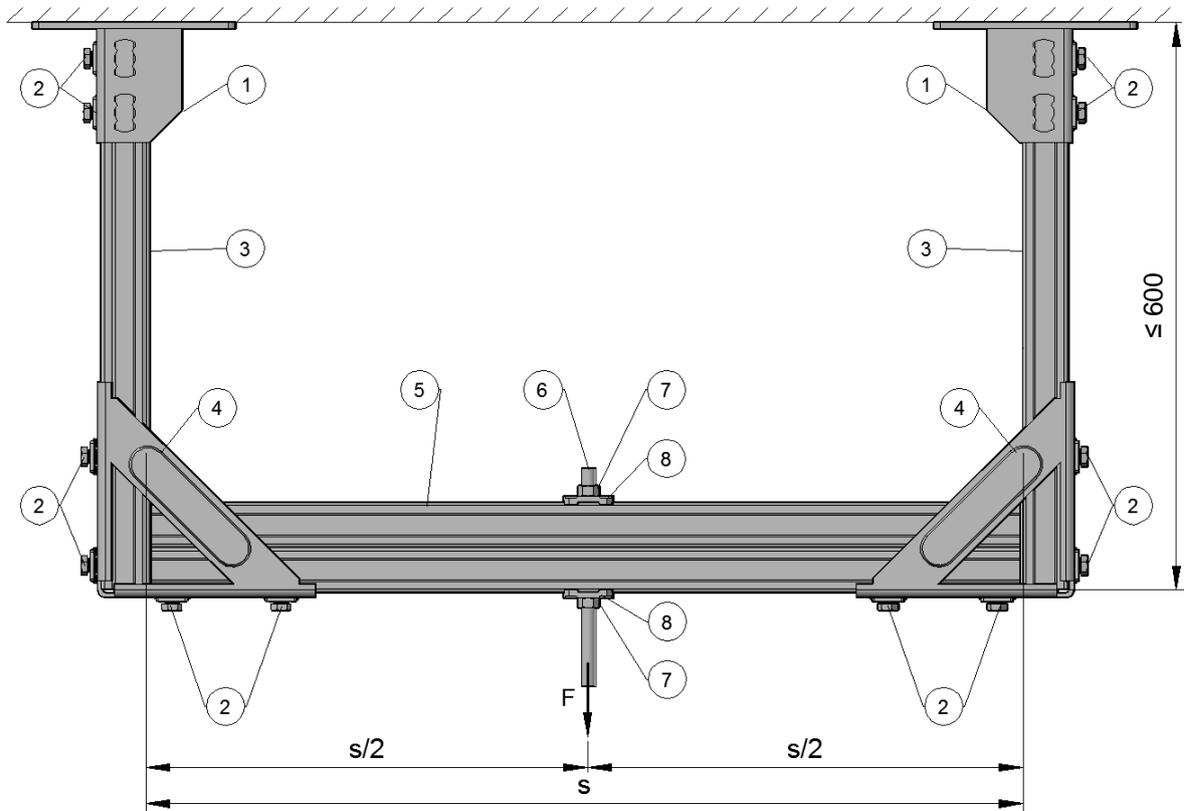
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 3 July 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Häßler



Legend

- 1 Rail support MQP-21-72
- 2 Channel connector MQN-B
- 3 Channel MQ-41/3 or MQ-41/3 LL
- 4 Angle bracket MQW-S/2
- 5 Channel MQ-41 D
- 6 Threaded rod M12
- 7 Hexagonal nut M12
- 8 Drilled plate MQZ-L13

Annex

- A4
- A3
- A2
- A4
- A2
- A4
- A4
- A3

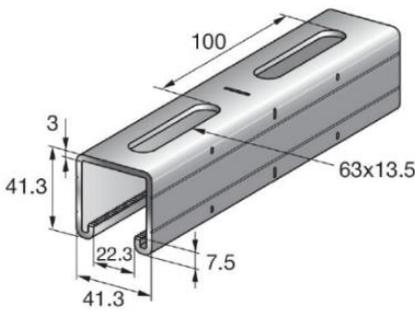
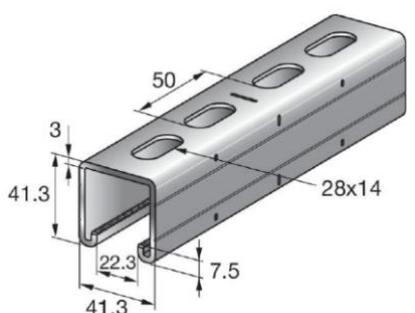
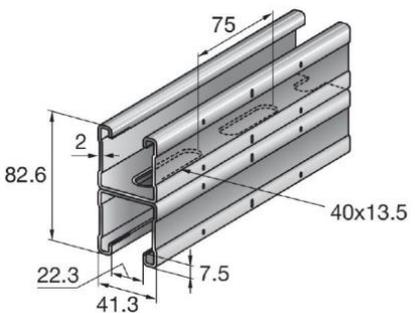
Dimensions in mm

Figure A1: Trapeze frame with clear span $s = 700 \text{ mm}$, 1000 mm , 1250 mm and centric connection for load introduction

electronic copy of the eta by dibt: eta-18/0133

Hilti trapeze frame	Annex A1
Description of product (kit) Dimensions and materials	

Table A2: Dimensions and materials of the channels MQ-41/3, MQ-41/3 LL und MQ-41 D

Illustration ¹⁾	Item number	Designation	Length [m]	Materials
	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	
 <p>Two profiles of MQ-41 D channel are connected in the area of the holes in the back of the channels in a shape-fitting and force-fitting way as a kind of riveted connection.</p>	369603	MQ-41 D 3m	3	S250GD+Z275-M-A-C in accordance with EN 10346
	369604	MQ-41 D 6m	6	

¹⁾ Dimensions in mm

Hilti trapeze frame

Description of the product (kit)
Dimensions and materials of the components of the kit

Annex A2

Table A3.1: Dimensions and material of the drilled plates

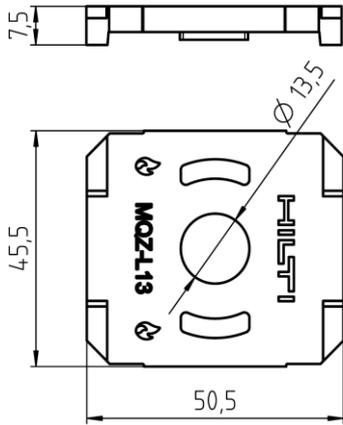
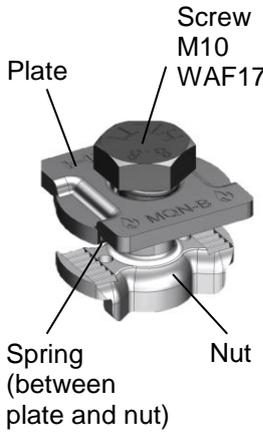
Illustration	Dimensions [mm]	Designation	Item number	Material
		MQZ-L13	2199456	S235JR in accordance with EN 10025-2, zinc coated

Table A3.2: Materials of the components of the channel connector²⁾

Illustration	Item number	Designation	Materials
	2184853	MQN-B	<p>Plate: DD11 in accordance with EN 10111³⁾, zinc coated</p> <p>Nut: S355MC in accordance with EN 10149-2, zinc coated</p> <p>Screw: strength class 8.8 in accordance with EN ISO 898-1, zinc coated</p> <p>Spring element: X10CrNi18-8 in accordance with EN 10270-3</p>

²⁾ Components of the channel connector see ETA-18/0078

³⁾ with $235 \text{ N/mm}^2 \leq R_{eL} \leq 340 \text{ N/mm}^2$, Method of deoxidation: fully killed

Hilti trapeze frame

Description of the product (kit)
Dimensions and materials of the components of the kit

Annex A3

Table A4.1: Dimensions and material of the threaded rods

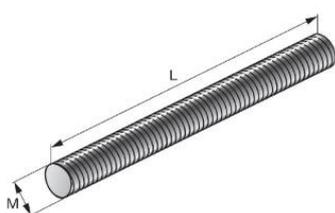
Illustration	Designation	Item number	M thread	L [mm]	Material
	AM12x3000 4.8	216421	M12	3000	Strength class 4.8 in accordance with DIN 976-1, zinc coated
	AM12x2000 4.8	216420	M12	2000	
	AM12x1000 4.8	339797	M12	1000	

Table A4.2: Dimensions and material of the hexagonal nuts

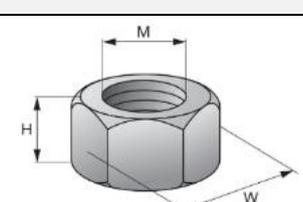
Illustration	Designation	Item number	M thread	W [mm]	H [mm]	Material
	M12 hexagonal nut	216467	M12	19	10	Strength class 8 in accordance with ISO 4032, zinc coated

Table A4.3: Dimensions and material of the rail supports

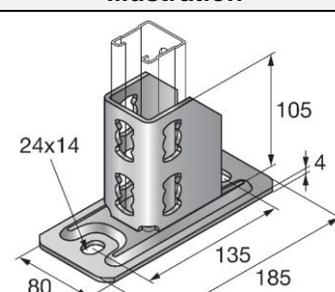
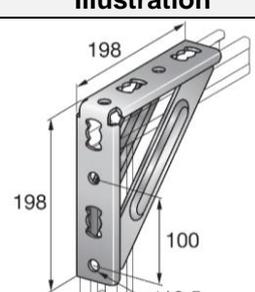
Illustration	Designation	Item number	Material
	MQP-21-72	369651	S235JR in accordance with EN 10025-2, zinc coated

Table A4.4: Dimensions and material of the angle brackets

Illustration	Designation	Item number	Material
	MQW-S/2	369665	S235JR in accordance with EN 10025-2, zinc coated

Hilti trapeze frame

Description of the product (kit)
Dimensions and materials of the components of the kit

Annex A4

- Hilti trapeze frame is used to transfer building services component loads such as ducts and equipment for sprinklers, water, heating, cooling, ventilation, electrical and other systems. Hilti trapeze frame is performing this loadbearing function at elevated temperatures under the conditions described in Section 2 of this European Technical Assessment.
- Information on resistance and deformation at elevated temperatures applies to static and centric actions on the trapeze frame according to Annex A1. The suspension height of 600 mm corresponds to the length of the vertical MQ-41/3 or MQ-41/3 LL channel. The span width corresponds to the clear distance between the suspended vertical channels.
- The resistance and deformation at elevated temperatures are referring to the boundary conditions of the standard temperature / time curve (STTC) in accordance with EN 1363-1.
- MQZ-L13 drilled plates are always used in pairs in conjunction with zinc coated threaded rods in accordance with DIN 976-1 as per Table A4.1; zinc coated hexagonal nuts in accordance with ISO 4032 as per Table A4.2; and Hilti MQ-41 D installation channels as per Table A2. The hexagonal nuts are to be tightened with a torque of 30 Nm. The threaded rod must protrude by at least 5 mm over the hexagonal nut on the opposite of the load-bearing side (see Figure B1).
- All MQN-B channel connectors must be tightened with a torque of 40 Nm. 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.
- The 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 fastening of the base connector to the base material is made with appropriate anchors. The anchoring used with the base material must have a fireproof certificate.
- Prior to installation, it must be ensured that the component to be supported by the trapeze frame, the anchoring of the trapeze frame to the base material and the base material itself are suitable to withstand the resistance values of the trapeze frame 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 assembly instructions of the manufacturer apply.

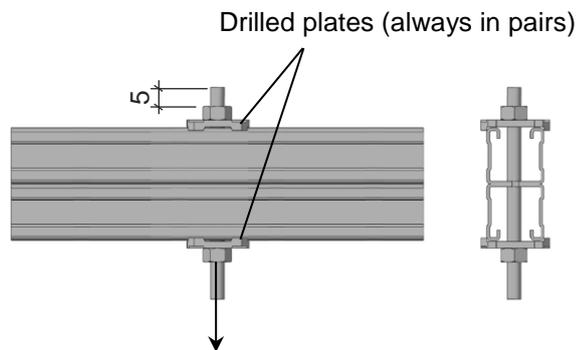
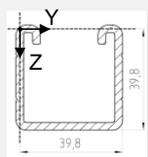
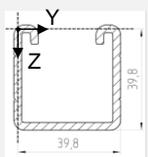
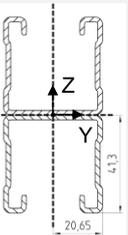


Figure B1: Direction of force and arrangement of the drilled plates

electronic copy of the eta by dibt: eta-18/0133

Hilti trapeze frame	Annex B1
Requirements for performance assessment	

Table B2: Section properties of installation channels MQ-41/3, MQ-41/3 LL und MQ-41 D

Description	Symbol	MQ-41/3	MQ-41/3 LL	MQ-41 D	Unit
					
Classification cross section in accordance with EN 1993-1-1	-	3	3	3	-
Cross section areas	A	375.88	379.93	545.97	mm ²
	A _{tot}	375.88	379.93	545.97	mm ²
Shear areas	A _y	48.69	54.43	66.37	mm ²
	A _z	195.47	194.59	197.58	mm ²
Centroid position	y _{C,0}	19.15	19.15	0.00	mm
	z _{C,0}	20.57	20.76	0.00	mm
Moments of inertia	I _y	76963.50	78224.80	323585.00	mm ⁴
	I _z	107949.00	108011.00	154070.00	mm ⁴
Inclination of principal axes	α	90.00	90.00	0.00	°
Polar moments of inertia	I _p	184913.00	186236.00	477656.00	mm ⁴
	I _{p,M}	778900.00	780561.00	477656.00	mm ⁴
Radii of gyration	i _y	14.31	14.35	24.35	mm
	i _z	16.95	16.86	16.80	mm
Polar radii of gyration	i _p	22.18	22.14	29.58	mm
	i _{p,M}	45.52	45.33	29.58	mm
Warping radius of gyration	i _{ω,M}	7.02	7.02	17.32	mm
Torsional constant	J	848.88	856.29	575.03	mm ⁴
Secondary torsional constant	J _s	105319.00	105394.00	91246.30	mm ⁴
Location of the shear center	y _{M,0}	19.15	19.15	0.00	mm
	z _{M,0}	60.32	60.31	0.00	mm
	y _M	0.00	0.00	0.00	mm
	z _M	39.75	39.55	0.00	mm
Warping constants	I _{ω,C}	2.09277E+08	2.07678E+08	1.43225E+08	mm ⁶
	I _{ω,M}	38387600	38417600.00	1.43225E+08	mm ⁶
	r _{ω,M}	0.00	0.00	0.00	-
Section moduli	S _{y,max}	4002.48	4108.45	7834.29	mm ³
	S _{y,min}	-3487.10	-3514.15	-7833.74	mm ³
	S _{z,max}	5227.58	5230.56	7460.71	mm ³
	S _{z,min}	-5277.58	-5230.56	-7460.71	mm ³
Torsional section modulus	S _t	282.96	285.43	287.51	mm ³
Max. plastic bending moment	M _{pl,y,k}	NPA ³⁾	NPA	NPA	kNm
	M _{pl,z,k}	NPA	NPA	NPA	kNm
Max. plastic section moduli	Z _y	NPA	NPA	NPA	mm ³
	Z _z	NPA	NPA	NPA	mm ³
Plastic shear areas	A _{pl,y}	NPA	NPA	NPA	mm ²
	A _{pl,z}	NPA	NPA	NPA	mm ²
Area bisecting axis position	f _{y,0}	NPA	NPA	NPA	mm
	f _{z,0}	NPA	NPA	NPA	mm
Plastic shear forces	V _{pl,y,k}	NPA	NPA	NPA	kN
	V _{pl,z,k}	NPA	NPA	NPA	kN
Plastic axial force	N _{pl,k}	NPA	NPA	NPA	kN
Buckling curves	BC _y	c	c	c	-
	BC _z	c	c	c	-

³⁾ NPA: No performance assessed

Hilti trapeze frame

Requirements for performance assessment

Annex B2

Table C1.1: Resistance of the trapeze frame with centric single load according to Annex A1 at elevated temperatures: Parameter of the regression curve $F_{Rk}(t) = c_3(c_1 + c_2/t)$

Clear span s [mm]	c_1	c_2	c_3	t_{min} [Minutes]	t_{max} [Minutes]
700	265.723	93772.378	0.86796	30	130
1000	-269.244	111054.96	0.89370	30	132
1250	-174.179	88162.761	0.8910	30	132

Table C1.2: Resistance $F_{Rk,t}$ of the trapeze frame with centric single load according to Annex A1 at elevated temperatures after $t = 30, 60, 90$ und 120 minutes

Clear span s [mm]	$F_{Rk,30}$ [N]	$F_{Rk,60}$ [N]	$F_{Rk,90}$ [N]	$F_{Rk,120}$ [N]
700	2944	1587	1135	909
1000	3068	1414	862	586
1250	2463	1154	718	499

Symbols and designation

δ	Deformation
$\delta_{max,t}$	Maximum deformation after an exposure time $\leq t$ minutes to elevated temperatures
$F_{Rk,30}(\delta)$	Load displacement function for an exposure time $t = 30$ minutes to elevated temperatures
$F_{Rk,t}$	Resistance after an exposure time t to elevated temperatures
$F_{Rk}(t)$	Resistance time function at elevated temperatures

Hilti trapeze frame

Resistance at elevated temperatures

Annex C1

Table C2.1: Load displacement function and deformation of the trapeze frame with centric single load according to Annex A1 at elevated temperatures. Parameter of the load displacement curve $F_{Rk,30}(\delta) = a_3 (a_1 + \delta^2)$

Clear span s [mm]	a_1	a_2	a_3	δ [mm]
700	624.4191	0.271158	0.630376	$4 \leq \delta \leq 217$
1000	99.19606	0.598566	0.721039	$30 \leq \delta \leq 379$
1250	91.69105	0.581169	0.700153	$28 \leq \delta \leq 420$

Table C2.2: Load displacement values $F_{Rk,30}(\delta)$ and deformation of the trapeze frame with centric single load according to Annex A1 at elevated temperatures

δ [mm]	Clear span s		
	700 mm	1000 mm	1250 mm
	$F_{Rk,30}(\delta)$ [N]		
50	1137	744	624
100	1372	1126	933
150	1532	1435	1181
200	1656	1705	1396
250	-	1949	1589
300	-	2174	1767
350	-	2384	1932

Table C2.3: Maximum displacement of the trapeze frame with centric single load according to Annex A1 at elevated temperatures until time t

$\delta_{max,t}$ [mm]	Clear span s		
	700 mm	1000 mm	1250 mm
$\delta_{max,60}$	303	395	430
$\delta_{max,90}$	303	395	430
$\delta_{max,120}$	303	395	430

Symbols and designation see Annex C1

Hilti trapeze frame	Annex C2
Deformation at elevated temperatures	

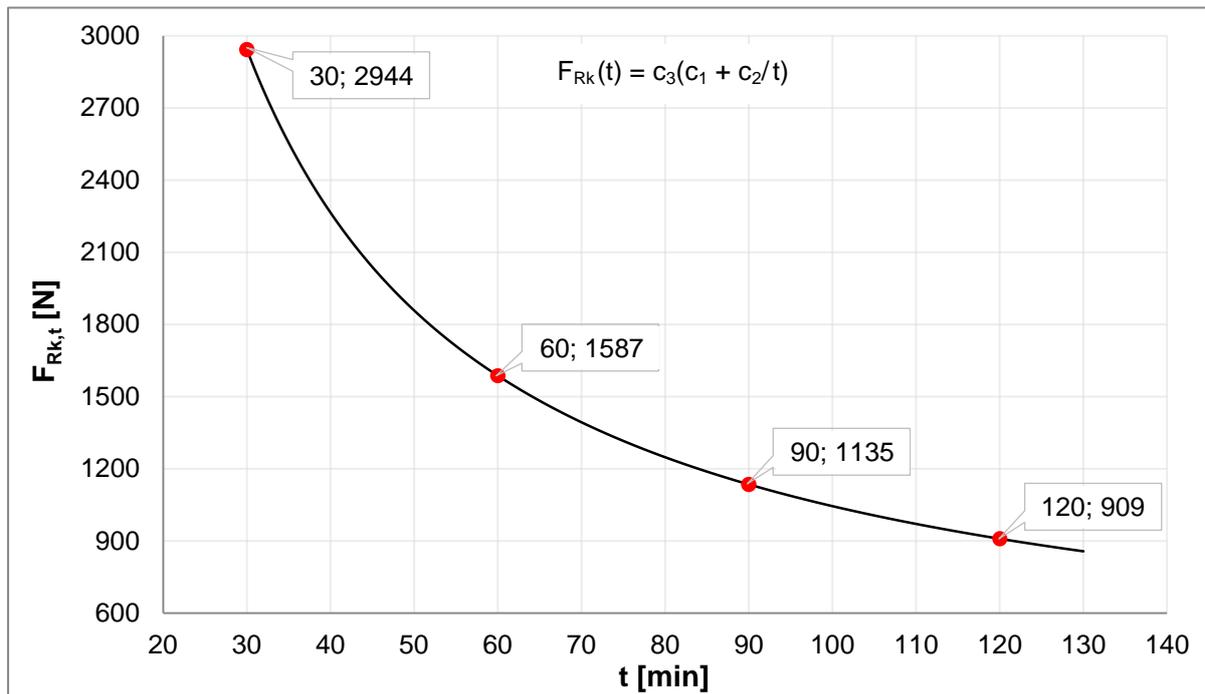


Figure C3.1: Resistance at elevated temperatures for trapeze frame with clear span of 700 mm

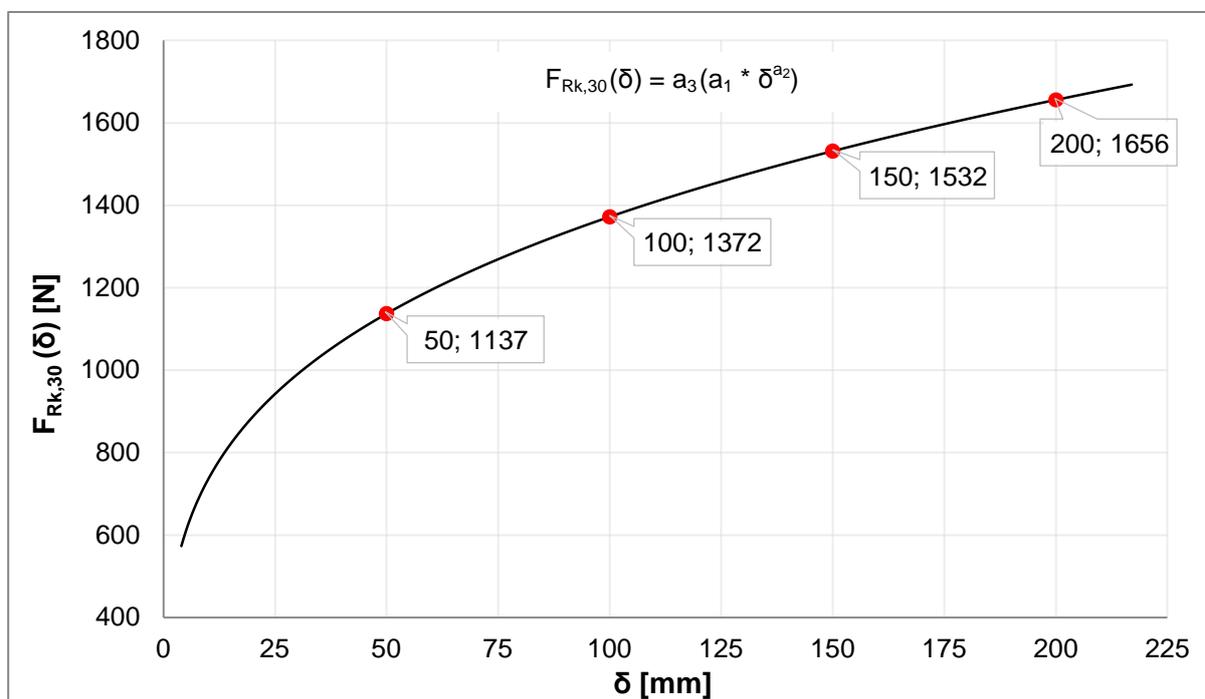


Figure C3.2: Deformation when exposed to elevated temperatures until 30 minutes for trapeze frame with clear span of 700 mm

Symbols and designation see Annex C1

Hilti trapeze frame	Annex C3
Resistance and deformation at elevated temperatures	

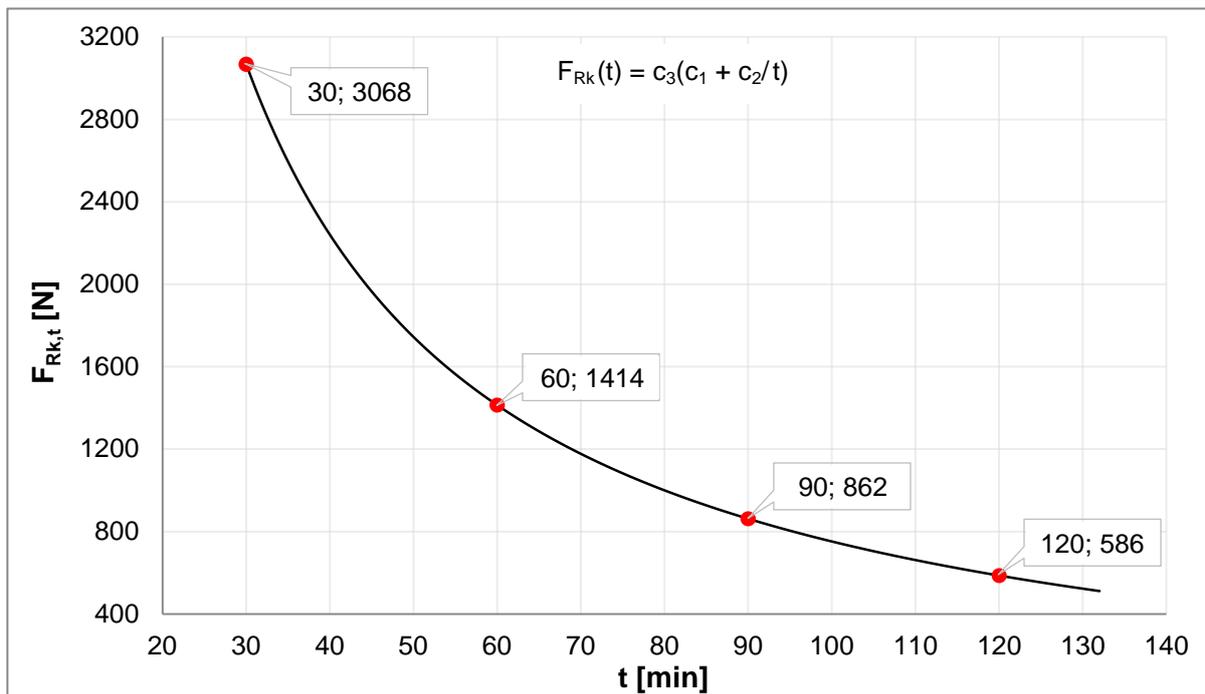


Figure C4.1: Resistance at elevated temperatures for trapeze frame with clear span of 1000 mm

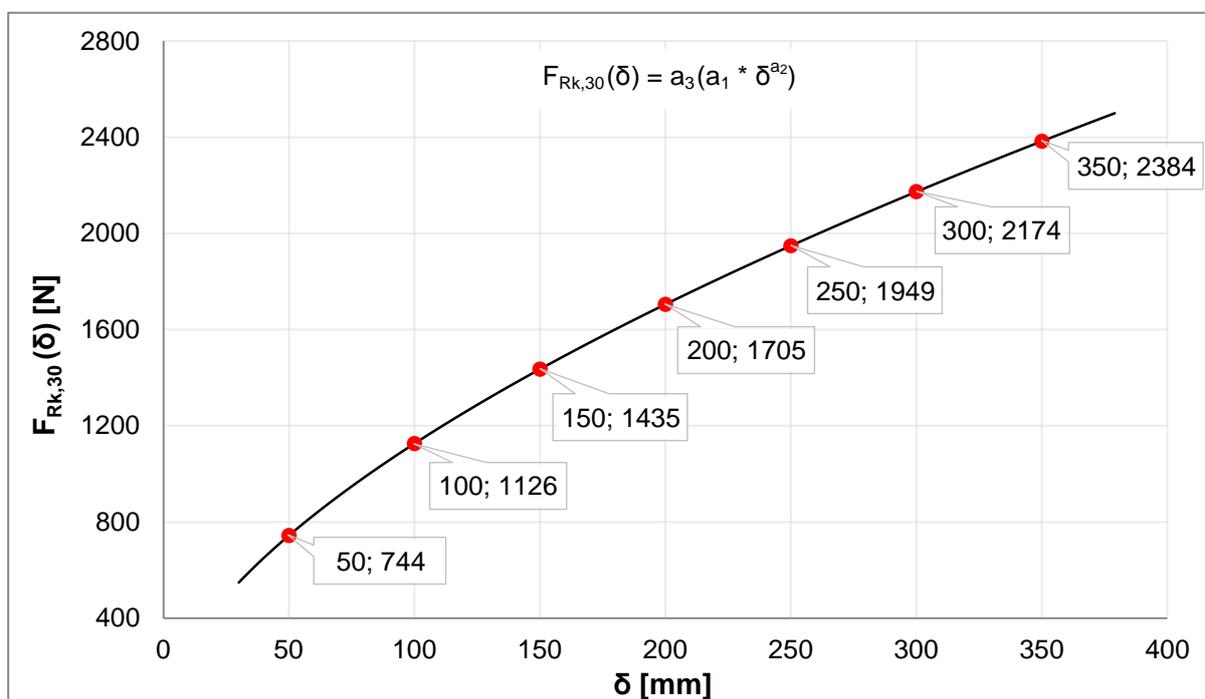


Figure C4.2: Deformation when exposed to elevated temperatures until 30 minutes for trapeze frame with clear span of 1000 mm

Symbols and designation see Annex C1

electronic copy of the eta by dibt: eta-18/0133

Hilti trapeze frame	Annex C4
Resistance and deformation at elevated temperatures	

English translation prepared by DIBt

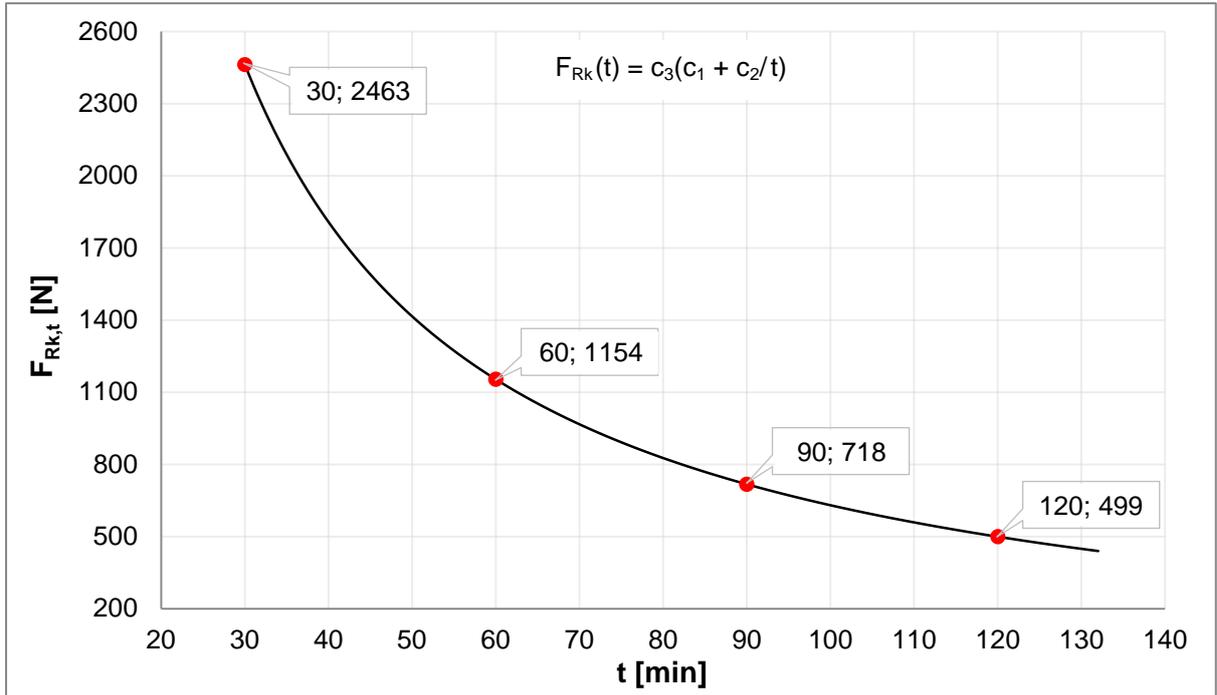


Figure C5.1: Resistance at elevated temperatures for trapeze frame with clear span of 1250 mm

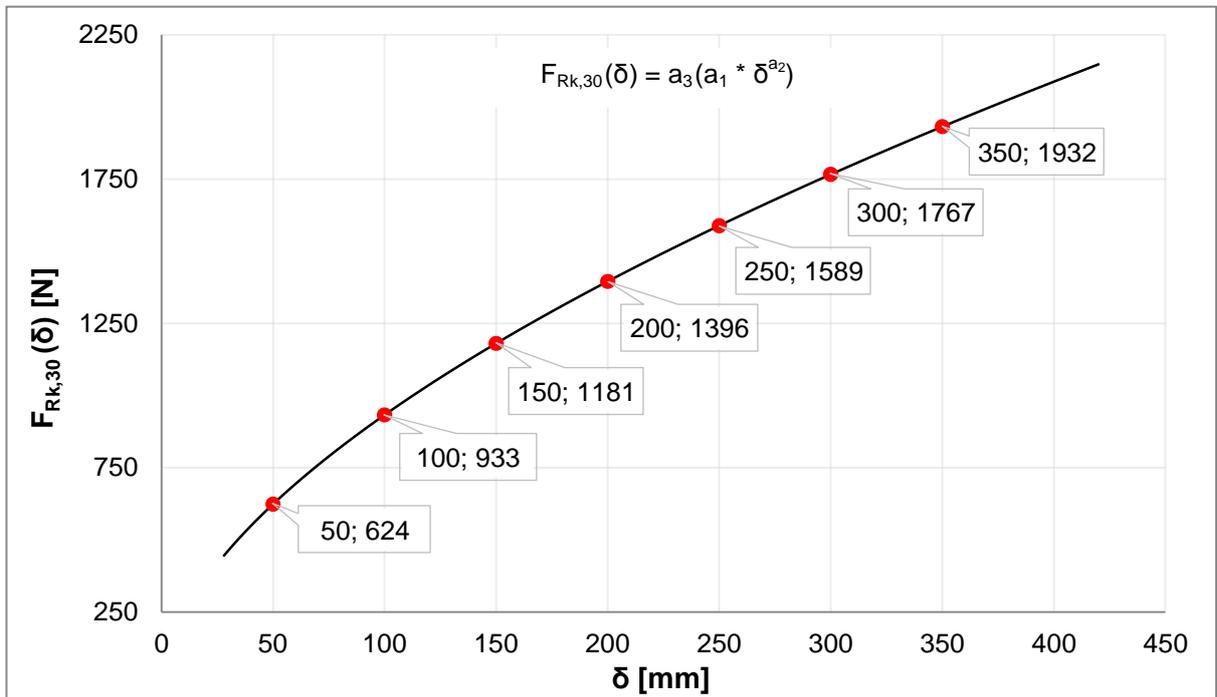
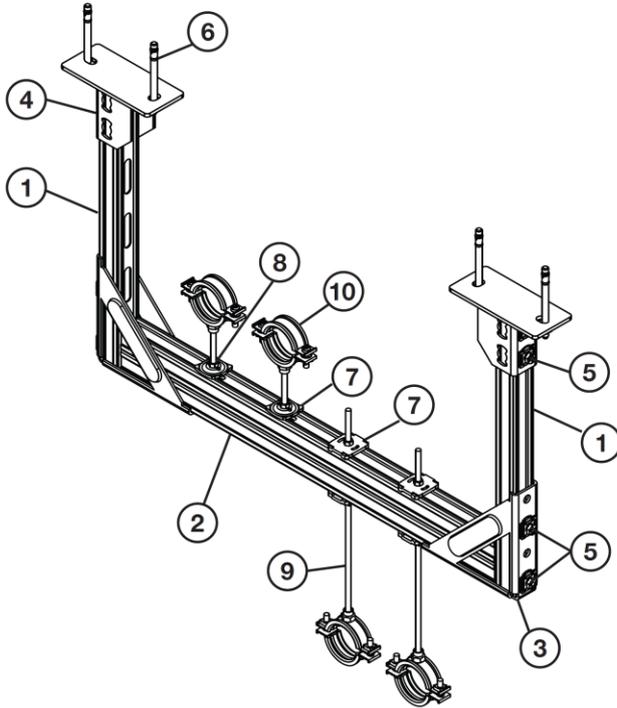


Figure C5.2: Deformation when exposed to elevated temperatures until 30 minutes for trapeze frame with clear span of 1250 mm

Symbols and designation see Annex C1

Hilti trapeze frame	Annex C5
Resistance and deformation at elevated temperatures	



Bill of material / Stückliste						
Part of typical/ Applikationselement	Ref.	Opt.	Item no. / Artikel Nr.	Description / Bezeichnung		
Channel / Schiene	1		369596	MQ-41/3 3m channel*		
	1		2048102	MQ-41/3 LL 3m channel*		
	2		369603	MQ-41 D 3m channel*		
	Structure / Aufbau	3		369655	MQW-S/2 angle	
		4		369651	MQP-21-72 base plate	
Fixation / Befestigung		5		2184853	MQN-B pushbutton	
		6	A	2107848	HST2 M12x105 10 stud anchor	
		6	B	2105718	HST3 M12x105 30/10 stud anchor	
6	C	2079912	HUS3-H 10x70 15/-/-			
Pipe Fixation / Rohr- fixierung	M10	7	A	2199452	MQA-M10-B piping saddle	
		7	B	2199455	MQZ-L11 bored plate	
		8		216466	M10 hexagon nut	
	M12	7	A	2199453	MQA-M12-B piping saddle	
		7	B	2199456	MQZ-L13 bored plate	
		8		216467	M12 hexagon nut	
	M16	7		2199454	MQA-M16-B piping saddle	
		8		216468	M16 hexagon nut	
		9		216422	AM16x1000 4.8 threaded rod**	
	Pipe Ring / Rohrschelle	M10/ M12/ M16	10		20843	MP-MI (from 3/8" to 244.5C, with M10, 12, 16)
			10		20898	

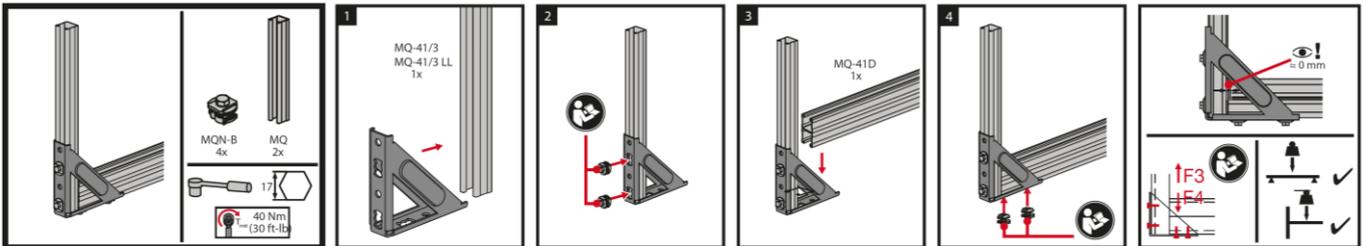
* other lengths of the channels also possible / * andere Schienenlängen auch möglich
** Threaded rod available in 1,2 & 3 meters / **Gewindestange erhältlich in 1,2 & 3 Meter

Assembly Instructions / Montagehinweise

1 / 2

Please use the Threaded rod either in closed long holes or closed round holes in the channel
Verwendung von Gewindestangen nur durch geschlossene Langlöcher bzw. Rundlöcher der Schiene

3

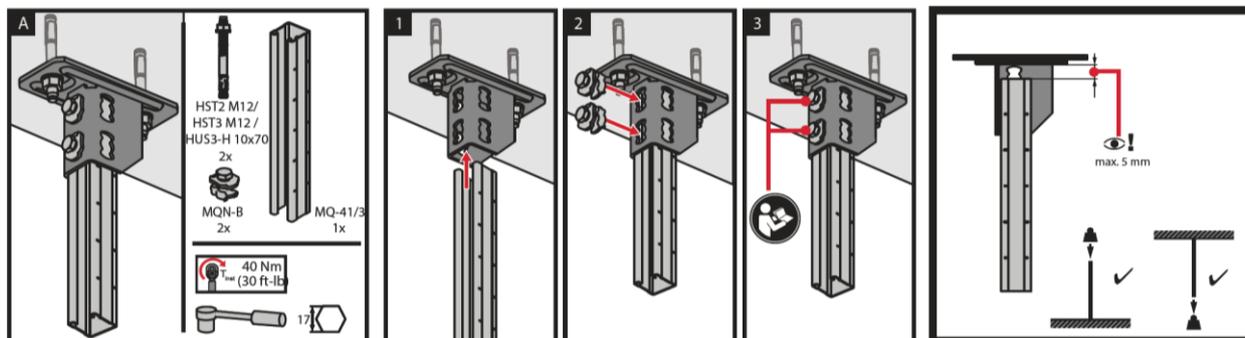


Hilti trapeze frame

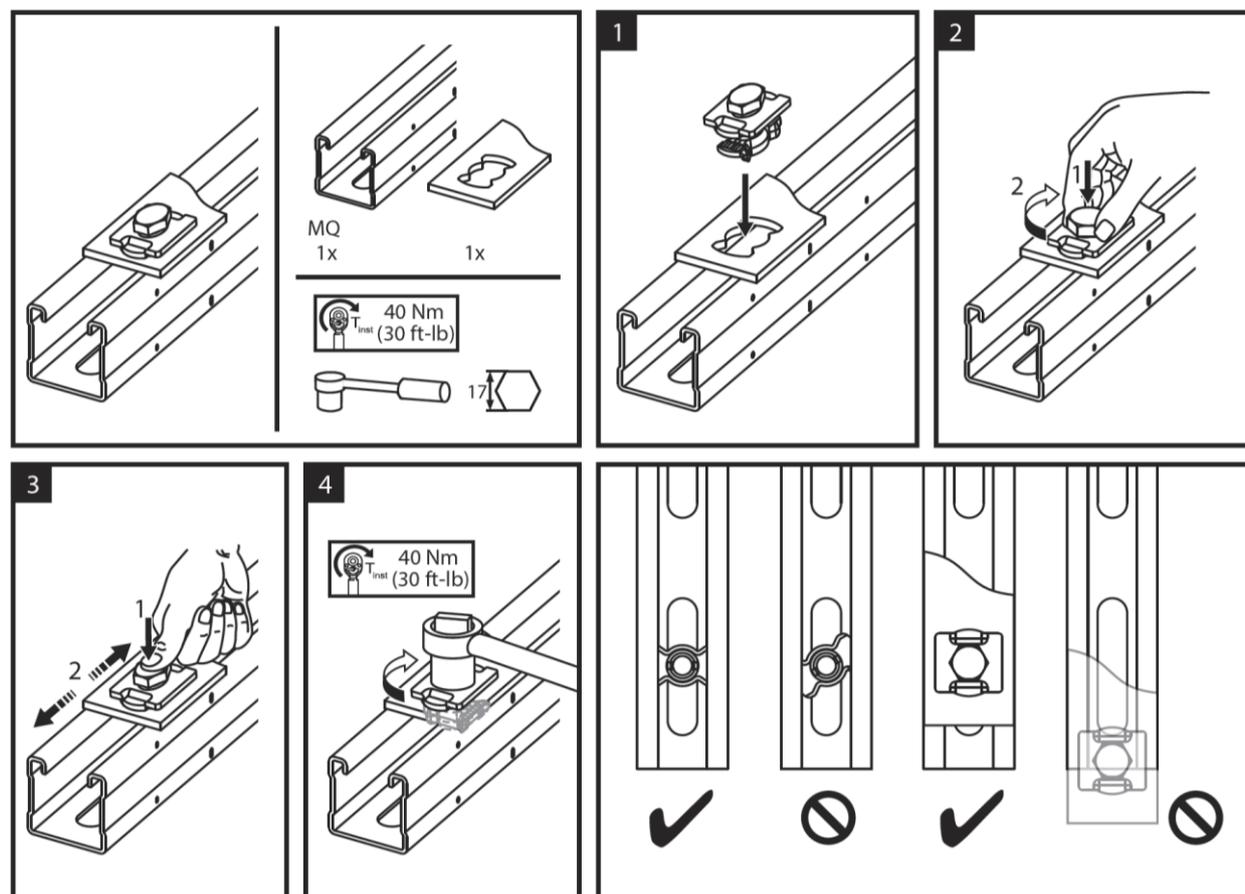
General assembly instructions

Annex D1
(informative)

4



5



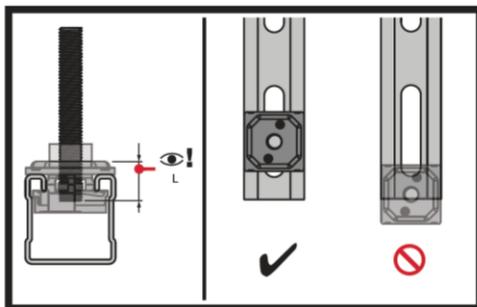
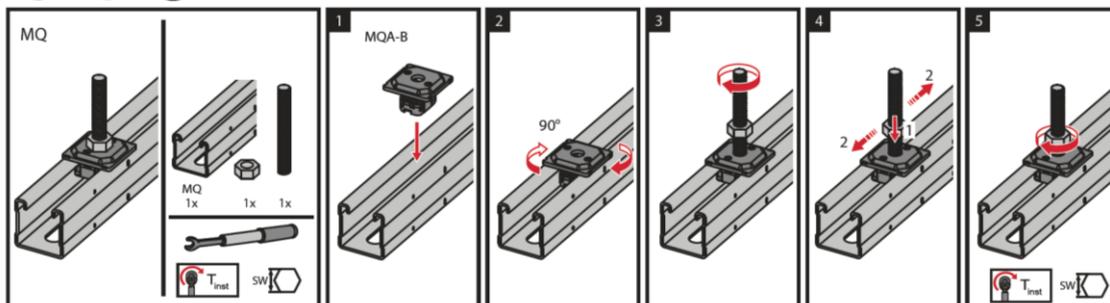
Hilti trapeze frame

General assembly instructions

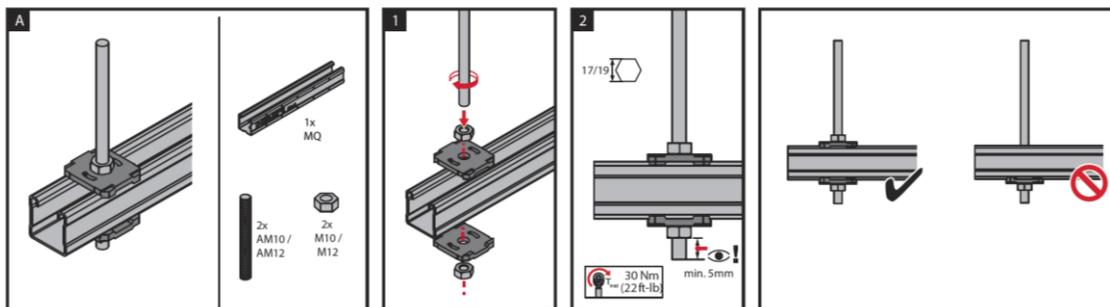
Annex D2
(informative)

English translation prepared by DIBt

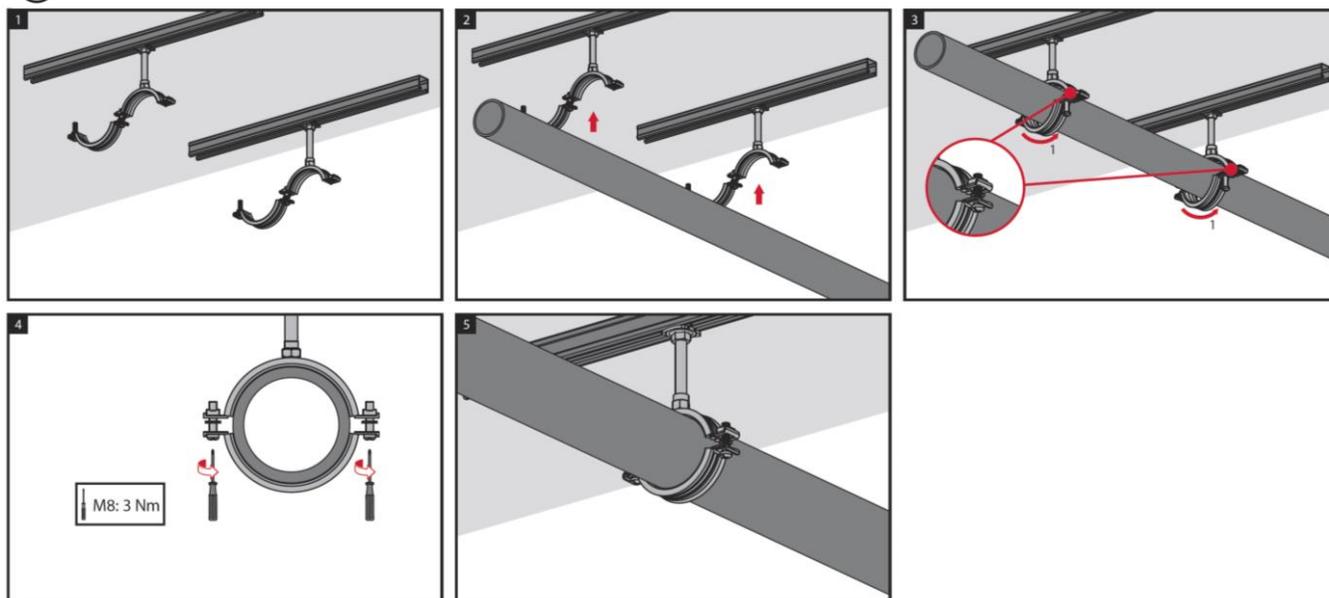
7 / 8 / 9 Not Part of this ETA / kein Bestandteil dieser ETA



or / oder



10 Not Part of this ETA / kein Bestandteil dieser ETA



Hilti trapeze frame

General assembly instructions

Annex D3
(informative)