Deutsches Institut für Bautechnik DIBt

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

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European Technical Assessment

ETA-18/0130
of 16 July 2024

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 heavy-duty pipe rings MP-MI serie G (size 3/8" to 6") and MP-MI serie C (size 4" to 244.5mm)
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 1000446
This European Technical Assessment contains	24 pages including 19 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	280016-00-0602 (Version 07/2020)
This version replaces	ETA-18/0130 issued on 1 June 2018

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Specific part

1   Technical description of the product

Objects of this European Technical Assessment are electrogalvanized Hilti heavy-duty pipe clamp MP-MI serie G with a stepped internal thread M10/M12 and Hilti heavy-duty pipe rings MP-MI serie C with a internal thread M16.

The MP-MI pipe clamps consist of two profiled steel strips, which are designed to be able to surround a pipe circularly. The clamping strips are connected together by M8 steel screws and are pressed onto the outside of the pipe to be fastened by tightening the screws. Each pipe clamp has a designated clamping range.

The clamping strips are fitted with an EDPM profile on the inside to aid structure-borne sound insulation, to balance unevenness and to prevent contact corrosion.

For the European Technical Assessment, the distinguishing features of the six subgroups are described in Table 1. The G series comprises subgroups 1 to 4, the C series subgroups 5 and 6.

Annex A describes the dimensions and materials of the Hilti heavy-duty pipe clamp. The requirements for performance assessment are given in Annex B.

Table 1: Distinguishing features of the subgroups

Sub-groub	Designation (size range)	Steel strip	Internal thread of connection head	Closure of clamping strips	
				Pull-through or welding nut	Strenght class of M8-screw
1	MP-MI 3/8" G to MP-MI 2" G	24 x 2.0	M10/M12 (Baureihe G)	M8 thread pull-through	4.8
2	MP-MI 68/72 G to MP-MI 78/84 G			M8 weld-on nut	
3	MP-MI 3" G				8.8
4	MP-MI 101.6 G to MP-MI 6" G	30 x 2.5			8.8
5	MP-MI 4" C to MP-MI 6" C	30 x 2.5	M16 (Baureihe C)	M8 weld-on nut	8.8
6	MP-MI 177.8 C to MP-MI 244.5 C	30 x 3			

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

In accordance with the European Assessment Document EAD 280016-00-0602, the product is intended to be used for supporting
a) Installations for the support of sprinkler kits
b) Installations for the support of technical building equipment in general.
c) installations for the support of pipes for the transport of water not intended for human consumption.
d) installations for the support of pipes for the transport of gas/fuel intended for the supply of building heating/cooling systems

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the Hilti heavy-duty pipe rings MP-MI of at least 50 years in final use under ambient temperatures in dry 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.

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	Steel: Class A1
	EPMD insert: NPA, (negligible small parts which are predominantly surrounded by steel)
Resistance and deformation under fire exposure	Annex D

3.2 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Shape	Annex E1
Dimension	Annex A2
Material	Annex A1
Characteristic resistance	Annex C1
Serviceability Limit State	Annex C2

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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 for assessment and verification of constancy of performance:

Intended use	System	Legal base, decision of EU-Commission
a) For the support of fire-fighting systems	1	96/577/EC, amended 2002/592/EC
b) For the support of technical building equipment in general	2+	97/161/EC
c) For supporting pipes for the transport of water not intended for human consumption	4	1999/472/EC, amended 2001/596/EC
d) For supporting pipes for the transport of gas/fuel intended for the supply of building heating/cooling systems	3	

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 16 July 2024 by Deutsches Institut für Bautechnik

Dr.-Ing. Ronald Schwuchow   *beglaubigt:*
Head of Section   Ascher

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Detail A

EPDM

Connection head

M12

M10

8

17

M16

10

17

21

M8 + threaded
pull-through in
clamping strip

M8 + welded-on nut

Detail A
MP-MI serie G

Detail A
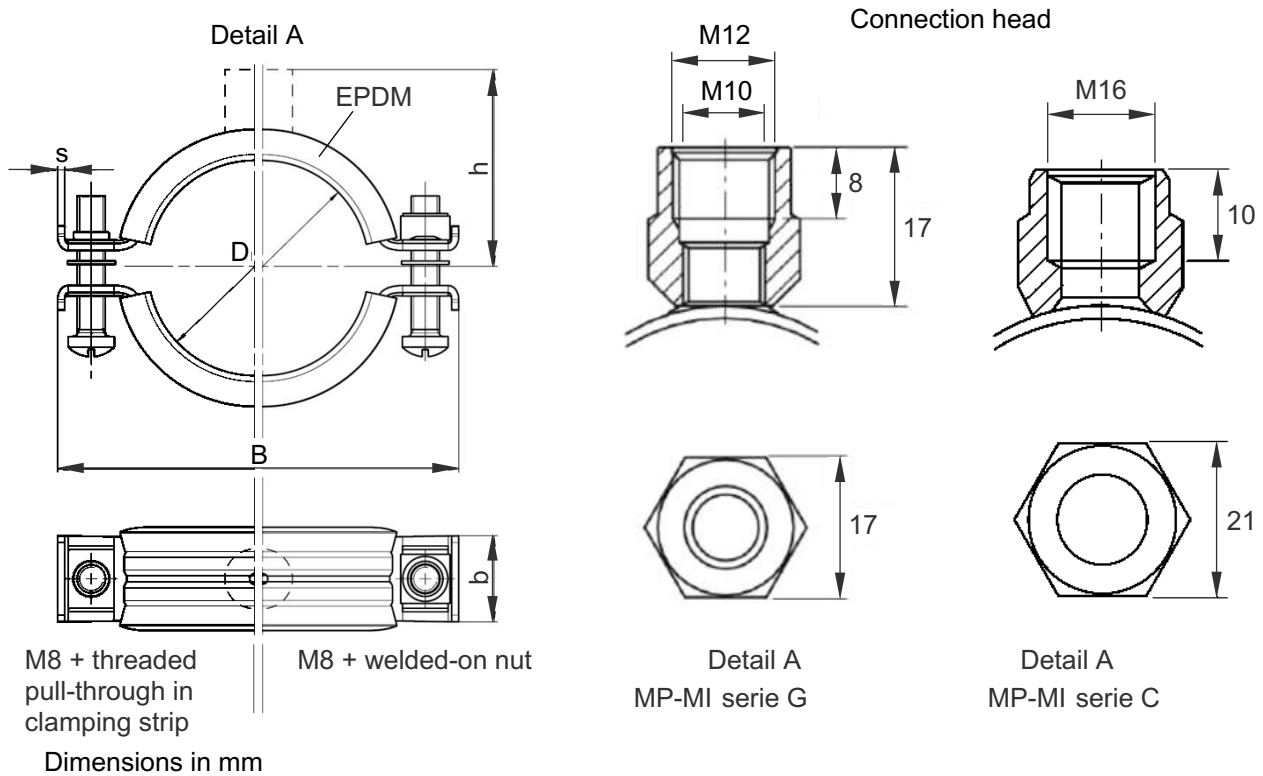MP-MI serie C

Dimensions in mm

Figure A1: Geometry und dimensions of heavy-duty pipe rings MP-MI, serie G with connection head M10/M12, serie C with connection head M16

Table A1: Materials of heavy-duty pipe rings MP-MI

Components of pipe rings	Materials
Clamping strip	DD11 in accordance with EN 10111[1]
Connection head	C10C+U+C in accordance with EN 10263-2, zinc coated
Screw plugs	MP-MI 3/8" G - MP-MI 78/84 G: Strength class 4.8 in accordance with EN ISO 898-1, zinc coated MP-MI 3" G - MP-MI 244.5 C: Strength class 8.8 in accordance with EN ISO 898-1, zinc coated
Nut of screw plug	MP-MI 68/72 G - MP-MI 244.5 C: Square weld nut in accordance with DIN 928-M8-St, zinc coated
Plastic inlays	EPDM

[1] with $235\ N/mm^2 \le R_{eL} \le 340\ N/mm^2$, Method of deoxidation: fully killed

Hilti heavy-duty pipe rings MP-MI serie G (size 3/8" to 6") and MP-MI serie C (size 4" to 244.5mm)	Annex A1
Product description Dimensions and materials	

Table A2.1: Dimensions of heavy-duty pipe rings MP-MI serie G (connection head M10/M12)

Item number	Designation	D [mm]	B [mm]	b x s [mm]	h [mm]	Closing mechanism
20843	MP-MI 3/8" G	15-19	64	24 x 2.0	33	M8 + thread in clamping strip
20845	MP-MI 1/2" G	20-25	69	24 x 2.0	36	
20847	MP-MI 3/4" G	25-30	75	24 x 2.0	39	
20849	MP-MI 1" G	32-38	83	24 x 2.0	42	
20851	MP-MI 1 1/4" G	40-45	92	24 x 2.0	47	
20853	MP-MI 1 1/2" G	48-54	101	24 x 2.0	50	
20855	MP-MI 54/57 G	54-57	107	24 x 2.0	53	
20857	MP-MI 2" G	57-64	111	24 x 2.0	55	
20860	MP-MI 68/72 G	68-72	123	24 x 2.0	60	M8 + nut
20862	MP-MI 2 1/2" G	70-77	130	24 x 2.0	64	
20865	MP-MI 78/84 G	80-84	139	24 x 2.0	68	
20866	MP-MI 3" G	82-90	144	24 x 2.0	71	
20869	MP-MI 101.6 G	97-103	163	30 x 2.5	78	
20871	MP-MI 4" G	108-114	174	30 x 2.5	84	
20874	MP-MI 117 G	114-119	179	30 x 2.5	86	
20876	MP-MI 125 G	122-127	187	30 x 2.5	90	
20879	MP-MI 133 G	132-137	198	30 x 2.5	95	
20882	MP-MI 5" G	137-142	203	30 x 2.5	98	
20885	MP-MI 159 G	156-162	223	30 x 2.5	107	
20887	MP-MI 6" G	162-168	229	30 x 2.5	110	

Table A2.2: Dimensions of heavy-duty pipe rings MP-MI serie C (connection head M16

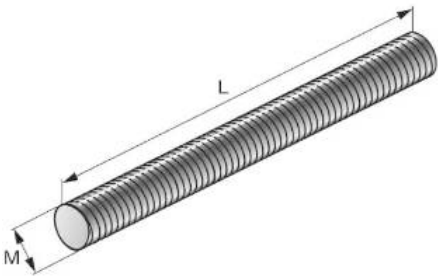| Item number	Designation	D [mm]	B [mm]	b x s [mm]	h [mm]	Closing mechanism
20872	MP-MI 4" C	108-114	174	30 x 2.5	84	M8 + nut
20880	MP-MI 133 C	132-137	198	30 x 2.5	96	
229087	MP-MI 159 C	156-162	223	30 x 2.5	107	
20888	MP-MI 6" C	162-168	229	30 x 2.5	111	
20890	MP-MI 177.8 C	175-180	244	30 x 3.0	117	
20892	MP-MI 193.7 C	190-200	263	30 x 3.0	127	
20894	MP-MI 212 C	210-219	283	30 x 3.0	136	
20896	MP-MI 219.1 C	217-224	288	30 x 3.0	139	
20898	MP-MI 244.5 C	242-250	314	30 x 3.0	152	

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	Annex A2
Product description Dimensions	

- Hilti heavy-duty pipe rings MP-MI are used to transfer the loads of building services components such as ducts and equipment for sprinkler, water, heating, cooling, ventilation, electrical and other installations. The Hilti heavy-duty pipe rings MP-MI are suitable for undertaking this load-bearing function under the conditions described in Section 2 of this European Technical Assessment.

- The resistance and deformation at ambient and elevated temperatures applies for static and centric actions.

- 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.

- The screw plugs for the heavy-duty pipe rings must be tightened consistently with a torque of 3 Nm.

- The performance data for the MP-MI heavy-duty pipe ring results in conjunction with the threaded rods as per Table B1.

- Prior to installation, it must be ensured that the pipe to be inserted, the anchoring of the threaded rods to the base material and the base material itself are suitable to withstand the resistance values of the MP-MI heavy-duty pipe rings and that they have a fireproof certificate.

- The heavy-duty pipe rings must be installed by appropriately qualified personnel and under the supervision of the site manager.

Table B1: Threaded rods for use with heavy-duty pipe rings MP-MI

Illustration	Item number	Designation	M thread	L [mm]	Material
	216418	AM10x3000 4.8	M10	3000	Strength class 4.8 in accordance with DIN 976-1, zinc coated
	339796	AM10x2000 4.8	M10	2000	
	339795	AM10x1000 4.8	M10	1000	
	216421	AM12x3000 4.8	M12	3000	
	216420	AM12x2000 4.8	M12	2000	
	339797	AM12x1000 4.8	M12	1000	
	216424	AM16x3000 4.8	M16	3000	
	216423	AM16x2000 4.8	M16	2000	
	216422	AM16x1000 4.8	M16	1000	

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)Hilti heavy-duty pipe rings MP-MI serie G (size 3/8" to 6") and MP-MI serie C (size 4" to 244.5mm)	Annex B
Requirements for performance assessment	

Table C1: Characteristic tensile strength at ambient temperatur

Item number	Designation	Characteristic tensile strength
		F_{Rk} [kN]
20843	MP-MI 3/8" G	8.38
20845	MP-MI 1/2" G	
20847	MP-MI 3/4" G	
20849	MP-MI 1" G	
20851	MP-MI 1 1/4" G	
20853	MP-MI 1 1/2" G	
20855	MP-MI 54/57 G	
20857	MP-MI 2" G	
20860	MP-MI 68/72 G	11.24
20862	MP-MI 2 1/2" G	
20865	MP-MI 78/84 G	
20866	MP-MI 3" G	10.07
20869	MP-MI 101.6 G	12.55
20871	MP-MI 4" G	
20874	MP-MI 117 G	
20876	MP-MI 125 G	
20879	MP-MI 133 G	
20882	MP-MI 5" G	
20885	MP-MI 159 G	
20887	MP-MI 6" G	
20872	MP-MI 4" C	13.92
20880	MP-MI 133 C	
229087	MP-MI 159 C	
20888	MP-MI 6" C	
20890	MP-MI 177.8 C	11.62
20892	MP-MI 193.7 C	
20894	MP-MI 212 C	
20896	MP-MI 219.1 C	
20898	MP-MI 244.5 C	

All characteristic resistances for ambient temperatures do not consider deflections.
- Partial safety factor for design resistance is $\gamma_M = F_{Rk} / F_{Rd}$.
- For design resistances the manufacturer's specifications and national regulations must be observed.

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Characteristic tensile strength at ambient temperature	Annex C1

Table C2: Service loads and deformations at ambient temperature

Item number	Designation	Service load F_{SLS} [kN]	Associated deformation [mm]
20843	MP-MI 3/8" G	2.67	1.5
20845	MP-MI 1/2" G		
20847	MP-MI 3/4" G		
20849	MP-MI 1" G		
20851	MP-MI 1 1/4" G		
20853	MP-MI 1 1/2" G		
20855	MP-MI 54/57 G		
20857	MP-MI 2" G		
20860	MP-MI 68/72 G	2.16	1.5
20862	MP-MI 2 1/2" G		
20865	MP-MI 78/84 G		
20866	MP-MI 3" G	2.22	1.8
20869	MP-MI 101.6 G	2.43	3.4
20871	MP-MI 4" G		
20874	MP-MI 117 G		
20876	MP-MI 125 G		
20879	MP-MI 133 G		
20882	MP-MI 5" G		
20885	MP-MI 159 G		
20887	MP-MI 6" G		
20872	MP-MI 4" C	2.40	3.4
20880	MP-MI 133 C		
229087	MP-MI 159 C		
20888	MP-MI 6" C		
20890	MP-MI 177.8 C	4.56	5.0
20892	MP-MI 193.7 C		
20894	MP-MI 212 C		
20896	MP-MI 219.1 C		
20898	MP-MI 244.5 C		

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	Annex C2
Service loads and deformations at ambient temperature	

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Table D1: Resistance of $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 3/8" G - MP-MI 2" G at elevated temperatures after t = 30, 60, 90 and 120 minutes

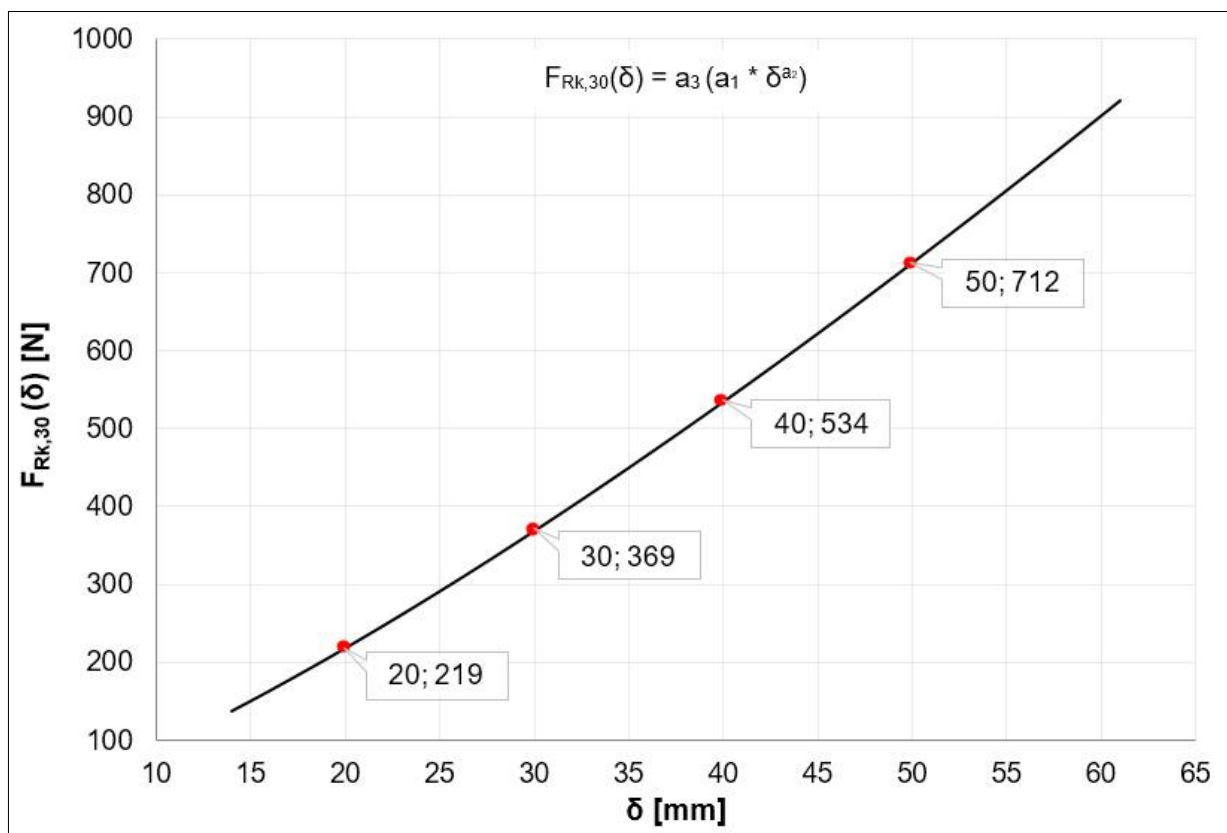| Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3 (c_1 + c_2/t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20843	MP-MI 3/8" G					
20845	MP-MI 1/2" G					
20847	MP-MI 3/4" G	c_1 = 375.85N				
20849	MP-MI 1" G	c_2 = 24736.41N*min.	728	478	395	353
20851	MP-MI 1 1/4" G	c_3 = 0.60663				
20853	MP-MI 1 1/2" G	18 min ≤ t ≤ 143 min				
20855	MP-MI 54/57 G					
20857	MP-MI 2" G					

Figure D1: Regression curve according to Table D1

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	Annex D1
Resistance at elevated temperatures of heavy-duty pipe rings MP-MI 3/8" G - MP-MI 2" G	

Table D2: Load displacement function and deformations of heavy-duty pipe rings MP-MI 3/8" G - MP-MI 2" G under elevated temperatures

Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3 (a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]				$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(20)$	$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$F_{Rk,30}(50)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20843	MP-MI 3/8" G								
20845	MP-MI 1/2" G								
20847	MP-MI 3/4" G	$a_1 = 7.0564$							
20849	MP-MI 1" G	$a_2 = 1.2896$							
20851	MP-MI 1 1/4" G	$a_3 = 0.65031$	219	369	534	712	72	72	88
20853	MP-MI 1 1/2" G	$14 \text{ mm} \leq \delta \leq 61 \text{ mm}$							
20855	MP-MI 54/57 G								
20857	MP-MI 2" G								

Symbols and designation

δ Deformation

$\delta_{max,t}$ Maximum deformation after an exposure time $\leq t$ minutes to elevated temperatures

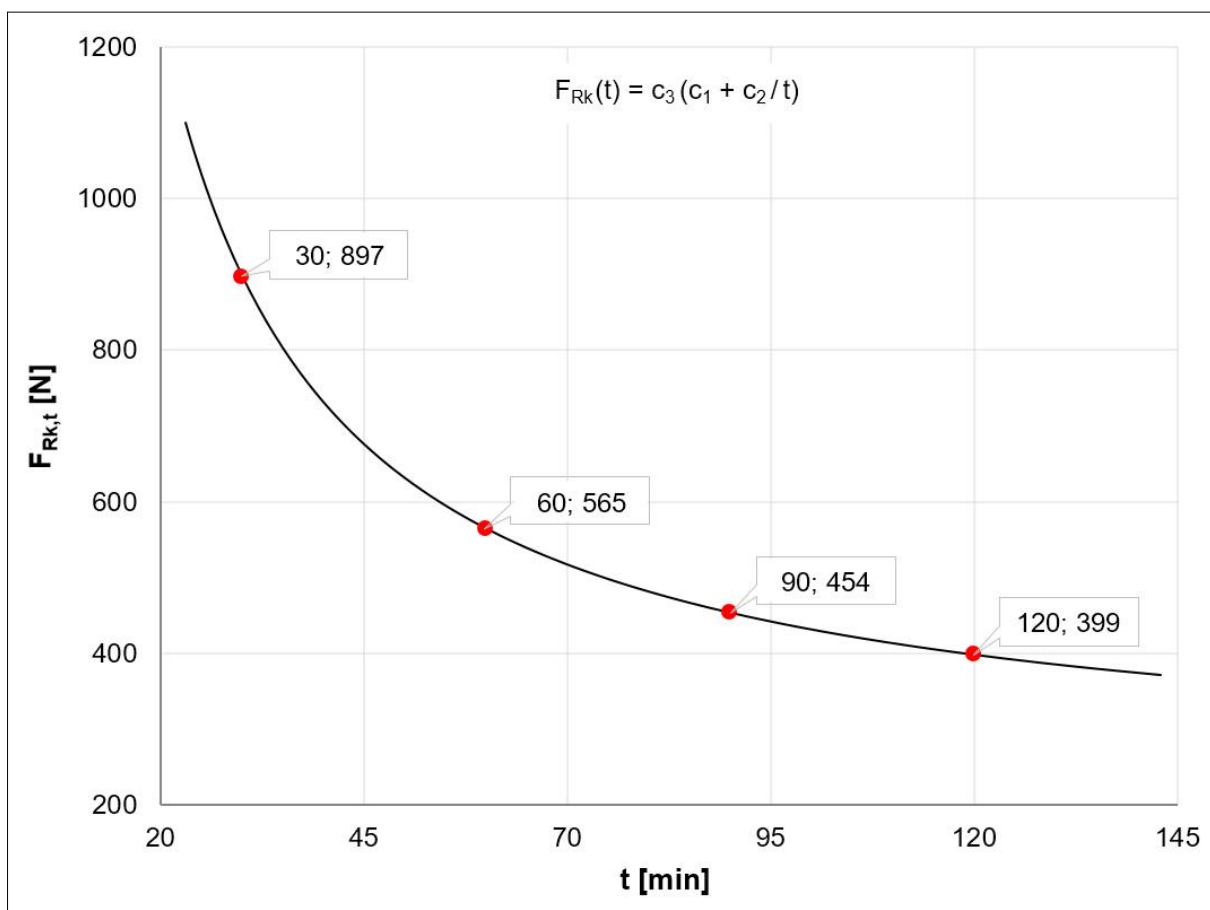$F_{Rk,30}(\delta)$ Load displacement function for an exposure time $t = 30$ minutes to elevated temperatures

Figure D2: Regression curve according to Table D2

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	Annex D2
Load displacement function and deformations at elevated temperatures of heavy-duty pipe rings MP-MI 3/8" G - MP-MI 2" G	

Table D3: Resistance $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 68/72 G - MP-MI 78/84 G at elevated temperatures after t = 30, 60, 90 and 120 minutes

Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3 (c_1 + c_2/t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20860	MP-MI 68/72 G	c_1 = 343.93N c_2 = 29526.43N*min. c_3 = 0.675613 23 min ≤ t ≤ 142 min	897	565	454	399
20862	MP-MI 2 1/2" G					
20865	MP-MI 78/84 G					

$$F_{Rk}(t) = c_3 (c_1 + c_2/t)$$

Data points: (30; 897), (60; 565), (90; 454), (120; 399)
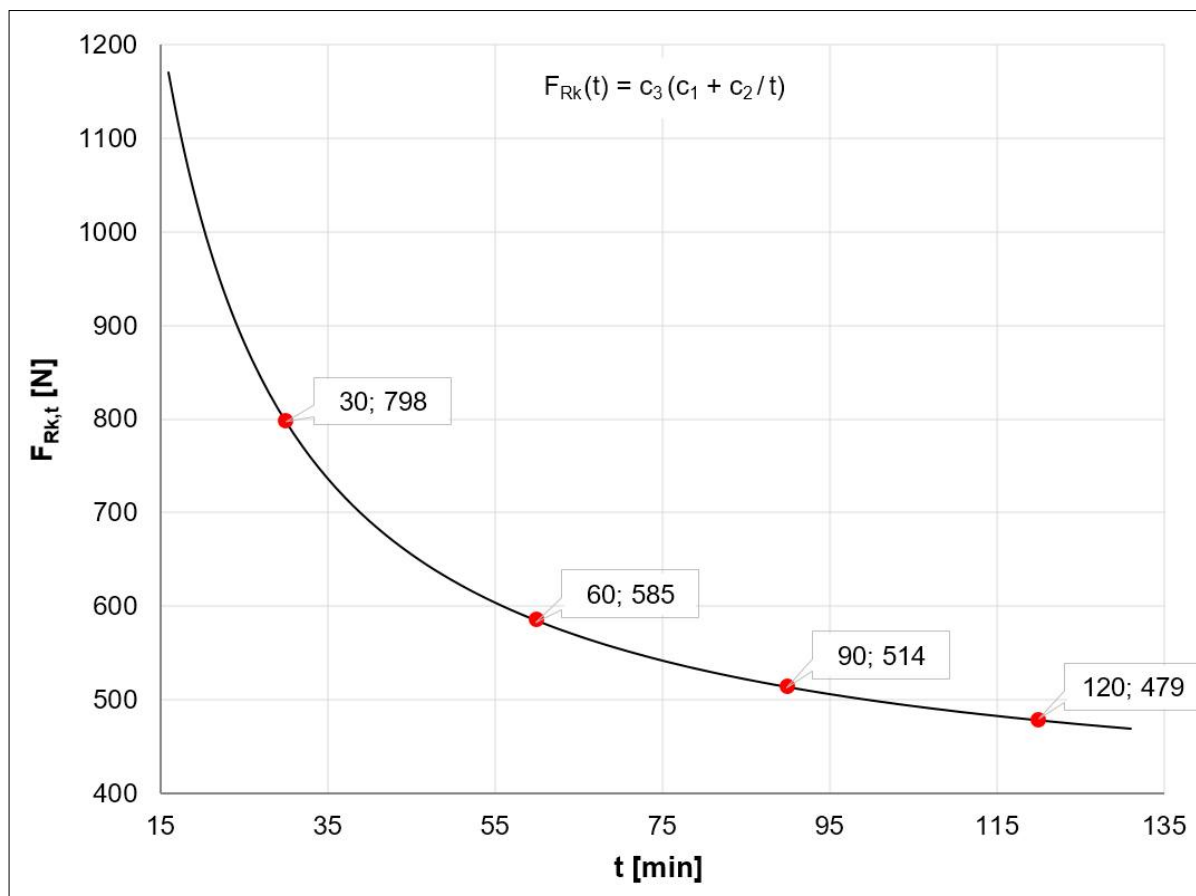
Figure D3: Regression curve according to table D3

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Resistance at elevated temperatures of heavy-duty pipe rings MP-MI 68/72 G - MP-MI 78/84 G	Annex D3

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Table D4: Load displacement function and deformations of heavy-duty pipe rings MP-MI 68/72 G - MP-MI 78/84 G under elevated temperatures

| Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3(a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]				$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(20)$	$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$F_{Rk,30}(50)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20860	MP-MI 68/72 G	$a_1 = 20.86$ $a_2 = 0.9443$ $a_3 = 0.6584$ $20 \text{ mm} \leq \delta \leq 61 \text{ mm}$	232	341	447	552	88	88	88
20862	MP-MI 2 1/2" G								
20865	MP-MI 78/84 G								
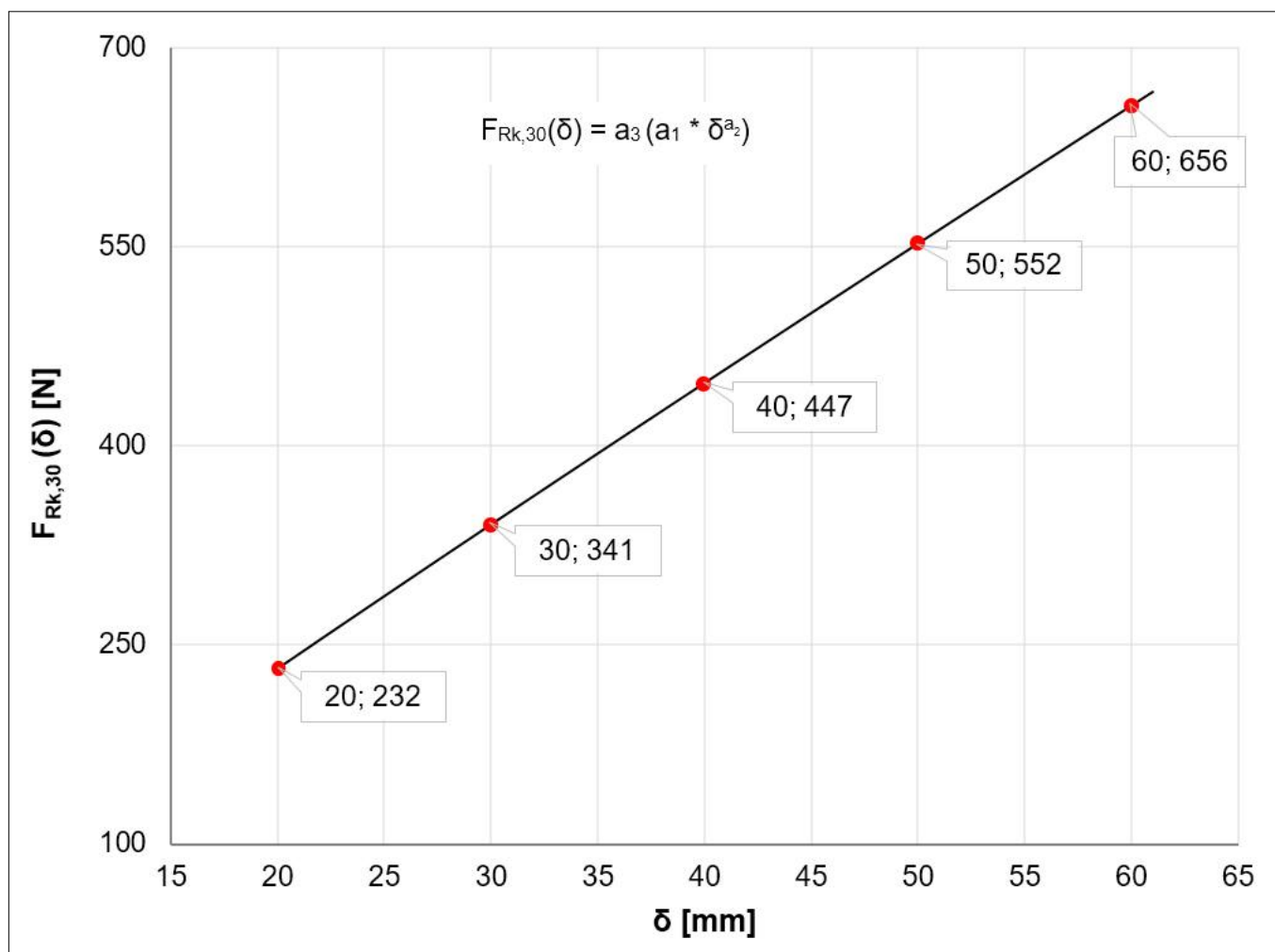
Figure D4: Regression curve according to Table D4

Symbols and designation see Annex D2

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Load displacement function and deformations at elevated temperatures of heavy-duty pipe rings MP-MI 68/72 G - MP-MI 78/84 G	Annex D4

Table D5: Resistance $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 3" G at elevated temperatures after t = 30, 60, 90 and 120 minutes

Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3\,(c_1 + c_2/t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20866	MP-MI 3" G	c_1 = 491.32N c_2 = 16847.4N*min. c_3 = 0.75781 16 min ≤ t ≤ 131 min	798	585	514	479

Figure D5: Regression curve according to Table D5

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Resistance at elevated temperatures of heavy-duty pipe ring MP-MI 3" G	Annex D5

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Table D6: Load displacement function and deformations of heavy-duty pipe rings MP-MI 3" G under elevated temperatures

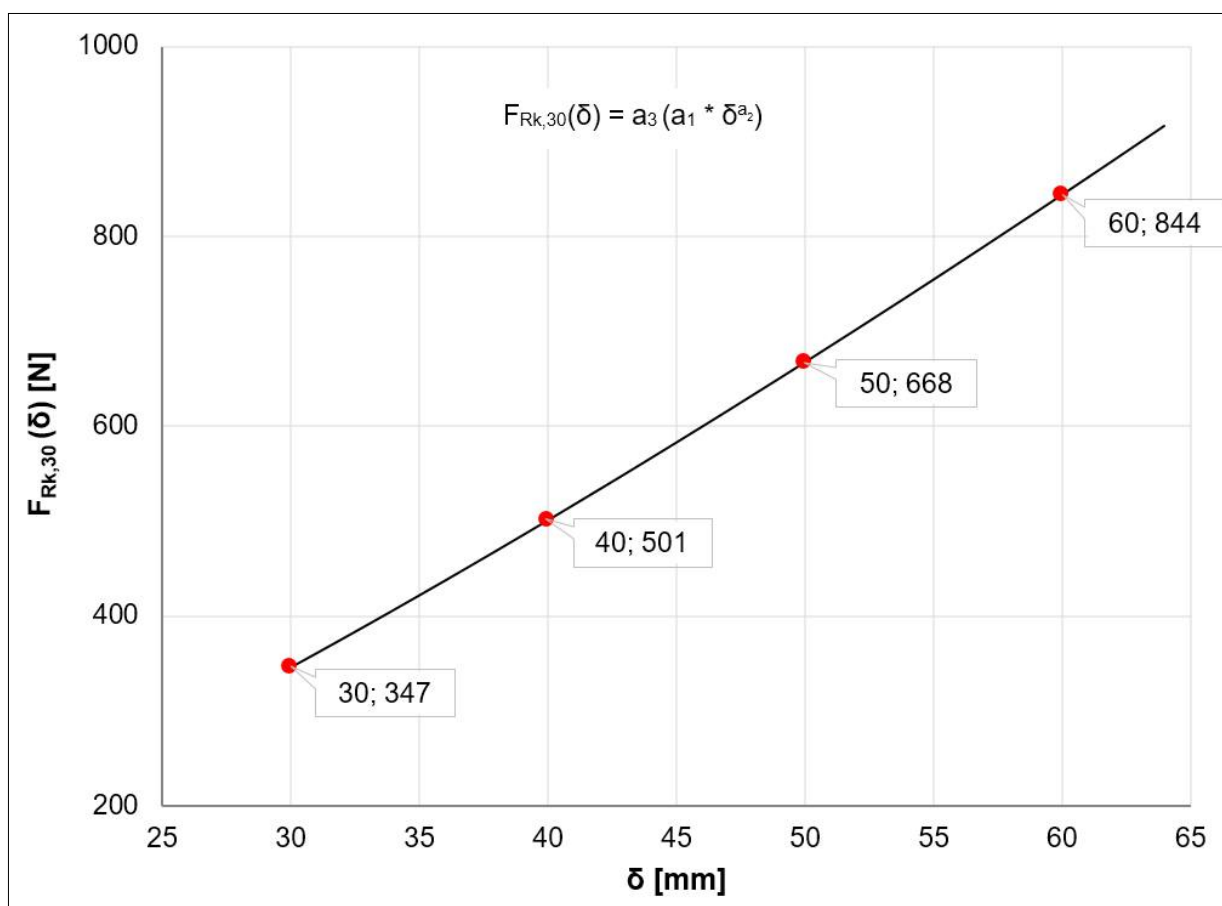| Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3 (a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]			$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(20)$	$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20866	MP-MI 3" G	$a_1 = 52.971$ $a_2 = 0.720365$ $a_3 = 0.684765$ $20\ mm \leq \delta \leq 46\ mm$	314	420	517	59	59	59
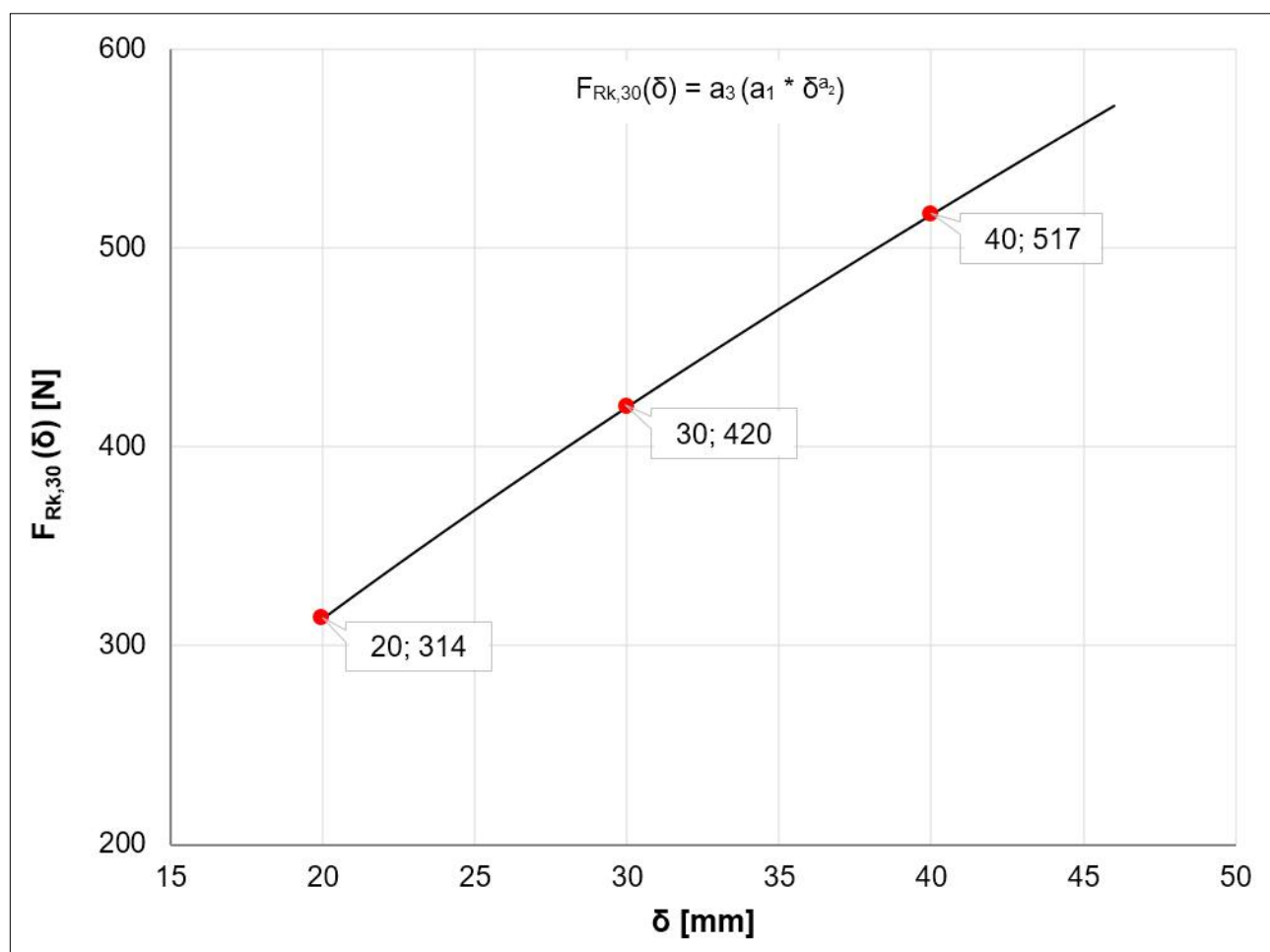
Figure D6: Regression curve according to Table D6

Symbols and designation see Annex D2

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Load displacement function and deformations at elevated temperatures of heavy-duty pipe ring MP-MI 3" G	Annex D6

Table D7: Resistance $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 101.6 G - MP-MI 6" G at elevated temperatures after t = 30, 60, 90 and 120 minutes

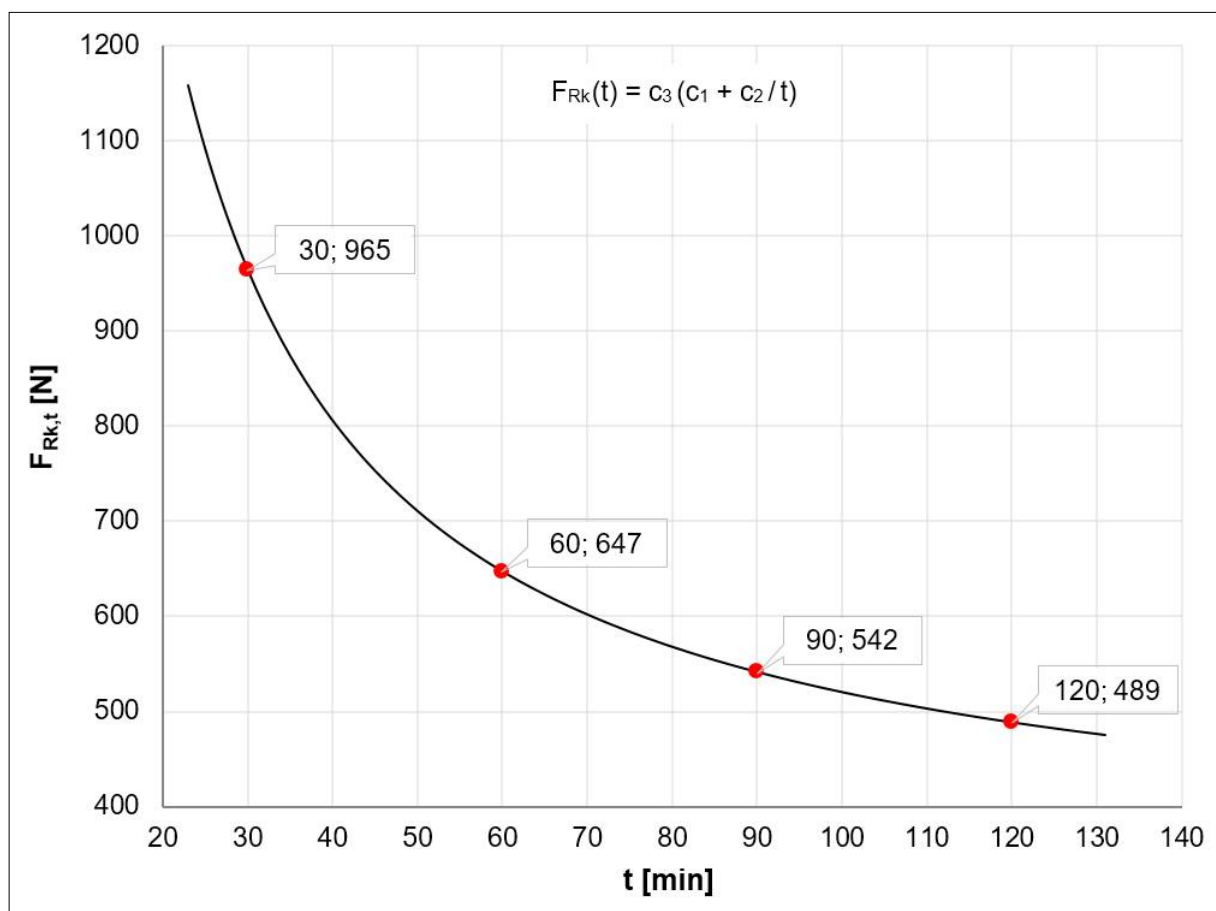| Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3 (c_1 + c_2/t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20869	MP-MI 101.6 G	c_1 = 489.07N c_2 = 31566.91N*min. c_3 = 0.835567 23 min ≤ t ≤ 147 min	1288	848	702	628
20871	MP-MI 4" G					
20874	MP-MI 117 G					
20876	MP-MI 125 G					
20879	MP-MI 133 G					
20882	MP-MI 5" G					
20885	MP-MI 159 G					
20887	MP-MI 6" G					

Figure D7: Regression curve according to Table D7

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Resistance at elevated temperatures of heavy-duty pipe rings MP-MI 101.6 G - MP-MI 6" G	Annex D7

Table D8: Load displacement function and deformations of heavy-duty pipe rings MP-MI 101.6 G - MP-MI 6" G under elevated temperatures

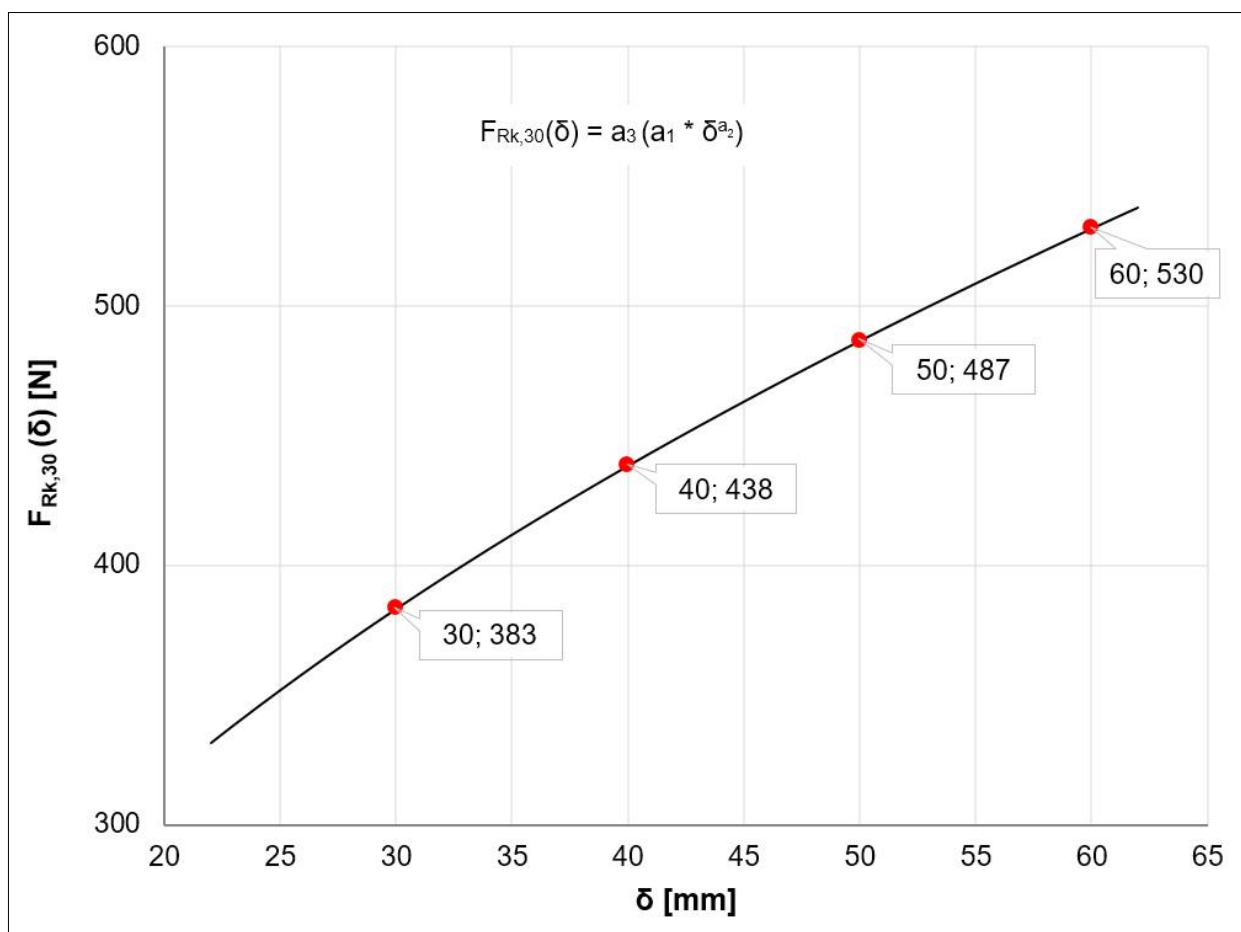| Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3(a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]				$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$F_{Rk,30}(50)$	$F_{Rk,30}(60)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20869	MP-MI 101.6 G								
20871	MP-MI 4" G								
20874	MP-MI 117 G	$a_1 = 6.060$							
20876	MP-MI 125 G	$a_2 = 1.2842$							
20879	MP-MI 133 G	$a_3 = 0.7250$	347	501	668	844	94	109	111
20882	MP-MI 5" G	$30\text{ mm} \leq \delta \leq 64\text{ mm}$							
20885	MP-MI 159 G								
20887	MP-MI 6" G								

Figure D8: Regression curve according to Table D8

Symbols and designation see Annex D2

Hilti heavy-duty pipe rings MP-MI serie G (size 3/8" to 6") and MP-MI serie C (size 4" to 244.5mm)	Annex D8
Load displacement function and deformations at elevated temperatures of heavy-duty pipe rings MP-MI 101.6 G - MP-MI 6" G	

Table D9: Resistance $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 4" C - MP-MI 6" C at elevated temperatures after t = 30, 60, 90 and 120 minutes

Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3 (c_1 + c_2 / t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20872	MP-MI 4" C	c_1 = 503.45N c_2 = 29045.63N*min. c_3 = 0.6555 23 min ≤ t ≤ 131 min	965	647	542	489
20880	MP-MI 133 C					
229087	MP-MI 159 C					
20888	MP-MI 6" C					

Figure D9: Regression curve according to Table D9

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Resistance at elevated temperatures of heavy-duty pipe rings MP-MI 4" C - MP-MI 6" C	Annex D9

Table D10: Load displacement function and deformations of heavy-duty pipe rings MP-MI 4" C - MP-MI 6" C under elevated temperatures

Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3 (a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]				$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$F_{Rk,30}(50)$	$F_{Rk,30}(60)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20872	MP-MI 4" C								
20880	MP-MI 133 C	$a_1 = 142.265$ $a_2 = 0.46707$	383	438	487	530	84	92	92
229087	MP-MI 159 C	$a_3 = 0.5502$ $22\ mm \leq \delta \leq 62\ mm$							
20888	MP-MI 6" C								

Figure D10: Regression curve according to Table D10

Symbols and designation see Annex D2

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Load displacement function and deformations at elevated temperatures of heavy-duty pipe rings MP-MI 4" C - MP-MI 6" C	Annex D10

Table D11: Resistance $F_{Rk,t}$ of heavy-duty pipe rings MP-MI 177.8 C - MP-MI 244.5 C at elevated temperatures after t = 30, 60, 90 and 120 minutes

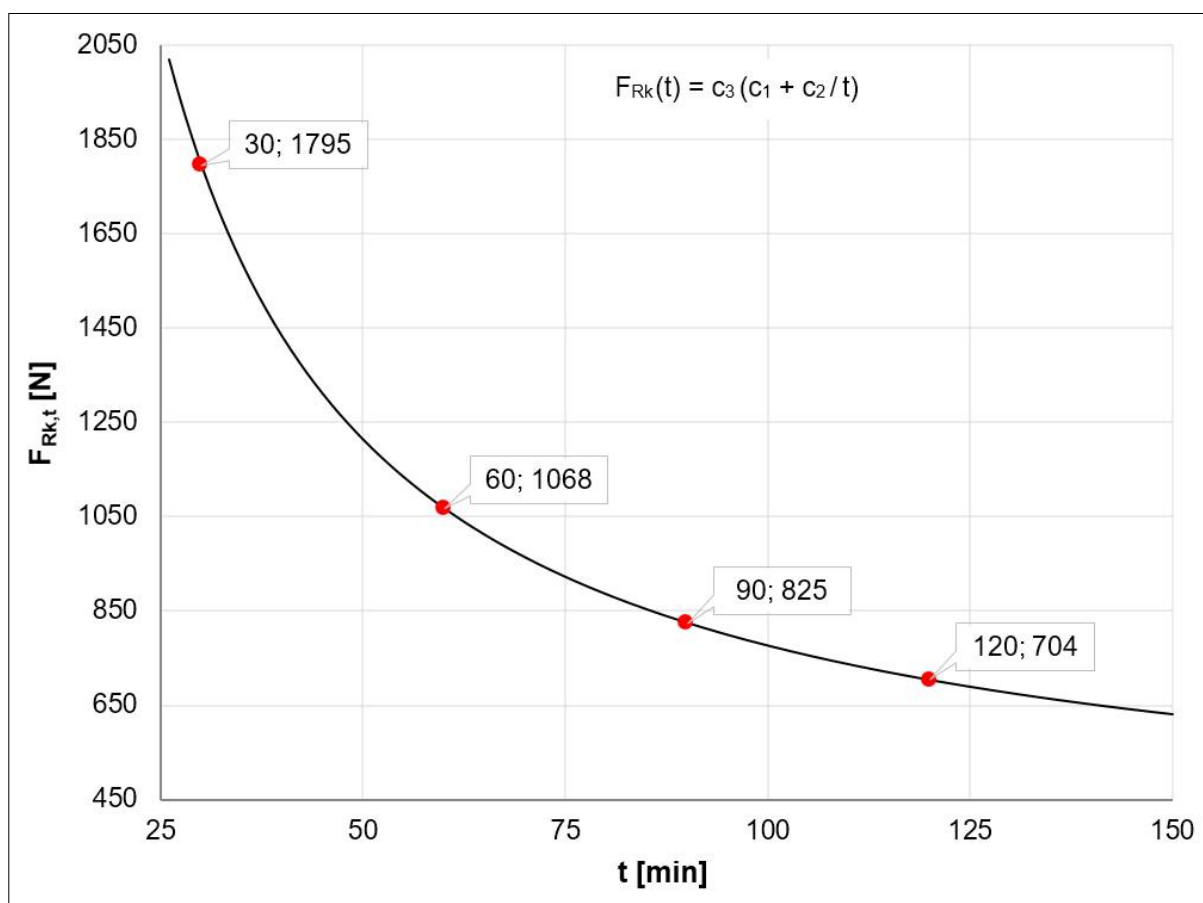| Item number	Designation	Parameter of regression curve $F_{Rk}(t) = c_3 (c_1 + c_2 / t)$	$F_{Rk,t}$ [N]			
			$F_{Rk,30}$	$F_{Rk,60}$	$F_{Rk,90}$	$F_{Rk,120}$
20890	MP-MI 177.8 C					
20892	MP-MI 193.7 C	$c_1 = 457.9N$ $c_2 = 58689.67N*min.$ $c_3 = 0.743589$ $26\ min \leq t \leq 150\ min$	1795	1068	825	704
20894	MP-MI 212 C					
20896	MP-MI 219.1 C					
20898	MP-MI 244.5 C					

Figure D11: Regression curve according to Table D11

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Resistance at elevated temperatures of heavy-duty pipe rings MP-MI 177.8 C - MP-MI 244.5 C	Annex D11

Table D12: Load displacement function and deformations of heavy-duty pipe rings MP-MI 177.8 C - MP-MI 244.5 C under elevated temperatures

Item number	Designation	Parameter of regression curve $F_{Rk,30}(\delta) = a_3 (a_1 * \delta^{a_2})$	$F_{Rk,30}(\delta)$ [N]				$\delta_{max,t}$ [mm]		
			$F_{Rk,30}(20)$	$F_{Rk,30}(30)$	$F_{Rk,30}(40)$	$F_{Rk,30}(50)$	$\delta_{max,60}$	$\delta_{max,90}$	$\delta_{max,120}$
20890	MP-MI 177.8 C								
20892	MP-MI 193.7 C	$a_1 = 18.197$							
20894	MP-MI 212 C	$a_2 = 1.0675$ $a_3 = 0.70999$	316	488	663	841	118	118	118
20896	MP-MI 219.1 C	16 mm ≤ δ ≤ 67 mm							
20898	MP-MI 244.5 C								

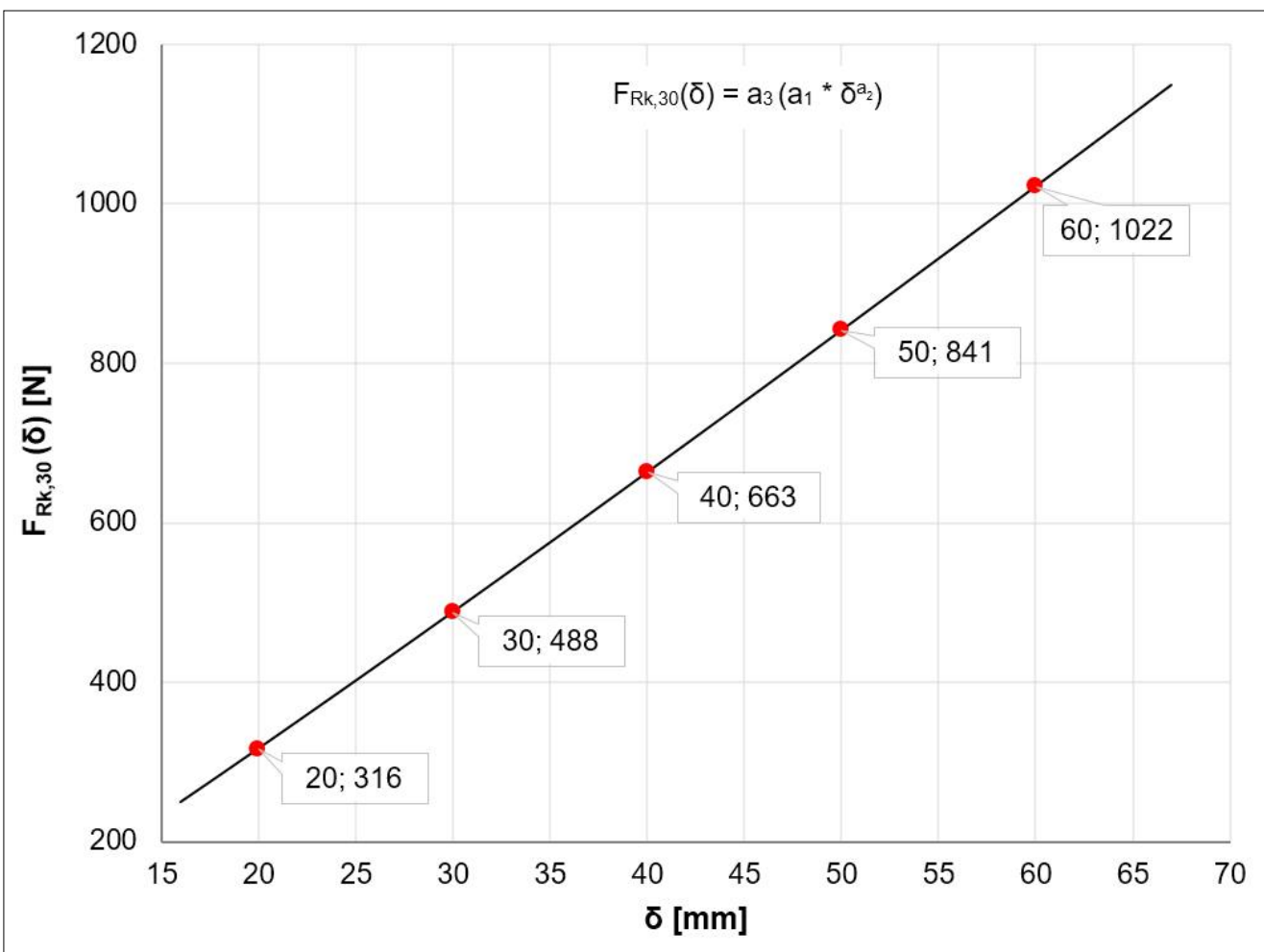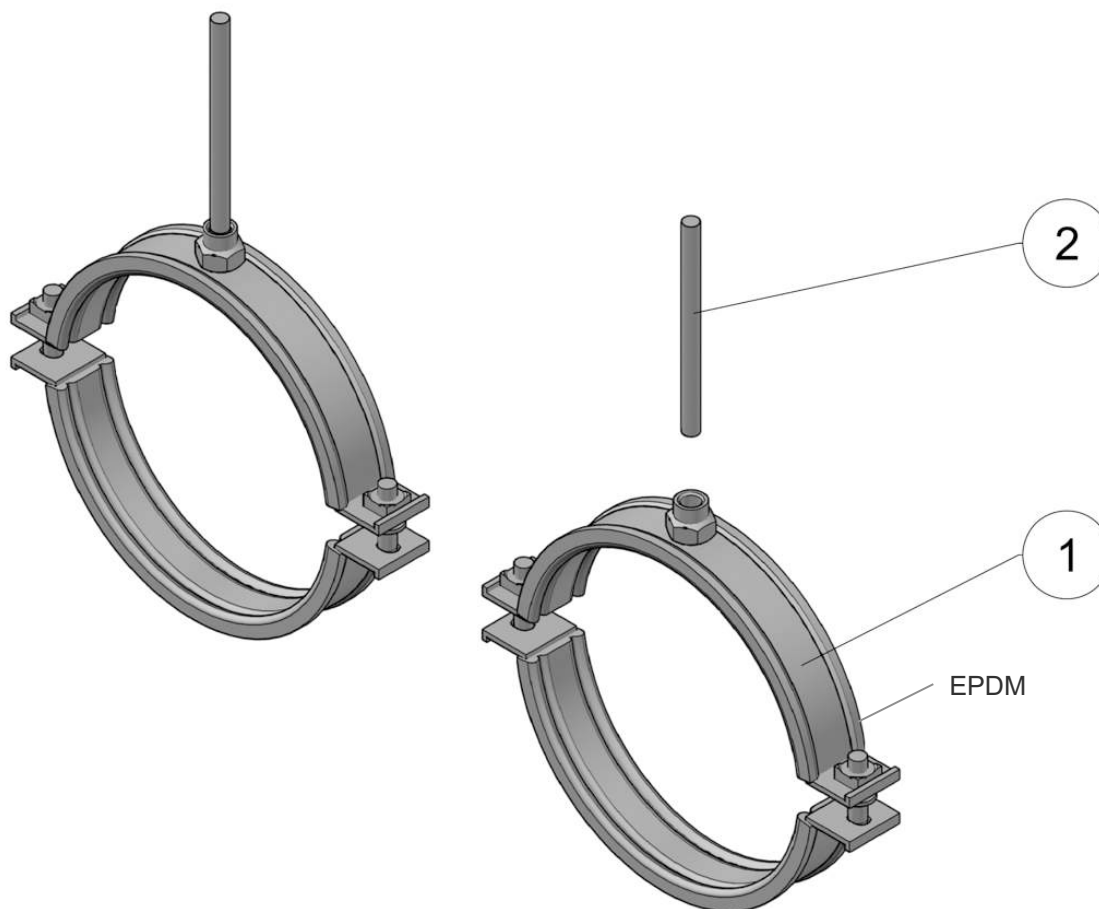$$F_{Rk,30}(\delta) = a_3 (a_1 * \delta^{a_2})$$

Figure D12: Regression curve according to Table D12

Symbols and designation see Annex D2

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Load displacement function and deformations at elevated temperatures of heavy-duty pipe rings MP-MI 177.8 C - MP-MI 244.5 C	Annex D12

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Legend

1   Heavy-duty pipe rings MP-MI
2   Threaded rods M10, M12 or M16 (not an integral part of this ETA)

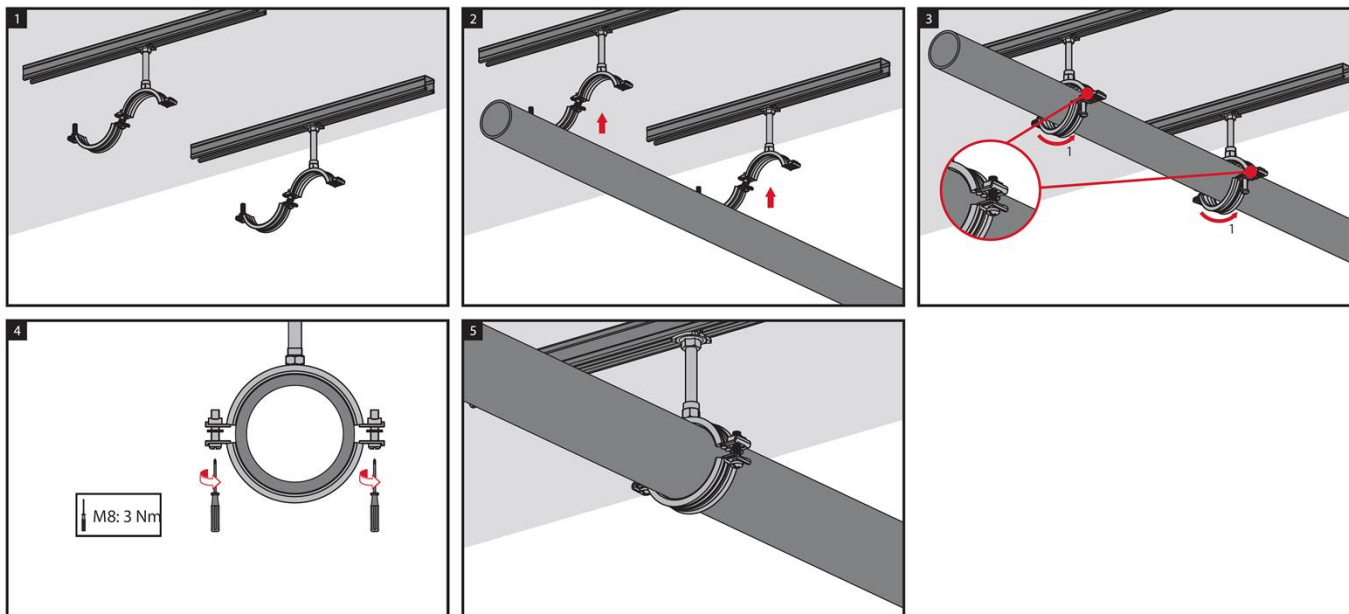| Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)	
Installation of heavy-duty pipe rings MP-MI with threaded rod Exemplary representation of closing mechanism: M8 + nut	Annex E1 (informative)

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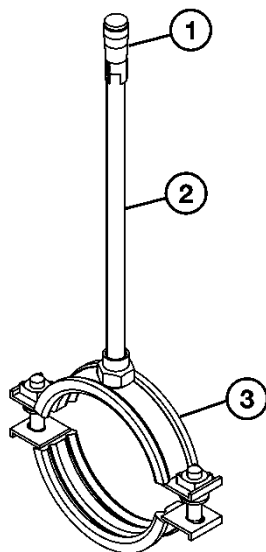
Bill of material / Stückliste

Part of typical/ Applikationselement		Ref.	Opt.	Item no. / Artikel Nr.	Description / Bezeichnung
Structure / Aufbau	**Fixation / Befestigung**	1 1 1	A B C	376967 378544 382941	HKD M10x40 drop-in anchor HKD M12x50 drop-in anchor HKD M16x65 drop-in anchor
		2 2 2	A B C	339795 339797 216422	AM10x1000 4.8 threaded rod* AM12x1000 4.8 threaded rod* AM16x1000 4.8 threaded rod*
Pipe Ring / Rohrschelle	**M10/ M12/ M16**	3		20843 - 20898	MP-MI (from 3/8" to 244.5C", with M10, 12, 16)

* Threaded rod available in 1,2 & 3 meters / Gewindestange erhältlich in 1,2 & 3 Meter

Assembly Instructions / Montagehinweise

③

Hilti heavy-duty pipe rings MP-MI series G (M10/M12) and C (M16)

General assembly instructions

Annex E2
(informative)

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