



HMU UNDERCUT ANCHOR

Technical Datasheet



Update: Jul-20



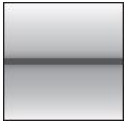










HMU-P/PF Undercut anchor

Everyday standard undercut anchor for cracked concrete

Anchor version		Benefits
	HMU-P (M10-M12)	<ul style="list-style-type: none"> - Reliable mechanical interlock due to consistent high quality self-undercut - ETA approval for cracked and non-cracked concrete - Seismic approval ETA C1 and C2 - Comes standard with a hot-dip galvanized protective coating against corrosion - Cost efficient heavy duty anchoring solution for high volume fastenings - Easy verification of correct setting due to red setting mark - Optimized and matching system components enable efficient and reliable installation
	HMU-PF (M10-M16)	

Base material	Load conditions
 Concrete (non-cracked)  Concrete (cracked)	 Static/ quasi-static  Seismic ETA-C1,C2  Fire resistance
Installation conditions	Other information
 Hammer drilled holes	 European Technical Assessment  CE conformity  PROFIS design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment ^{a)}	CSTB, Marne-la-Vallée	ETA-14/0069 / 2020-06-05
Shockproof fastenings in civil defence installations ^{b)}	Federal Office for Civil Protection, Bern	BZS D 14-602/2014-10-31

a) All data given in this section according to ETA-14/0069, issue 2020-06-05.

b) Certificate valid only for HMU-PF M12 and HMU-PF M16.

Static resistance

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube} = 25 \text{ N/mm}^2$

Effective anchorage depth for static

Anchor size	M10	M12	M16	M16
Effective anchorage depth range h_{ef} [mm]	60	80	100	125

Characteristic resistance

Anchor size		M10x60	M12x80	M16x100	M16x125
Non-cracked concrete					
Tension N_{Rk}	HMU-P/PF	22,9	35,2	49,2	68,8
Shear V_{Rk}	HMU-P/PF	23,2	33,7	62,8	62,8
Cracked concrete					
Tension N_{Rk}	HMU-P/PF	16,0	24,6	34,4	48,1
Shear V_{Rk}	HMU-P/PF	23,2	33,7	62,8	62,8

Design resistance

Anchor size		M10x60	M12x80	M16x100	M16x125
Non-cracked concrete					
Tension N_{Rd}	HMU-P/PF	15,2	23,5	32,8	45,8
Shear V_{Rd}	HMU-P/PF	18,6	27,0	50,2	50,2
Cracked concrete					
Tension N_{Rd}	HMU-P/PF	10,7	16,4	23	32,1
Shear V_{Rd}	HMU-P/PF	18,6	27,0	45,9	50,2

Recommended loads ^{a)}

Anchor size		M10x60	M12x80	M16x100	M16x125
Non-cracked concrete					
Tension N_{Rec}	HMU-P/PF	10,9	16,8	23,4	32,7
Shear V_{Rec}	HMU-P/PF	13,3	19,3	35,9	35,9
Cracked concrete					
Tension N_{Rec}	HMU-P/PF	7,6	11,7	16,4	22,9
Shear V_{Rec}	HMU-P/PF	13,3	19,3	32,8	35,9

a) With overall partial safety factor for action $\gamma = 1,4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.

Seismic resistance (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- *Steel* failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube} = 25 \text{ N/mm}^2$
- $\alpha_{gap} = 1,0$ (using Hilti seismic filling set)

Effective anchorage depth for seismic C2

Anchor size		M10	M12	M16
Effective anchorage depth	h_{ef} [mm]	60	80	125

Characteristic resistance in case of seismic performance category C2

Anchor size		M10x60	M12x80	M16x125
Tension $N_{Rk,seis}$	HMU-PF [kN]	13,6	20,9	40,9
Shear $V_{Rk,seis}$	HMU-PF	18,6	28,6	41,5

Design resistance in case of seismic category C2

Anchor size		M10x60	M12x80	M16x125
Tension $N_{Rd,seis}$	HMU-PF [kN]	9,1	14,0	27,3
Shear $V_{Rd,seis}$	HMU-PF	14,8	22,9	33,2

Effective anchorage depth for seismic C1

Anchor size		M10	M12	M16	M16
Effective anchorage depth	h_{ef} [mm]	60	80	100	125

Characteristic resistance in case of seismic performance category C1

Anchor size		M10x60	M12x80	M16x100	M16x125
Tension $N_{Rk,seis}$	HMU-P/PF [kN]	13,6	20,9	29,3	40,9
Shear $V_{Rk,seis}$	HMU-P/PF	20,9	33,7	58,5	62,8

Design resistance in case of seismic category C1

Anchor size		M10x60	M12x80	M16x100	M16x125
Tension $N_{Rd,seis}$	HMU-P/PF [kN]	9,1	14,0	19,5	27,3
Shear $V_{Rd,seis}$	HMU-P/PF	16,7	27,0	39,0	50,2

Fire resistance

Fire resistance data according to ETA-14/0069

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Steel failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube} = 25 \text{ N/mm}^2$

Recommended tension and shear resistance in cracked and non-cracked concrete

Anchor size		M10x60	M12x80	M16x100	M16x125
HMU-P/PF	R30 $F_{Rk,fi}$ [kN]	0,87	1,69	3,14	
	R120 $F_{Rk,fi}$ [kN]	0,46	0,84	1,57	

For more information about different failure modes and fire resistance times please see the full ETA-14/0069 report.

Materials

Mechanical properties

Anchor size		M10x60	M12x80	M16x100	M16x125
Nominal tensile strength	f_{uk} [N/mm ²]	800	800	800	800
Yield strength	f_{yk} [N/mm ²]	640	640	640	640
Stressed cross-section, thread	A_s [mm ²]	58	84,3	157	157
Moment of resistance	W [mm ³]	62,3	109	278	278
Char. bending resistance	$M^{0Rk,s}$ [Nm]	59,8	105	266	266

Material quality

Part		Material
HMU-P (M10-M12)	Threaded bolt with cone	Carbon steel strength 8.8, galvanized to $\geq 5 \mu\text{m}$
	Sleeve	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
	Hexagon nut	Steel grade 8, galvanized to $\geq 5 \mu\text{m}$
	Washer	According to DIN 125-1, 140 HV, galvanized to $\geq 5 \mu\text{m}$
HMU-PF (M10-M16)	Threaded bolt with cone	Carbon steel strength 8.8, hot dip galvanized to min. $50 \mu\text{m}$
	Sleeve	Carbon steel, hot dip galvanized min. $50 \mu\text{m}$
	Hexagon nut	Steel grade 8, hot dip galvanized min. $50 \mu\text{m}$
	Washer	According to DIN 125-1, 140 HV, hot dip galvanized min. $50 \mu\text{m}$

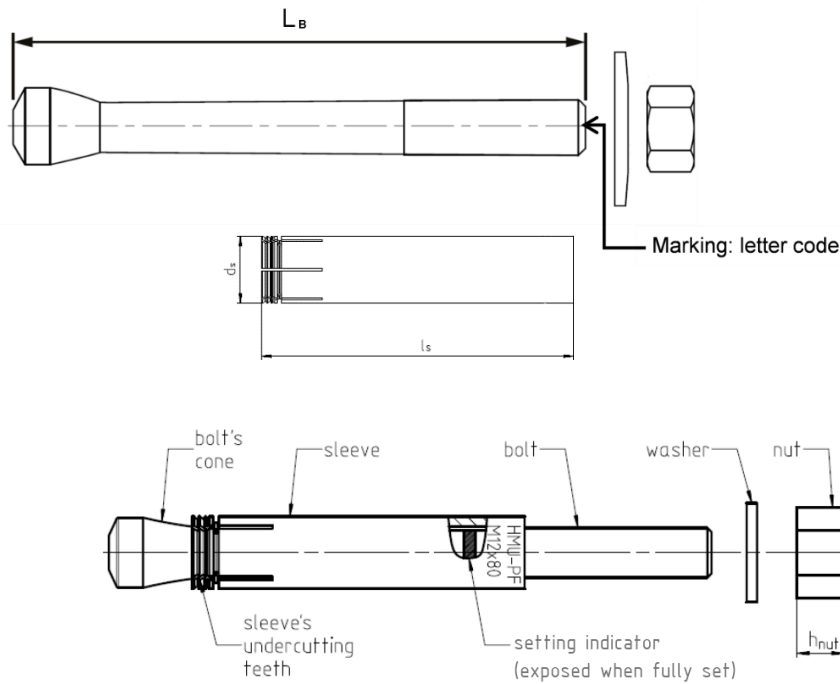
Letter code for anchor length

Anchor size	HMU-P/PF M10	M10x60/20	M10x60/50	
Letter code		F	H	
Anchor size	HMU-P/PF M12	M12x80/20	M12x80/35	M12x80/65 ^{a)}
Letter code		H	I	K
Anchor size	HMU-PF M16	M16x100/30	M16x100/60	M16x125/60
Letter code		K	M	O

a) Only HMU-PF M12

Anchor dimension

Anchor size		M10x60	M12x80	M16x100	M16x125
Total length of bolt L_B	min	109,5	133	167	222
	max	139,5	176	197	239
Diameter of sleeve	d_s	14,5	17,5	21,6	21,6
Length of sleeve	l_s	61	80,6	100	125



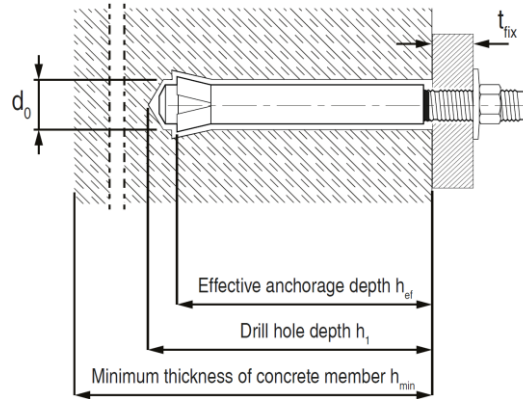
Setting information

Setting details of HMU-PF

Anchor size		M10x60	M12x80	M16x100	M16x125
Effective anchorage depth	h_{ef}	60	80	100	125
Nominal Diameter of drill bit	d_0	15	18	23	
Cutting diameter of drill bit ¹⁾	$d_{cut} \leq$	15,5	18,5	23,0	
Depth of drill hole	$h_1 =$	69	92	115	140
Diameter of clearance hole in the fixture	$d_f \leq$	12	14	18	
Thickness of fixture	t_{fix} min. max	2	2	0 ²⁾	0 ²⁾
		50	65	60	75
Torque moment	T_{inst}	30	45	120	
Width across nut flats	SW	17	19	24	

1) Use special stop drill bit TE-C-HMU-B and TE-Y-HMU-B only.

2) When thickness of attachment is less than 3mm, big washer acc. to DIN1052 standard needs to be used.



Installation equipment

Anchor size	M10x60	M12x80	M16x100	M16x125
Rotary hammer	TE 30 / TE 30-A36	TE 40 / TE 30-A36	TE 40 / TE 50	
Stop drill bit	TE-C-HMU-B M10x60	TE-C-HMU-B M12x80	TE-C-HMU-B M16x100 TE-Y-HMU-B M16x100	TE-C-HMU-B M16x125 TE-Y-HMU-B M16x125
Setting tool	TE-C-HMU-ST-M10	TE-C-HMU-ST-M12	TE-C-HMU-ST-M16 / TE-Y-HMU-ST-M16	
Insert connections	TE-C (SDS Plus)	TE-C (SDS Plus)	 	TE-C (SDS Plus) TE-Y (SDS Max)
Other tools	Blow-out bulb			

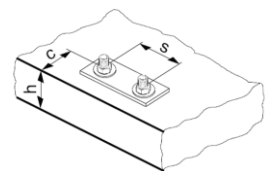
Setting parameters

Anchor size		M10	M12	M16	M16
Effective anchorage depth	h_{ef} [mm]	60	80	100	125
Minimum base material thickness	$h_{min} \geq$ [mm]	120	160	200	250
Minimum spacing	$s_{min} \geq$ [mm]	60	90	100	100
Minimum edge distance	$c_{min} \geq$ [mm]	55	90	100	100
Critical spacing for splitting failure	$s_{cr,sp}$ [mm]	230	300	300	375
Critical edge distance for splitting failure	$c_{cr,sp}$ [mm]	115	150	160	200
Critical spacing for concrete cone failure	$s_{cr,N}$ [mm]	180	240	300	375
Critical edge distance for concrete cone failure	$c_{cr,N}$ [mm]	90	120	150	188

In case of smaller edge distance and spacing than $c_{cr,sp}$, $s_{cr,sp}$, $c_{cr,N}$ and $s_{cr,N}$ the load values shall be reduced according ETAG 001, Annex C.

Critical spacing and critical edge distance for splitting failure apply only for non-cracked concrete.

For cracked concrete only the critical spacing and critical edge distance for concrete cone failure are decisive.



Setting instruction

*For detailed information on installation see instruction for use given with the package of the product.

Setting instruction for HMU-PF	
<p>1. Drilling</p>	<p>2. Cleaning</p>
<p>3. Inserting the anchor by hand</p>	<p>4. Applying hammer drill</p>
<p>5. Applying hammer drill</p>	<p>6. Checking</p>
<p>7. Attaching the fixture</p>	<p>8. Attaching the belonging washer</p>