HMU
UNDERCUT ANCHOR

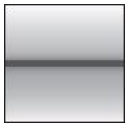
Technical Datasheet

Update: Jan-23

HMU-P/PF Undercut anchor

Everyday standard undercut anchor for cracked concrete

Anchor version		Benefits
	HMU-P (M10-M12)	- 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 Engineering design Software

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment [a)]	CSTB, Marne-la-Vallèe	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 N/mm²

Effective anchorage depth for static

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

Characteristic resistance

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

Design resistance

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

Recommended loads [a)]

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

a) With overall partial safety factor for action γ = 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 N/mm²
- α_{gap} = 1,0 (using Hilti seismic filling set)

Effective anchorage depth for seismic C2

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

Characteristic resistance in case of seismic performance category C2

Anchor size				M10x60	M12x80	M16x100	M16x125
Tension	HMU-PF	$N_{Rk,seis}$	[kN]	13,6	20,9	-	40,9
Shear	HMU-PF	$V_{Rk,seis}$		18,6	28,6	-	41,5

Design resistance in case of seismic category C2

Anchor size				M10x60	M12x80	M16x100	M16x125
Tension	HMU-PF	$N_{Rd,seis}$	[kN]	9,1	14,0	-	27,3
Shear	HMU-PF	$V_{Rd,seis}$		14,8	22,9	-	33,2

Effective anchorage depth for seismic C1

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

Characteristic resistance in case of seismic performance category C1

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

Design resistance in case of seismic category C1

Anchor size				M10x60	M12x80	M16x100	M16x125
Tension	HMU-P/PF	$N_{Rd,seis}$	[kN]	9,1	14,0	19,5	27,3
Shear	HMU-P/PF	$V_{Rd,seis}$		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 N/mm²

Effective anchorage depth

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

Characteristic resistance

Anchor size				M10x60	M12X80	M16X100	M16X125
Fire exposure R30							
Tension	HMU-P/PF	$N_{Rk,fi}$	[kN]	0,9	1,7	3,1	3,1
Shear	HMU-P/PF	$V_{Rk,fi}$		0,9	1,7	3,1	3,1
Fire exposure R120							
Tension	HMU-P/PF	$N_{Rk,fi}$	[kN]	0,5	0,8	1,6	1,6
Shear	HMU-P/PF	$V_{Rk,fi}$		0,5	0,8	1,6	1,6

Design resistance

Anchor size				M10x60	M12X80	M16X100	M16X125
Fire exposure R30							
Tension	HMU-P/PF	$N_{Rk,fi}$	[kN]	0,9	1,7	3,1	3,1
Shear	HMU-P/PF	$V_{Rk,fi}$		0,9	1,7	3,1	3,1
Fire exposure R120							
Tension	HMU-P/PF	$N_{Rk,fi}$	[kN]	0,5	0,8	1,6	1,6
Shear	HMU-P/PF	$V_{Rk,fi}$		0,5	0,8	1,6	1,6

For more information about diffrent 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/mm²]	800	800	800	800
Yield strength	f_{yk}	[N/mm²]	640	640	640	640
Stressed cross-section, thread	A_s	[mm²]	58	84,3	157	157
Moment of resistance	W	[mm³]	62,3	109	278	278
Char. bending resistance	$M^0_{Rk,s}$	[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 ≥ 5 µm
	Sleeve	Carbon steel, galvanized to ≥ 5 µm
	Hexagon nut	Steel grade 8, galvanized to ≥ 5 µm
	Washer	According to DIN 125-1, 140 HV, galvanized to ≥ 5 µm
HMU-PF (M10-M16)	Threaded bolt with cone	Carbon steel strength 8.8, hot dip galvanized to min. 50 µm
	Sleeve	Carbon steel, hot dip galvanized min. 50µm
	Hexagon nut	Steel grade 8, hot dip galvanized min. 50µm
	Washer	According to DIN 125-1, 140 HV, hot dip galvanized min. 50µm

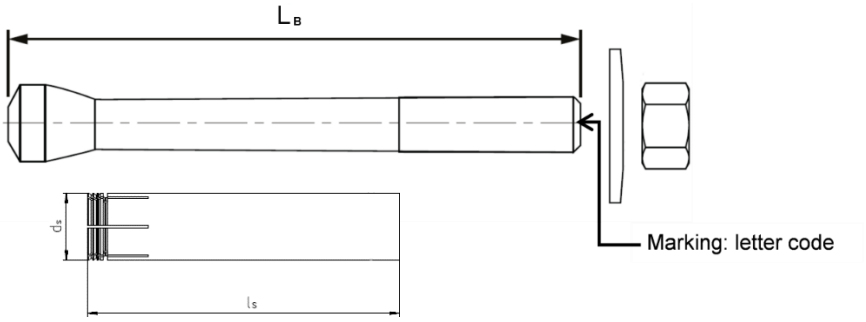
Letter code for anchor length

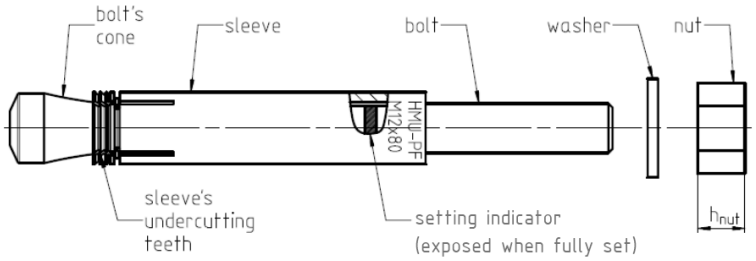
Anchor size	**HMU-P/PF M10**	**M10x60/20**	**M10x60/50**	
Letter code		F	H	
Anchor size	**HMU-P/PF M12**	**M12x80/20**	**M12x80/35**	**M12x80/65** [a]
Letter code		H	I	K
Anchor size	**HMU-PF M16**	**M16x100/30**	**M16x100/60**	**M16x125/60**
Letter code		K	M	O

a) Only HMU-PF M12

Anchor dimension

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





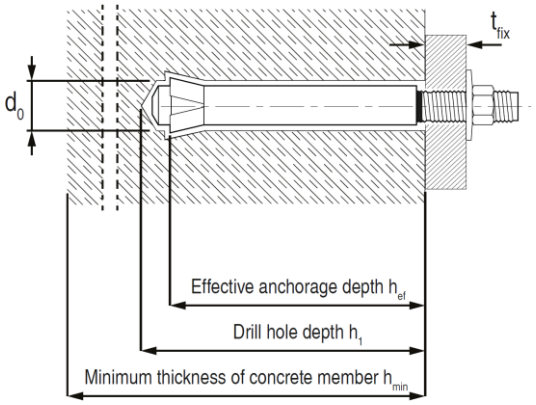
Setting information

Setting details of HMU-PF

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



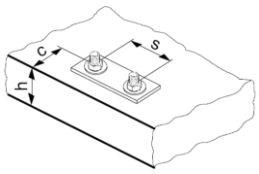
Installation equipment

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 pump			

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 EN 1992-4.
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.

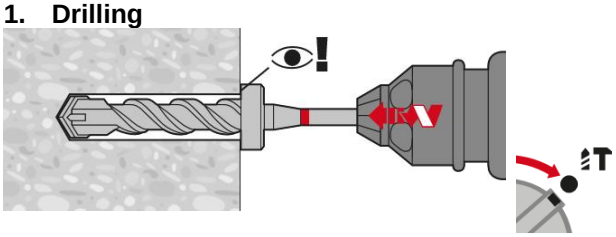


Setting instruction

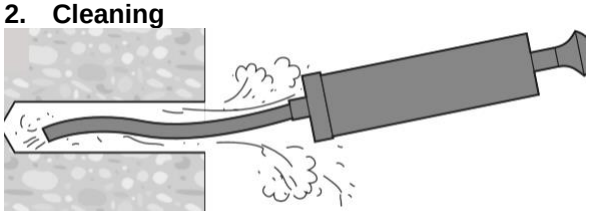
***For detailed information on installation see instruction for use given with the package of the product.**

Setting instruction for HMU-PF

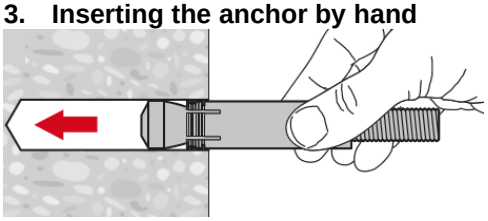
1. Drilling



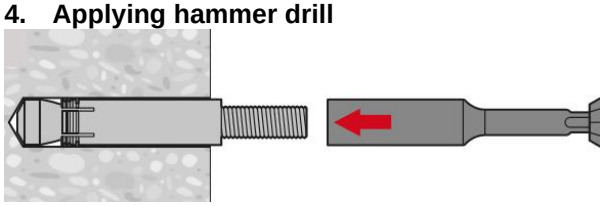
2. Cleaning



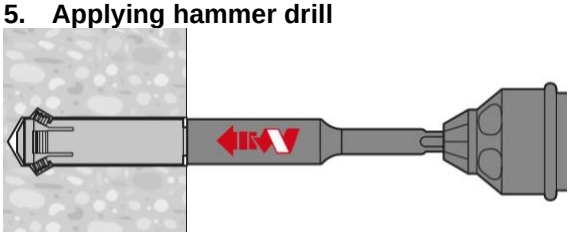
3. Inserting the anchor by hand



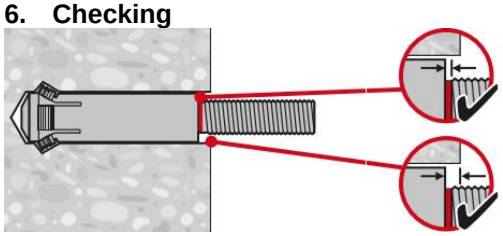
4. Applying hammer drill



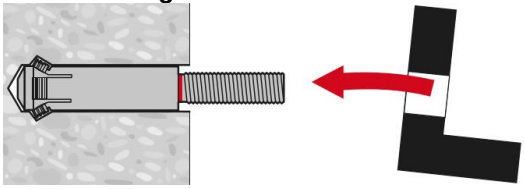
5. Applying hammer drill



6. Checking



7. Attaching the fixture



8. Attaching the belonging washer