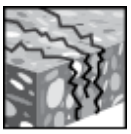
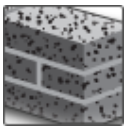
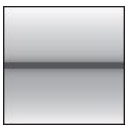
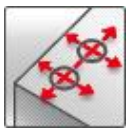
HUS3 Screw anchor

Ultimate performance screw anchor

Anchor version		Benefits
	HUS3-H (6-14)	- High productivity - less drilling and fewer operations than with conventional anchors - ETA approval for cracked and non-cracked concrete - ETA approval for Seismic C1 and C2 - ETA approval for adjustability (unscrew-rescrew) - High loads - Small edge and spacing distance - abZ (DIBt) approval for reusability in fresh concrete ($f_{ck,\ cube}$ = 10/15/20 Nmm^2) for temporary applications - Three embedment depths for maximum design flexibility - No cleaning required - HUS3-HF with multilayer coatings for additional corrosion protection - Forged-on washer and hexagon head with no protruding thread - Through fastening
	HUS3-HF (8-14)	
	HUS3-C (8-10)	
	HUS3-A (6)	
	HUS3-P (6)	
	HUS3-PL (6)	
	HUS3-PS (6)	
	HUS3-I (6)	
	HUS3-I Flex (6)	

Base material				Load conditions		
						
Concrete (non-cracked)	Concrete (cracked)	Solid brick	Autoclaved aerated concrete	Static / quasi-static	Seismic ETA-C1,C2	Fire resistance

Installation conditions	Other information			
				
Small edge distance and spacing	European Technical Assessment	CE conformity	PROFIS Anchor design software	DIBt Approval Reusability

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-13/1038 / 22-07-2019
Fire test report	DIBt, Berlin	ETA-13/1038 / 22-07-2019

a) All data given in this section according ETA-13/1038 issue 22-07-2019.

Static and quasi-static loading data (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

Anchorage depth

Anchor size		6		8			10			14		
Type	HUS3-	H,C,A, I,I-flex	P,PS	H,C,HF			H,C,HF			H,HF		H
Nominal embedmenth depth	h_{nom} [mm]	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		55	55	50	60	70	55	75	85	65	85	115

Characteristic resistance

Anchor size		6		8			10			14		
Type	HUS3-	H,C,A, I,I-flex	P,PS, PL	H,C,HF			H,C,HF			H,HF		H
Non-cracked concrete												
Tension N_{Rk}	[kN]	9,0	7,5	9,0	12,0	16,0	12,0	20,0	27,8	17,5	27,3	44,4
Shear V_{Rk}	[kN]	*12,5*	*12,5*	12,8	*19,0*	*22,0*	13,5	*30,0*	*34,0*	35,0	*54,5*	*62,0*
Cracked concrete												
Tension N_{Rk}	[kN]	6,0	6,0	6,0	9,0	12,0	9,7	16,2	19,8	12,5	19,4	31,7
Shear V_{Rk}	[kN]	*12,5*	*12,5*	9,1	*19,0*	*22,0*	9,7	*30,0*	*34,0*	24,9	*38,9*	*62,0*

Design resistance

Anchor size		6		8			10			14		
Type	HUS3-	H,C,A, I,I-flex	P,PS, PL	H,C,HF			H,C,HF			H,HF		H
Non-cracked concrete												
Tension N_{Rd}	[kN]	5,0	4,2	6,0	8,0	10,7	8,0	13,3	18,5	11,7	18,2	29,6
Shear V_{Rd}	[kN]	*8,3*	*8,3*	8,5	*12,7*	*14,7*	9,0	*20,0*	*22,7*	23,3	*36,3*	*41,3*
Cracked concrete												
Tension N_{Rd}	[kN]	3,3	3,3	4,0	6,0	8,0	6,4	10,8	13,2	8,3	13,0	21,1
Shear V_{Rd}	[kN]	*8,3*	*8,3*	6,1	*12,7*	*14,7*	6,4	*20,0*	*22,7*	16,6	*25,9*	*41,3*

Recommended loads[a)]

Anchor size		6		8			10			14		
Type	HUS3-	H,C,A, I,I-flex	P,PS, PL	H,C,HF			H,C,HF			H,HF		H
Non-cracked concrete												
Tension N_{Rec}	[kN]	3,6	3,0	4,3	5,7	7,6	5,7	9,5	13,2	8,3	13,0	21,2
Shear V_{Rec}	[kN]	*6,0*	*6,0*	6,1	*9,0*	*10,5*	6,5	*14,3*	*16,2*	16,6	*26,0*	*29,5*
Cracked concrete												
Tension N_{Rec}	[kN]	2,4	2,4	2,9	4,3	5,7	4,6	7,7	9,4	5,9	9,3	15,1
Shear V_{Rec}	[kN]	*6,0*	*6,0*	4,3	*9,0*	*10,5*	4,6	*14,3*	*16,2*	11,9	*18,5*	*29,5*

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 loading data (for 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)

Anchorage depth for seismic C2

Anchor size			8	10	14
Type		**HUS3 -**	**H**	**H**	**H**
Nominal anchor. depth range	h_{nom}	[mm]	h_{nom3}	h_{nom3}	h_{nom3}
			70	85	115
Effective anchorage depth	h_{eff}	[mm]	54,9	67,1	91,8

Characteristic resistance in case of seismic performance category C2

Anchor size			8	10	14
with Hilti filling set (α_{gap} = 1,0)					
Type		**HUS3 -**	**H, HF**	**H, HF**	**H, HF**
Tension $N_{Rk,seis}$		[kN]	3,2	9,4	17,7
Shear $V_{Rk,seis}$			14,7	25,6	46,6
without Hilti filling set (α_{gap} = 0,5)					
Type		**HUS3**	**H, HF**	**H, HF, C**	**H, HF**
Tension $N_{Rk,seis}$		[kN]	3,2	9,4	17,7
Shear $V_{Rk,seis}$			5,4	8,9	17,2

Design resistance in case of seismic performance category C2

Anchor size			8	10	14
with Hilti filling set (α_{gap} = 1,0)					
Type		**HUS3 -**	**H, HF**	**H, HF**	**H, HF**
Tension $N_{Rd,seis}$		[kN]	2,1	6,3	11,8
Shear $V_{Rd,seis}$			9,8	17,1	31,1
without Hilti filling set (α_{gap} = 0,5)					
Type		**HUS3**	**H, HF**	**H, HF, C**	**H, HF**
Tension $N_{Rd,seis}$		[kN]	2,1	6,3	11,8
Shear $V_{Rd,seis}$			3,6	5,9	11,5

Anchorage depth for seismic C1

Anchor size			8		10		14	
Type		**HUS3-**	**H**		**H**		**H**	
Nominal anchorage depth range	h_{nom}	[mm]	h_{nom2}	h_{nom3}	h_{nom2}	h_{nom3}	h_{nom2}	h_{nom3}
			60	70	75	85	85	115
Effective anchorage depth	h_{ef}	[mm]	46,4	54,9	58,6	67,1	66,3	91,8

Characteristic resistance in case of seismic performance category C1

Anchor size		8		10		14	
with Hilti filling set (α_{gap} = 1,0)							
Type	**HUS3 -**	**H, HF**		**H, HF**		**H, HF**	**H**
Tension $N_{Rk,seis}$	[kN]	9,0	12,0	13,8	16,8	16,5	26,9
Shear $V_{Rk,seis}$	[kN]	11,9	11,9	16,8	17,7	22,5	34,5
without Hilti filling set (α_{gap} = 0,5)							
Type	**HUS3 -**	**H, HF**		**H, HF, C**		**H, HF**	
Tension $N_{Rk,seis}$	[kN]	9,0	12,0	13,7	16,8	16,5	26,9
Shear $V_{Rk,seis}$	[kN]	6,0	6,0	8,4	8,9	11,3	17,3

Design resistance in case of seismic performance category C1

Anchor size		8		10		14	
with Hilti filling set (α_{gap} = 1,0)							
Type	**HUS3 -**	**H, HF**		**H, HF**		**H, HF**	**H**
Tension $N_{Rd,seis}$	[kN]	6,0	8,0	9,2	11,2	11,0	17,9
Shear $V_{Rd,seis}$	[kN]	7,9	7,9	11,2	11,8	15,0	23,0
without Hilti filling set (α_{gap} = 0,5)							
Type	**HUS3 -**	**H, HF**		**H, HF, C**		**H, HF**	
Tension $N_{Rd,seis}$	[kN]	6,0	8,0	9,1	11,2	11,0	17,9
Shear $V_{Rd,seis}$	[kN]	4,0	4,0	5,6	5,9	7,5	11,5

Fire resistance

All data in this section applies to:

- Correct setting (see setting instruction)
- No edge distance and spacing influence
- Minimum base material thickness
- For more fire resistance data please see the full ETA-13/1038 report.

Recommended loads under fire exposure[1)]

Anchor size				6					
Type			**HUS3-**	**H**	**C**	**A**	**I / I-Flex**	**P**	**PS / PL**
Nominal embedmenth depth		h_{nom}	[mm]	55					
Steel failure for tension and shear load ($F_{Rec,s,fi}$ =$N_{Rec,s,fi}$ =$V_{Rec,s,fi}$)									
Recommended tensile and shear load	R30	$F_{Rec,s,fi}$	[kN]	1,6					
	R120	$F_{Rec,s,fi}$	[kN]	0,7					
	R30	$M^0_{Rec,s,fi}$	[Nm]	1,4					
	R120	$M^0_{Rec,s,fi}$	[Nm]	0,6					
Pull-out failure									
Recommended ressitance	R30 to R90	$N_{Rec,p,fi}$	[kN]	1,5					
	R120	$N_{Rec,p,fi}$	[kN]	1,2					
Concrete cone failure									
Edge distance[2)]	R30 to R120	$c_{cr,fi}$	[mm]	2 h_{ef}					
Spacing	R30 to R120	$s_{cr,fi}$	[mm]	2$c_{cr,fi}$					
Concrete pry-out failure									
	R30 to R120	k	[-]	1,5					
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.									

1) The recommended loads under fire exposure include a safety factor for resistance under fire exposure $\gamma_{Ms,fire}$ =1,0 and the partial safety factor for action $\gamma_{Ms,fire}$ =1,0. The partial safety factors for action shall be taken from national regulations, in this case it was taken the factor γ =1,4.

2) In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm.

Recommended loads under fire exposure[1)]

Anchor size				8			10			14		
Type			**HUS3-**	**H, HF**			**H, HF**			**H, HF**		
Nominal embedmenth depth		h_{nom}	[mm]	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				50	60	70	55	75	85	65	85	115
Steel failure for tension and shear load ($F_{Rec,s,fi}$ =$N_{Rec,s,fi}$ =$V_{Rec,s,fi}$)												
Recommended tensile and shear load	R30	$F_{Rec,s,fi}$	[kN]	3,2	3,5	3,8	6,1	6,2		10,4	10,6	
	R120	$F_{Rec,s,fi}$	[kN]	1,2	1,2	1,5	2,4	2,5		4,0	4,3	
	R30	$M^0_{Rec,s,fi}$	[Nm]	3,8	4,1	4,4	9,1	9,2		20,4	20,6	
	R120	$M^0_{Rec,s,fi}$	[Nm]	1,5	1,4	1,7	3,5	3,7		7,9	8,3	
Pull-out failure												
Recommended ressitance	R30 to R90	$N_{Rec,p,fi}$	[kN]	1,5	2,3	3,0	2,4	4,0	4,9	3,1	4,8	7,8
	R120	$N_{Rec,p,fi}$	[kN]	1,2	1,8	2,4	1,9	3,2	3,9	2,5	3,8	6,3
Concrete cone failure												
Characteristic ressitance	R30 to R90	$N^{0Rec}_{,p,fi}$	[kN]	1,8	2,6	4,0	2,0	4,7	6,6	3,0	6,4	14,4
	R120	$N^0_{Rec,p,fi}$	[kN	1,4	2,1	3,2	1,6	3,8	5,3	2,4	5,1	11,5
Edge distance[2)]	R30 to R120	$c_{cr,fi}$	[mm]	2 h_{ef}								
Spacing	R30 to R120	$s_{cr,fi}$	[mm]	2 $c_{cr,fi}$								
Concrete pry-out failure												
	R30 to R120	k	[-]	1,0	2,0		1,0	2,0				
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.												

1) The recommended loads under fire exposure include a safety factor for resistance under fire exposure $\gamma_{Ms,fire}$ =1,0 and the partial safety factor for action $\gamma_{Ms,fire}$ =1,0. The partial safety factors for action shall be taken from national regulations, in this case it was taken the factor γ =1,4.

Recommended loads under fire exposure[1)]

Anchor size				8			10		
Type			**HUS3-**	**C**			**C**		
Nominal embedmenth depth		h_{nom}	[mm]	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				50	60	70	55	75	85
Steel failure for tension and shear load ($F_{Rec,s,fi}$ =$N_{Rec,s,fi}$ =$V_{Rec,s,fi}$)									
Recommended tensile and shear load	R30	$F_{Rec,s,fi}$	[kN]	0,5			1,2		
	R120	$F_{Rec,s,fi}$	[kN]	0,2			0,6		
	R30	$M^0_{Rec,s,}$	[Nm]	0,6			1,7		
	R120	$M^0_{Rec,s,}$	[Nm]	0,3			0,9		
Pull-out failure									
Recommended ressitance	R30 to R90	$N_{Rec,p,fi}$	[kN]	1,5	2,3	3,0	2,4	4,0	5,0
	R120	$N_{Rec,p,fi}$	[kN]	1,2	1,8	2,4	1,9	3,2	4,0
Concrete cone failure									
Characteristic ressitance	R30 to R90	$N^0_{Rec,p,}$	[kN]	1,8	2,6	4,0	2,0	4,7	6,6
	R120	$N^0_{Rec,p,}$	[kN]	1,5	2,1	3,2	1,6	3,8	5,3
Edge distance[2)]	R30 to R120	$c_{cr,fi}$	[m	2 h_{ef}					
Spacing	R30 to R120	$s_{cr,fi}$	[m	2 $c_{cr,fi}$					
Concrete pry-out failure									
	R30 to R120	k	[-]	1,0	2,0		1,0	2,0	
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.									

2) In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm.

1) The recommended loads under fire exposure include a safety factor for resistance under fire exposure $\gamma_{Ms,fire}$ =1,0 and the partial safety factor for action $\gamma_{Ms,fire}$ =1,0. The partial safety factors for action shall be taken from national regulations, in this case it was taken the factor γ =1,4.
2) In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm.