

TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free



Application in non-cracked concrete



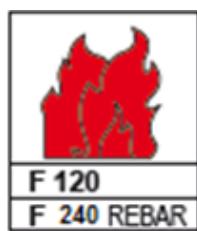
Post-installed rebar



Application in cracked concrete



Application under Seismic loading



F 120

F 240 REBAR

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Product description



The U-H mortar is a 2-component reaction resin mortar based on a URETHAN HYBRID resin styrene-free and will be delivered in a 2-c cartridge (420ml & 825ml) system. This high performance product may be used in combination with a hand-, battery- or pneumatic tool and a static mixer. It was designed especially for the anchoring of threaded rods, reinforcing bars or internal threaded rod sleeves into concrete (also porous and light). Based on the excellent standing behaviour the usability for overhead application is given. The UM-H mortar product is characterised, by a huge range of applications with an installation temperature from -5 °C and an application temperature up to 160 °C as well as by high chemical resistance for applications in extreme ambiances e.g. in swimming pools (chlorine) or in closeness to the sea (salt). The wide range of certificates, national and international approvals, allows nearly every application.

Properties and benefits



- European Assesment acc. to ETAG 001 (TR 029) in concrete Opt 1+7: ETA- 19/0205
- European Assesment acc. to ETAG 001 Annex E Seismic C1 and C2: ETA- 19/0205
- European Assesment acc. to ETAG 001 (TR 023) (rebar): ETA- 19/0209
- For heavy anchoring - doweling and post-installed rebar connection
- Fire resistance test report:
- Overhead application
- Suitable for attachment points with small edge- and axial distances due to an anchoring free of expansion forces
- High chemical resistance
- Low odour
- high bending and pressure strength
- Cartridge can be reused up to the end of the shelf life by replacing the static mixer or resealing cartridge with the sealing cap

Applications samples



Suitable for the fixation of facades, roofs, wood constructions, metal constructions; metal profiles, columns, beams, consoles, railings, sanitary devices, cable trays, piping, post-installed rebar connection (reconstruction or reinforcement), etc.

Handling and storage

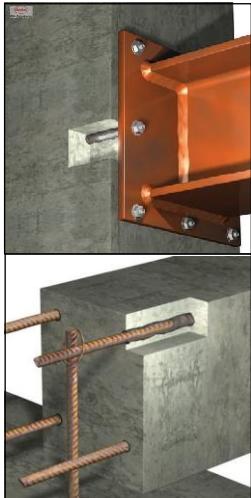
- **Storage:**
store in a cold and dark place, storage temperature: from +5°C up to +25 °C
- **Shelf life:**
18 months for cartridges (ST)



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Applications and intended use

- **Underground:**
cracked and non-cracked concrete, light-concrete, porous-concrete, natural stone
(Attention! natural stone, can discolour; shall be checked in advance)
- **Anchor elements:**
Threaded rods (zinc plated or hot dip, stainless steel and high corrosion resistance steel), reinforcing bars, internal threaded rods, profiled rod, steel section with undercuts (e.g. perforated section)
- **Temperature range:**
-5°C up to +40°C installation temperature cartridge
temperature min. +5°C; optimal +20°C
-40°C to +160°C base material temperature after full curing

Mortar properties

Properties	Test Method	Result
UV resistance		Pass
Watertightness	DIN EN 12390-8	0 mm
Temperature stability		≤ 160°C
Density		1,78 kg / dm³
Compressive strength	DIN EN 196-1	122 N / mm²
Tensile strength	DIN EN ISO 527-2	14,9 N / mm²
Flexural strength	DIN EN 196-1	22,2 N / mm²
E modulus	DIN EN ISO 527-2	8300 N / mm²
Shrinkage	DIN 52450	<0,2 %
Hardness Shore A	DIN EN ISO 868	97,6
Electrical resistance	DIN IEC 93	7,2 x 10¹³ Ωm
Thermal conductivity	DIN EN 993-15	1,06 W/m·K
Thermal heat capacity	DIN EN 993-15	1.090 J/kg·K

Reactivity

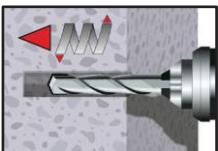
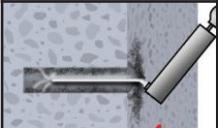
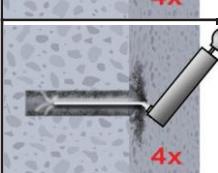
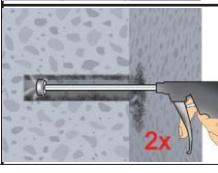
Temperature of base material	Gelling- and working time	Full curing time in dry base material	Full curing time in wet base material
-5 °C to -1 °C	50 Min.	300 Min.	600 Min.
0 °C to +4 °C	25 Min.	210 Min.	420 Min.
+5 °C to +9 °C	15 Min.	120 Min.	240 Min.
+10 °C to +19 °C	10 Min.	60 Min.	120 Min.
+20 °C to +29 °C	6 Min.	40 Min.	80 Min.
+30 °C to +34 °C	3 Min.	30 Min.	60 Min.
+35 °C to +39 °C	2 Min.	30 Min.	60 Min.
+40 °C	2 Min.	30 Min.	60 Min.



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TILCA TIM U-H**2K** Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Usage instructions - concrete

	1. Drill with hammer drill mode a hole into the base material to the size and embedment depth required by the selected anchor.
MAC: Cleaning for borehole diameter $d_0 \leq 20$ mm and bore hole depth $h_0 \leq 10d_s$ (uncracked concrete only!)	
	2a. Starting from the bottom or the back of the bore hole, blow the hole clean by a hand pump (see page 6) a minimum of four times
	2b. Check the brush diameter (page 6). Brush the hole with an appropriate sized wire brush $> d_{b,min}$ (see page 6) a minimum of four times in a twisting motion. If the borehole ground is not reached with the brush, a brush extension must be used.
	2c. Finally blow the hole clean again with a hand pump a minimum of four times.
CAC: Cleaning for all borehole diameter in uncracked and cracked concrete	
	2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used.
	2b. Check the brush diameter (page 6). Brush the hole with an appropriate sized wire brush $> d_{b,min}$ (see page 6) a minimum of two times in a twisting motion. If the borehole ground is not reached with the brush, a brush extension must be used.
	2c. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used.
	After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning has to be repeated directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.



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TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

	3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. After every working interruption longer than the recommended working time as well as for new cartridges, a new static- mixer shall be used.
	4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods. Diagram shows an anchor rod with a red mark at height h_{ef} .
	5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.
	6. Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw of the static mixing nozzle as the hole is filled avoids creating air pockets. For embedments larger than 190mm an extension nozzle shall be used. For overhead and horizontal installation in bore holes bigger than 20mm resp. deeper than 240mm a piston plug shall be used. Observe the gel-/ working times given.
	7. Push the threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor should be free of dirt, grease, oil or other foreign material.
	8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed.
	9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured.
	10. After full curing, the add-on part can be installed with the max. torque by using a calibrated torque wrench. Diagram shows an anchor being tightened with a torque wrench to $T_{inst.}$.



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TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Cleaning of the drill hole - concrete



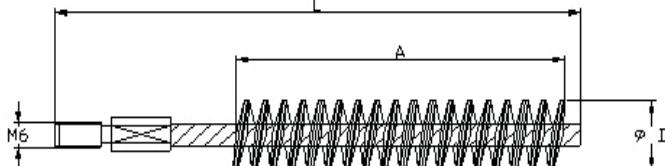
MAC - Hand pump (volume 750)

ml) Drill bit diameter (d_0): 10 mm to 20 mm Drill hole depth (h_0) < 10 d_s
Only uncracked concrete



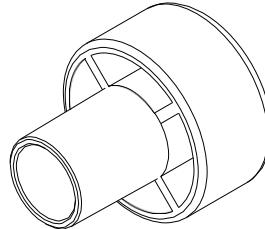
CAC - compressed air tool (min. 6 bar)

Drill bit diameter (d_0): all diameters



Steel brush

Drill bit diameter (d_0): all diameters



Piston plug for overhead or horizontal installation

Drill bit diameter (d_0): 18 mm to 40 mm

Threaded rod	Rebar	Internal Threaded Rod	Bore hole-Ø	Brush-Ø		Min. brush-Ø	Piston plug
(mm)	(mm)	(mm)	(mm)		d_b (mm)	$d_{b,min}$ (mm)	(Nr.)
M 8			10,0	RB 10	11,5	10,5	not necessary
M 10	8	IG-M6	12,0	RB 12	13,5	12,5	
M 12	10	IG-M8	14,0	RB 14	15,5	14,5	
	12		16,0	RB 16	17,5	16,5	
M 16	14	IG-M10	18,0	RB 18	20,0	18,5	
	16		20,0	RB 20	22,0	20,5	
M 20		IG-M12	22,0	RB 22	24,0	22,5	VS 16
	20		25,0	RB 25	27,0	25,5	VS 18
M 24		IG-M16	28,0	RB 28	30,0	28,5	VS 20
M 27			30,0	RB 30	31,8	30,5	VS 22
	25		32,0	RB 32	34,0	32,5	VS 25
M 30	28	IG-M20	35,0	RB 25	37,0	35,5	VS 28
	32		40,0	RB 40	43,5	40,5	VS 30
							VS 32
							VS 35
							VS 38



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TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Setting parameter - concrete

Anchor size (Threaded rod)			M8	M10	M12	M16	M20	M24	M27	M30
Edge distance	$C_{cr,Np}$	[mm]	120	135	165	188	255	315	355	395
Min. edge distance	C_{min}	[mm]	35	40	45	50	60	65	75	80
Axial distance	$S_{cr,Np}$	[mm]	240	270	330	375	510	630	711	790
Min. axial distance	S_{min}	[mm]	40	50	60	75	95	115	125	140
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210	250	270
Min. part thickness	h_{min}	[mm]	110	120	140	161	218	266	314	340
Anchor diameter	d	[mm]	8	10	12	16	20	24	27	30
Drill diameter	d_0	[mm]	10	12	14	18	24	28	32	35
Installation torque	$T_{inst.}$	[Nm]	10	20	35	60	100	170	250	300

Anchor size (Rebar)			$\varnothing 8$	$\varnothing 10$	$\varnothing 12$	$\varnothing 14$	$\varnothing 16$	$\varnothing 20$	$\varnothing 25$	$\varnothing 28$	$\varnothing 32$
Edge distance	$C_{cr,Np}$	[mm]	109	135	164	173	188	255	315	369	405
Min. edge distance	C_{min}	[mm]	35	40	45	50	50	60	70	75	85
Axial distance	$S_{cr,Np}$	[mm]	219	270	328	345	375	510	630	737	810
Min. axial distance	S_{min}	[mm]	40	50	60	70	75	95	120	130	150
Embedment depth	h_{ef}	[mm]	80	90	110	115	125	170	210	250	270
Min. part thickness	h_{min}	[mm]	110	120	142	151	165	218	274	320	350
Anchor diameter	d	[mm]	8	10	12	14	16	20	25	28	32
Drill diameter	d_0	[mm]	12	14	16	18	20	24	32	35	40

Anchor size (Internal threaded rod) ¹⁾			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Edge distance	$C_{cr,Np}$	[mm]	135	165	188	255	315	395
Min. edge distance	C_{min}	[mm]	40	45	50	60	65	75
Axial distance	$S_{cr,Np}$	[mm]	270	330	375	510	630	790
Min. axial distance	S_{min}	[mm]	50	60	75	95	115	125
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210
Min. part thickness	h_{min}	[mm]	110	120	140	169	226	280
Inner Anchor Diameter	d_2	[mm]	6	8	10	12	16	20
Outer Anchor diameter ¹⁾	d	[mm]	10	12	16	20	24	30
Drill diameter	d_0	[mm]	12	14	18	22	28	35
Installation torque	$T_{inst.}$	[Nm]	10	10	20	40	60	100

¹⁾With metric threads according to EN1993-1-8:2005+AC:2009



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Threaded rod)¹⁾

TENSION LOADS - Design method acc. to Technical Report TR 029, characteristic values for tension loading

Anchor size (Threaded rod)	M8	M10	M12	M16	M20	M24	M27	M30							
Steel failure															
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 4.6; 4.8															
N _{Rk,s}	[kN]	15	23	34	63	98	141	184							
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 5.6; 5.8	N _{Rk,s}	[kN]	18	29	42	78	122	176							
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 8.8	N _{Rk,s}	[kN]	29	46	67	125	196	282							
Partial safety factor 4.6; 5.6	γ _{Ms,N}	2,0													
Partial safety factor 4.8; 5.8; 8.8	γ _{Ms,N}	1,5													
Characteristic tension resistance, Stainless steel A4 and HCR, property class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177							
Characteristic tension resistance, Stainless steel A4 and HCR, property class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247							
Partial safety factor, property class 50	γ _{Ms,N}	2,86													
Partial safety factor, property class 70	γ _{Ms,N}	1,87													
Pullout and concrete cone failure²⁾															
Characteristic bond resistance in concrete C20/25															
80°C/50°C ³⁾	uncracked concrete	N _{Rk,p} = N ⁰ R _{k,c}	[kN]	34,2	48,1	66,4	94,2	149,5	205,8	275,7	343,1				
	cracked concrete			13,1	19,8	31,1	53,4	90,8	134,6	180,2	224,3				
120°C/72°C ³⁾	uncracked concrete	N _{Rk,p} = N ⁰ R _{k,c}	[kN]	30,2	39,6	58,1	81,7	128,2	190,0	233,3	290,3				
	cracked concrete			11,1	17,0	27,0	47,1	80,1	118,8	159,0	197,9				
160°C/100°C ³⁾	uncracked concrete	N _{Rk,p} = N ⁰ R _{k,c}	[kN]	24,1	33,9	45,6	62,8	101,5	142,5	190,9	237,5				
	cracked concrete			10,1	15,6	24,9	40,8	69,4	102,9	137,8	171,5				
Partial safety factor	uncracked concrete	γ _{Mp} = γ _{Mc}	1,5							1,8					
	cracked concrete	γ _{Mp} = γ _{Mc}	1,8												
Embedment depth		h _{ef}	[mm]	80	90	110	125	170	210	250	270				
Edge distance		c _{cr,Np}	[mm]	120	135	165	188	255	315	355	395				
Axial distance		s _{cr,Np}	[mm]	2 × c _{cr,Np}											
Increasing factors for concrete γ _c		(f _{ck} ^{0,1}) / 1,38													
Splitting failure															
Edge distance	h/hef ≥ 2,0	c _{cr,sp}	[mm]	1,0 h _{ef}											
	2,0 > h/hef > 1,3			2 h _{ef} (2,5 - h _{ef})											
	h/hef ≤ 1,3			2,4 h _{ef}											
Axial distance		s _{cr,sp}	[mm]	2 × c _{cr,sp}											

The data in this table are intended to use together with the design provisions of TR029

1) For more details see ETA- 19/0205.

2) Shall be determined acc. to this table or to TR 029. The smaller value is decisive.

3) Short term temperature/ Long term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Threaded rod)¹⁾

SHEAR LOADS - Design method acc. to Technical Report TR 029, characteristic values for shear loading

Anchor size (Threaded rod)	M8	M10	M12	M16	M20	M24	M27	M30							
Steel failure without leaver arm															
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 4.6; 4.8	V _{Rk,s}	[kN]	7	12	17	31	49	71	92	112					
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 5.6; 5.8	V _{Rk,s}	[kN]	9	15	21	39	61	88	115	140					
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 8.8	V _{Rk,s}	[kN]	15	23	34	63	98	141	184	224					
Characteristic shear resistance, Stainless steel A4 and HCR; property class 50	V _{Rk,s}	[kN]	9	15	21	39	61	88	115	140					
Characteristic shear resistance, Stainless steel A4 and HCR; property class 70	V _{Rk,s}	[kN]	13	20	30	55	86	124	-	-					
Steel failure with leaver arm															
Characteristic bending moment, Steel, zinc plated or hot dip, property class 4.6; 4.8	M ⁰ _{Rk,s}	[kN]	15	30	52	133	260	449	666	900					
Characteristic bending moment, Steel, zinc plated or hot dip, property class 5.6; 5.8	M ⁰ _{Rk,s}	[Nm]	19	37	65	166	324	560	833	1123					
Characteristic bending moment, Steel, zinc plated or hot dip, property class 8.8	M ⁰ _{Rk,s}	[Nm]	30	60	105	266	519	896	1333	1797					
Characteristic shear resistance, Stainless steel A4 and HCR; property class 50	M ⁰ _{Rk,s}	[Nm]	19	37	66	167	325	561	832	1125					
Characteristic shear resistance, Stainless steel A4 and HCR; property class 70	M ⁰ _{Rk,s}	[Nm]	26	52	92	232	454	784	-	-					
Partial safety factors for shear loads															
Partial safety factor, property class 4.6; 5.6	γ _{Ms,V}	1,67													
Partial safety factor, property class 4.8; 5.8; 8.8	γ _{Ms,V}	1,25													
Partial safety factor, property class 50	γ _{Ms,V}	2,38													
Partial safety factor, property class 70	γ _{Ms,V}	1,56					-								
Concrete Pryout failure															
Factor k in equation (5.7) of TR 029	2,0														
Partial safety factor	γ _{Msp}	1,5													
Concrete edge failure															
Partial safety factor	γ _{Msp}	1,5													

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1) For more details see ETA- 19/0205.



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TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Internal threaded rod)¹⁾

TENSION LOADS - Design method acc. to Technical Report TR 029, characteristic values for tension loading

Anchor size (Internal threaded rod)			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20								
Steel failure																
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 5.8	$N_{Rk,s}$	[kN]	10	18	29	42	76	123								
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 8.8	$N_{Rk,s}$	[kN]	16	29	46	67	121	196								
Partial safety factor	$\gamma_{Ms,N}$		1,50													
Characteristic tension resistance, Stainless steel A4-70 and HCR	$N_{Rk,s}$	[kN]	14	26	41	59	110	172								
Partial safety factor	$\gamma_{Ms,N}$		1,87													
Pullout and concrete cone failure²⁾																
Characteristic bond resistance in concrete C20/25																
80°C/50°C ³⁾	uncracked concrete	$N_{Rk,p} = N_{Rk,c}^0$	[kN]	48,1	66,4	94,2	149,5	205,8	343,1							
	cracked concrete			19,8	31,1	53,4	90,8	134,6	224,3							
120°C/72°C ³⁾	uncracked concrete			39,6	58,1	81,7	128,2	190,0	290,3							
	cracked concrete			17,0	27,0	47,1	80,1	118,8	197,9							
160°C/100°C ³⁾	uncracked concrete			33,9	45,6	62,8	101,5	142,5	237,5							
	cracked concrete			15,6	24,9	40,8	69,4	102,9	171,5							
Partial safety factor	uncracked concrete	$\gamma_{Mp} = \gamma_{Mc}$	1,5				1,8									
	cracked concrete	$\gamma_{Mp} = \gamma_{Mc}$	1,8													
Embedment depth		h_{ef}	[mm]	90	110	125	170	210	280							
Edge distance		$c_{cr,np}$	[mm]	135	165	188	255	315	395							
Axial distance		$s_{cr,np}$	[mm]	2 x $c_{cr,np}$												
Increasing factors for concrete ψ_c				$(f_{ck}^{0,1})/1,38$												
Splitting failure																
Edge distance	$h/hef \geq 2,0$	$c_{cr,sp}$	[mm]	$1,0 h_{ef}$												
	$2,0 > h/hef > 1,3$			$2 h_{ef} (2,5 - h/h_{ef})$												
	$h/hef \leq 1,3$			$2,4 h_{ef}$												
Axial distance		$s_{cr,sp}$	[mm]	$2 x c_{cr,sp}$												

The data in this table are intended to use together with the design provisions of TR029

- 1) For more details see ETA- 19/0205.
- 2) Shall be determined acc. to this table or to TR 029. The smaller value is decisive.
- 3) Short term temperature/ Long term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Internal threaded rod)¹⁾

SHEAR LOADS - Design method acc. to Technical Report TR 029, characteristic values for shear loading

Anchor size (Internal threaded rod)		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Steel failure without leaver arm							
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 5.8	$V_{Rk,s}$	[kN]	5	9	15	21	38
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 8.8	$V_{Rk,s}$	[kN]	8	15	23	34	61
Partial safety factor	$\gamma_{Ms,V}$				1,25		
Characteristic shear resistance, Stainless steel A4-70 and HCR	$V_{Rk,s}$	[kN]	7	13	21	30	55
Partial safety factor	$\gamma_{Ms,V}$				1,56		
Steel failure with leaver arm							
Characteristic bending moment, Steel, zinc plated or hot dip, property class 5.8	$M_{Rk,s}^0$	[Nm]	8	19	37	65	166
Characteristic bending moment, Steel, zinc plated or hot dip, property class 8.8	$M_{Rk,s}^0$	[Nm]	12	30	60	105	266
Partial safety factor	$\gamma_{Ms,V}$				1,25		
Characteristic bending moment, Stainless steel A4-70 and HCR	$M_{Rk,s}^0$	[Nm]	11	26	52	92	232
Partial safety factor	$\gamma_{Ms,V}$				1,56		
Concrete Pryout failure							
Factor k in equation (5.7) of TR 029					2,0		
Partial safety factor	γ_{Msp} ¹⁾				1,5		
Concrete edge failure							
Partial safety factor	γ_{Msp}				1,5		

The data in this table is intended to use together with the design provisions of TR029.

1) For more details see ETA- 19/0205.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Rebar)¹⁾

TENSION LOADS - Design method acc. to Technical Report TR 029, characteristic values for tension loading

Anchor size (Rebar)			ø8	ø10	ø12	ø14	ø16	ø20	ø25	ø28	ø32	
Steel failure												
Characteristic tension resistance, BST 500 S acc. to DIN 488-2:1986 or E DIN 488-2:2006 ²⁾	N _{Rk,s}	[kN]	28	43	62	85	111	173	270	339	442	
Partial safety factor	γ _{Ms,N}										1,4	
Pullout and concrete cone failure³⁾												
Characteristic bond resistance in concrete C20/25												
80°C/50°C ³⁾	uncracked concrete	N _{Rk,p} = N _{Rk,c} [kN]	28,1	39,6	58,1	70,8	81,7	138,9	214,4	285,9	352,9	
	cracked concrete		10,1	15,6	24,9	30,3	47,1	80,1	123,7	164,9	217,1	
120°C/72°C ³⁾	uncracked concrete		26,1	33,9	49,8	60,7	75,4	117,5	181,4	241,9	298,6	
	cracked concrete		9,0	14,1	20,7	27,8	40,8	69,4	107,2	142,9	190,0	
160°C/100°C ³⁾	uncracked concrete		20,1	28,3	39,4	48,1	59,7	96,1	148,4	197,9	244,3	
	cracked concrete		8,0	12,7	18,7	25,3	34,6	64,1	99,0	121,0	176,4	
Partial safety factor	uncracked concrete	γ _{Mp} = γ _{Mc}									1,8	
	cracked concrete	γ _{Mp} = γ _{Mc}									1,5	
Embedment depth		h _{ef}	[mm]	80	90	110	115	125	170	210	250	270
Edge distance		c _{cr,Np}	[mm]	109	135	164	173	188	255	315	369	405
Axial distance		s _{cr,Np}	[mm]									
Increasing factors for concrete γ _c											(f _{ck} ^{0,1}) / 1,38	
Splitting failure												
Edge distance	h/hef ≥ 2,0	c _{cr,sp} [mm]									1,0 h _{ef}	
	2,0 > h/hef > 1,3										2 h _{ef} (2,5 - h/hef)	
	h/hef ≤ 1,3										2,4 h _{ef}	
Axial distance		s _{cr,sp}	[mm]								2 x c _{cr,sp}	

The data in this table are intended to use together with the design provisions of TR029

- 1) For more details see ETA-19/0205.
- 2) For reinforcing bars which do not comply with DIN 488: The characteristic resistance NR_{k,s} shall be determined acc. to Technical Report
- 3) TR 029, equation (5.1)
- 4) Shall be determined acc. to this table or to TR 029. The smaller value is decisive.
- 5) Short term temperature/ Long term temperature . Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Rebar)¹⁾

SHEAR LOADS - Design method acc. to Technical Report TR 029, characteristic values for shear loading

Anchor size (Rebar)	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32		
Steel failure without leaver arm											
Characteristic shear resistance, BSt 500 S acc. to DIN 488-2:1986 or E DIN 488-2:2006 ²⁾											
V _{Rk,s}	[kN]	14	22	31	42	55	86	135	169	221	
Partial safety factor	γ _{Ms,V}						1,5				
Steel failure with leaver arm											
Characteristic bending moment, BSt 500 S acc. to DIN 488-2:1986 or E DIN 488-2:2006 ³⁾	M ⁰ _{Rk,s}	[Nm]	33	65	112	178	265	518	1012	1422	2123
Partial safety factor	γ _{Ms,V}						1,5				
Concrete Pryout failure											
Factor k in equation (5.7) of TR 029							2,0				
Partial safety factor	γ _{Mcp}						1,5				
Concrete edge failure											
Partial safety factor	γ _{Mc}						1,5				

The data in this table is intended to use together with the design provisions of TR029.

- 1) For more details see ETA- 19/0205.
- 2) For reinforcing bars which do not comply with DIN 488: The characteristic resistance VR_{k,s} shall be determined acc. to Technical Report TR 029, equation (5.5).
- 3) For reinforcing bars which do not comply with DIN 488: The characteristic resistance M0R_{k,s} shall be determined acc. to Technical Report TR 029, equation (5.5b).



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Seismic C1)

Design under seismic action acc. to TR 045

The decision of the selection of the seismic performance category is in the responsibility of each individual Member State. Furthermore, the values of $a_g \cdot S$ assigned to the seismicity levels may be different in the National Annexes to EN 1998-1:2004 (EC8) compared to the values given in the following table. The recommended categories C1 and C2 given in the following table are given in the case that no National requirements are defined.

Recommended seismic performance categories

Seismicity level ^{a)}		Importance Class acc. to EN 1998-1:2004, 4.2.5			
	$a_g \cdot S^c)$	I	II	III	IV
Very low ^{b)}	$a_g \cdot S \leq 0,05\text{ g}$	No additional requirement			
low ^{b)}	$0,05\text{ g} < a_g \cdot S \leq 0,1\text{ g}$	C1	C1 ^{d)} or C2 ^{e)}		C2
>low ^{b)}	$a_g \cdot S > 0,1\text{ g}$	C1			C2

a) The values defining the seismicity levels may be found in the National Annex of EN 1998-1.

b) Definition according to EN 1998-1:2004, 3.2.1.

c) a_g = Design ground acceleration on Type A ground (EN 1998-1: 2004,

3.2.1), S = Soil factor (see e.g. EN 1998-1: 2004, 3.2.2).

d) C1 attachments of non-structural elements

e) C2 for connections between structural elements of primary and/or secondary seismic members

Calculation of characteristic seismic resistance $R_{k,seis}$

Tension load: $R_{k,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot \alpha_{N,seis} \cdot R_k^0$

mit $R_k^0 = N_{Rk,s}, N_{Rk,p}, N_{Rk,c}, N_{Rk,sp}$ (from design in cracked concrete)

$\alpha_{N,seis} = 1,0$ for $N_{Rk,c}, N_{Rk,sp}$

$\alpha_{N,seis} =$ for $N_{Rk,s}, N_{Rk,p}$ see following Tables

α_{gap} = see following Tables

α_{seis} = see following

Shear load: $R_{k,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot \alpha_{V,seis} \cdot R_k^0$

mit $R_k^0 = V_{Rk,s}, V_{Rk,c}, V_{Rk,sp}$ (from design in cracked concrete)

$\alpha_{V,seis} = 1,0$ for $V_{Rk,c}, V_{Rk,sp}$

$\alpha_{V,seis} =$ for $V_{Rk,s}$ see following Tables

α_{gap} = see following Tables

α_{seis} = see following Tables



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Performance data - concrete (Seismic C1+C2)

Reduction factors $\alpha_{N,\text{seis}}$, $\alpha_{V,\text{seis}}$, α_{gap} and α_{seis}

Anchor size threaded rod ¹⁾			M8	M10	M12	M16	M20	M24	M27	M30
Tension load										
Steel failure ($N_{Rk,s}$)	$\alpha_{N,\text{seis}}$	[\cdot]								1,0
Combined pull-out and concrete failure ($N_{Rk,p}$)	$\alpha_{N,\text{seis},C1}$	[\cdot]								1,0
	$\alpha_{N,\text{seis},C2}$	[\cdot]	NPD	0,48						NPD
Shear load										
Steel failure without lever arm ($V_{Rk,s}$)	$\alpha_{V,\text{seis},C1}$	[\cdot]								0,70
	$\alpha_{V,\text{seis},C2}$	[\cdot]	NPD	0,80						NPD

Anchor size rebar ¹⁾			$\varnothing 8$	$\varnothing 10$	$\varnothing 12$	$\varnothing 14$	$\varnothing 16$	$\varnothing 20$	$\varnothing 25$	$\varnothing 28$	$\varnothing 32$
Tension load											
Steel failure ($N_{Rk,s}$)	$\alpha_{N,\text{seis}}$	[\cdot]									1,0
Combined pull-out and concrete failure ($N_{Rk,p}$)	$\alpha_{N,\text{seis},C1}$	[\cdot]									1,0
Shear load											
Steel failure without lever arm ($V_{Rk,s}$)	$\alpha_{V,\text{seis}}$	[\cdot]									0,70

Loading	Failure modes	α_{gap}	$\alpha_{\text{seis}} - \text{Single fastener}$	$\alpha_{\text{seis}} - \text{Fastener group}$
Tension	Steel failure	1,0	1,0	1,0
	Pull-out failure	1,0	1,0	0,85
	Combined pull-out and concrete failure	1,0	1,0	0,85
	Concrete cone failure	1,0	0,85	0,75
	Splitting failure	1,0	1,0	0,85
Shear	Steel failure without lever arm	0,5 ¹⁾	1,0	0,85
	Steel failure with lever arm	NPD ²⁾	NPD ²⁾	NPD ²⁾
	Concrete edge failure	0,5 ¹⁾	1,0	0,85
	Concrete pry-out failure	0,5 ¹⁾	0,85	0,75

1) The limitation for size of the clearance hole is $d1 + 1\text{mm}$,

$\alpha_{\text{gap}} = 1,0$ in case of no clearance between fastener and fixture by filling gap completely with mortar

2) No Performance Determined



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Recommended loads - concrete (Threaded rod)

The recommended loads are only valid for single anchor for a roughly design, if the following conditions are valid:

$$c \geq 1,5 \times h_{\text{ef}} \quad s \geq 3,0 \times h_{\text{ef}} \quad h \geq 2 \times h_{\text{ef}}$$

If the conditions are not fulfilled the loads must be calculated acc. to EOTA Technical Report TR 029.

The safety factors are already included in the recommended loads.

Anchor size (Steel quality 5.8) ¹⁾					M8	M10	M12	M16	M20	M24	M27	M30		
Recommended tension load	80°C/50°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	13,8	19,5	27,7	33,6	44,4	61,0	79,2	93,9		
		cracked concrete	N _{Rec,stat}		4,7	7,5	12,3	20,0	31,7	43,5	56,5	66,9		
			N _{Rec,seis,C1}		4,7	7,5	12,3	17,0	26,9	37,0	48,0	56,9		
			N _{Rec,seis,C2}		NPD		5,9	NPD						
	120°C/72°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	12,9	17,9	27,6	33,6	44,4	61,0	79,2	93,9		
		cracked concrete	N _{Rec,stat}		3,9	6,4	10,7	18,7	31,7	43,5	56,5	66,9		
			N _{Rec,seis,C1}		3,9	6,4	10,7	17,0	26,9	37,0	48,0	56,9		
			N _{Rec,seis,C2}		NPD		5,1	NPD						
	160°C/100°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	10,3	15,3	21,7	29,9	40,3	56,5	75,7	93,9		
		cracked concrete	N _{Rec,stat}		3,6	5,9	9,9	16,2	27,6	40,8	54,7	66,9		
			N _{Rec,seis,C1}		3,6	5,9	9,9	16,2	26,9	37,0	48,0	56,9		
			N _{Rec,seis,C2}		NPD		4,1	NPD						
Recommended shear load without leaver arm ¹⁾		uncracked concrete	V _{Rec,stat}	[kN]	8,6	13,1	19,4	24,7	40,5	57,0	75,3	90,5		
		cracked concrete	V _{Rec,stat}		8,1	10,0	13,9	17,5	28,7	40,4	53,3	64,1		
			V _{Rec,seis,C1} ³⁾		3,6	6,0	8,4	16,0	24,8	35,6	46,0	56,4		
			V _{Rec,seis,C2} ³⁾		NPD		9,6	NPD						
Embedment depth			h _{ef}	[mm]	80	90	110	125	170	210	250	270		
Edge distance			c _{cr,Np}	[mm]	120	135	165	188	255	315	355	395		
Axial distance			s _{cr,Np}	[mm]	2 x c _{cr,Np}									

1) Shear load with leaver arm for static load acc. TR 029, for seismic load acc. to TR 045

2) Short term temperature/ Long term temperature

N_{Rec,stat}, V_{Rec,stat} = Recommended Load under static and quasi-static action N_{Rec,seis}, V_{Rec,seis} = Recommended Load under seismic action

3) Gap between anchor rod and clearance hole of fixture must be filled with mortar; if not α_{gap} must be considered, see ETA- 19/0205.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Recommended loads - concrete (Internal threaded rod)

The recommended loads are only valid for single anchor for a roughly design, if the following conditions are valid:

$$c \geq 1,5 \times h_{\text{ef}} \quad s \geq 3,0 \times h_{\text{ef}} \quad h \geq 2 \times h_{\text{ef}}$$

If the conditions are not fulfilled the loads must be calculated acc. to EOTA Technical Report TR 029

The safety factors are already included in the recommended loads.

Anchor size (Steel quality 5.8) ¹⁾					IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20	
Recommended tension load	80°C/50°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	7,6	13,8	21,9	31,9	57,6	93,3	
		cracked concrete	N _{Rec,stat}		7,5	12,3	20,0	31,7	43,5	66,9	
	120°C/72°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	7,6	13,8	21,9	31,9	57,6	93,3	
		cracked concrete	N _{Rec,stat}		6,4	10,7	18,7	31,7	43,5	66,9	
	160°C/100°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	7,6	13,8	21,9	31,9	56,5	93,3	
		cracked concrete	N _{Rec,stat}		5,9	9,9	16,2	27,6	40,8	66,9	
Recommended shear load without leaver arm ¹⁾		uncracked concrete	V _{Rec,stat}	[kN]	4,6	8,6	13,1	19,4	34,9	56,0	
		cracked concrete	V _{Rec,stat}		4,6	8,6	13,1	19,4	34,9	56,0	
Embedment depth			h _{ef}	[mm]	90	110	125	170	210	280	
Edge distance			c _{cr,Np}	[mm]	135	165	188	255	315	395	
Axial distance			s _{cr,Np}	[mm]	² x c _{cr,Np}						

1) Shear load with leaver arm acc. TR 029.

2) Short term temperature/ Long term temperature

N_{Rec,stat}, V_{Rec,stat} = Recommended Load under static and quasi-static action



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Recommended loads - concrete (Rebar)

The recommended loads are only valid for single anchor for a roughly design, if the following conditions are valid:

$$c \geq 1,5 \times h_{ef} \quad s \geq 3,0 \times h_{ef} \quad h \geq 2 \times h_{ef}$$

If the conditions are not fulfilled the loads must be calculated acc. to EOTA Technical Report TR 029

The safety factors are already included in the recommended loads.

Anchor size (BSt 500) ¹⁾					ø8	ø10	ø12	ø14	ø16	ø20	ø25	ø28	ø32	
Recommended tension load	80°C/50°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	12,1	17,9	27,6	29,7	28,0	44,4	61,0	79,2	88,9	
		cracked concrete	N _{Rec,stat}		3,6	5,9	9,9	12,0	18,7	31,7	43,5	56,5	63,4	
			N _{Rec,seis,C1}		3,6	5,9	9,9	12,0	17,0	26,9	37,0	48,0	53,9	
	120°C/72°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	11,2	15,3	23,7	28,9	28,0	44,4	61,0	79,2	88,9	
		cracked concrete	N _{Rec,stat}		3,2	5,3	8,2	11,0	16,2	27,6	42,5	56,5	63,4	
			N _{Rec,seis,C1}		3,2	5,3	8,2	11,0	16,2	26,9	37,0	48,0	53,9	
	160°C/100°C ²⁾	uncracked concrete	N _{Rec,stat}	[kN]	8,6	12,8	18,8	22,9	23,7	38,1	58,9	78,5	88,9	
		cracked concrete	N _{Rec,stat}		2,9	4,8	7,4	10,0	13,7	25,4	39,3	48,0	63,4	
			N _{Rec,seis,C1}		2,9	4,8	7,4	10,0	13,7	25,4	37,0	48,0	53,9	
Recommended shear load without leaver arm¹⁾		uncracked concrete	V _{Rec,stat}	[kN]	6,7	10,5	14,8	20,5	26,2	41,4	60,8	80,3	91,8	
		cracked concrete	V _{Rec,stat}		6,7	10,5	14,7	16,1	18,6	30,4	43,1	56,8	65,0	
			V _{Rec,sei³⁾,_{s,C1}}		4,7	7,3	10,3	14,3	18,6	29,0	43,1	56,7	65,0	
Embedment depth			h _{ef}	[mm]	80	90	110	115	125	170	210	250	270	
Edge distance			c _{cr,Np}	[mm]	109	135	164	173	188	255	315	369	405	
Axial distance			s _{cr,Np}	[mm]	2 x c _{cr,Np}									

1) Shear load with leaver arm for static load acc. TR 029, for seismic load acc. to TR 045

2) Short term temperature/ Long term temperature

N_{Rec,stat}, V_{Rec,stat} = Recommended Load under static and quasi-static action

N_{Rec,seis}, V_{Rec,seis} = Recommended Load under seismic action

3) Gap between anchor rod and clearance hole of fixture must be filled with mortar; if not α_{gap} must be considered, see ETA- 19/0205.



TECHNICAL DATA SHEET

TILCA TIM U-H

2K Reaction resin mortar based on URETHAN HYBRID resin styrene-free

Chemical resistance

Chemical Agent	Concentration	Resistant	Not Resistant
Acetic acid	10	.	
Acetone	100		.
Ammonia, aqueous solution	5	.	
Benzyl Alcohol	100		.
Chlorinated lime	10	.	
Citric acid	10	.	
Chlorine water, swimming pool	all	.	
Demineralized Water	100	.	
Diesel oil	100	.	
Ethanol	100		.
Ethyl Acetate	100		.
Formic acid	100		.
Fuel Oil	100	.	
Gasoline (premium grade)	100	.	
Glycol (Ethylene glycol)	100		.
Hydraulic fluid	100	.	
Hydrogen peroxide	10		.
Isopropyl alcohol	100		.
Lactic acid	10	.	
Linseed oil	100	.	
Lubricating oil	100	.	
Nitric acid	10		.
Methanol	100		.
Phosphoric acid	10	.	
Potassium Hydroxide ph 13.2	100	.	
Salt (Calcium Chloride)	100	.	
Sea water, salty	100	.	
Sodium carbonate	10	.	
Sulfuric acid	10	.	

Results shown in the table are applicable to brief periods of chemical contact with full cured adhesive (e.g. temporary contact with adhesive during a spill).

