Sormat ITH EPOXe

Pure Epoxy

ITH 585 EPOXe
art. 72946

ISL + EXT EPOX(e)
art. 72914

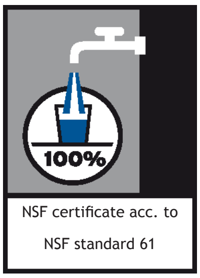
ISL EXT 200 mm
art. 72910

Application in cracked concrete

Application in non-cracked concrete

Application under seismic loading

Post-installed rebar



NSF certificate acc. to NSF standard 61

Fire test report

Content — Page

Sormat Oy
Harjutie 5
FIN-21290 Rusko, Finland
Telephone +358 (0) 207 940 200
Fax +358 (0) 201 76 3888
www.sormat.com
sormat@sormat.com

Sormat ITH EPOXe

Pure Epoxy

ETA OPTION 1 CE

Product description

The ITH EPOXe is a 2-component resin mortar based on a pure epoxy and will be delivered in an exclusive 2-C cartridge system. This high performance product may be used in combination with a hand-, battery- or pneumatic tool and a static mixer ISL EPOX(e). It was designed especially for the anchoring of threaded rods, reinforcing bars or internal threaded rod sleeves into concrete (also porous and light) as well as solid masonry. Based on the excellent standing behavior the usability in combination with a special plastic sleeve in hollow material is given. The ITH EPOXe is characterised, by a huge range of applications with an installation temperature from +5 °C and a service temperature up to 72 °C as well as by high chemical resistance for applications in extreme ambiences e.g. in swimming pools (chlorine) or closeness to the sea (salt). The wide range of certificates and approvals, allows nearly every application.

European Technical Assessment- Option 1 for cracked concrete
ETA-14/0352

European Technical Assessment- For post-installed rebar connection
ETA-14/0322

NSF Acc. standard 61

VOC

ÉMISSIONS DANS L'AIR INTÉRIEUR A+

Properties and benefits

- European Technical Assessment acc. to TR 029 in concrete Option 1+7: ETA-14/0352
  Option 1 = threaded rod M12 - M30 / rebar Ø 12 - 32
  Option 7 = threaded rod M8 - M30 / rebar Ø 8 -32
  Including also seismic anchor performance category (C1+C2)
- European Technical Assessment acc. to TR 023 (rebar): ETA-14/0322
- Certificated for drinking water applications acc. to NSF Standard 61
- For heavy anchoring - doweling and post-installed rebar connection
- Fire resistance test report
- Suitable for dynamic loads
- Hammer drilled and diamond drilled holes possible
- Overhead application; waterfilled bore holes
- Suitable for attachment points close to the edge, since anchoring is free of expansion forces
- High chemical resistance
- Low odour and VOC content (A+), LEED tested
- Cartridge can be reused up to the end of the shelf life by replacing the static mixer or resealing cartridge with the sealing cap

Sample applications

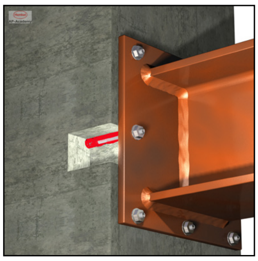
Suitable for facades, roofs, wood construction, metal construction; metal profiles, column, beam, console, railing, sanitary devices, cable trays, piping, post-installed rebar connection (reconstruction or reinforcement), etc.

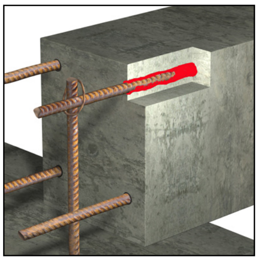
Handling and storage

- Storage:
  store in a cold and dark place, storage temperature: from +5 °C up to +35 °C
- Shelf life:
  24 months
- Expiry date marked on the cartridges
  (e.g. 123 SEP18 = September 2018)

Sormat ITH EPOXe

Pure Epoxy





Applications and intended use

- Base materials:
  cracked concrete, non-cracked concrete, light-concrete, porous-concrete, solid masonry, natural stone; hammer drilled and diamond drilled holes
- Anchor elements:
  Threaded rods (zinc plated or hdg, stainless steel and high corrosion resistant steel), reinforcing bars, internal threaded rods, profiled rods, steel section with undercuts
- Temperature range:
  +5 °C up to +40 °C installation temperature
  cartridge temperature min. +5 °C; optimal +20 °C
  -40 °C to +72 °C base material temperature after full curing
- Loading:
  static; quasi-static and seismic loading

Resin properties

Properties	Test Method	Result
UV resistance		Pass
Water tightness	DIN EN 12390-8	Pass
Temperature stability		72 °C
Viscosity (A-component)	ASTM D 2556	16600 mPas
Viscosity (B-component)	ASTM D 2556	16400 mPas
pH-value		> 12
Density		1,41 kg / dm^3
Compressive strength	EN 196 Part 1	120 N / mm^2
Flexural strength	EN 196 Part 1	42 N / mm^2
E modulus	EN 196 Part 1	10800 N / mm^2
Shrinkage		< 0,02 %
Hardness Shore D		85
Electrical resistance	IEC 93	1.2 10^{12} Ω m
Thermal conductivity	IEC 60093	0,47 W/m·K

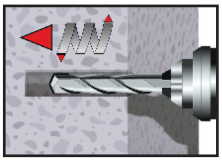
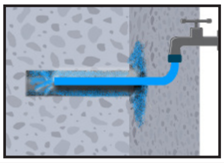
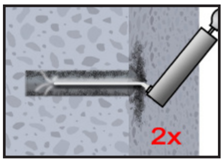
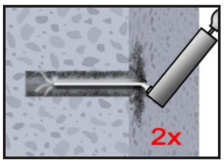
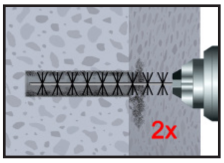
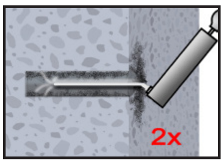
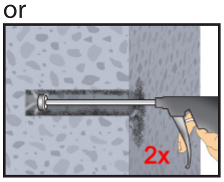
Curing times

Temperature of base material	Gel- / working time	Full curing time in dry base material	Full curing time in wet base material
+5 °C	120 min	50 h	100 h
+10 °C	90 min	30 h	60 h
+20 °C	30 min	10 h	20 h
+30 °C	20 min	6 h	12 h
+40 °C	12 min	4 h	8 h

Sormat ITH EPOXe

Pure Epoxy

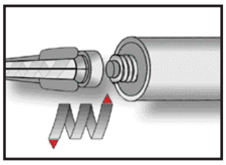
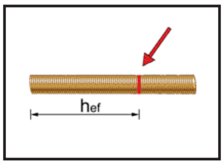
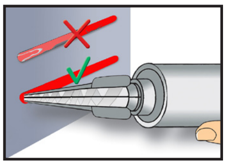
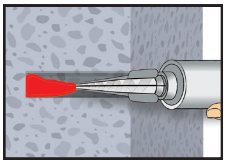
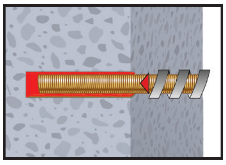
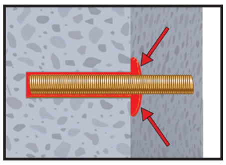
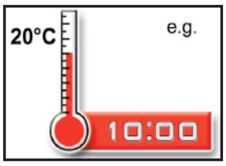
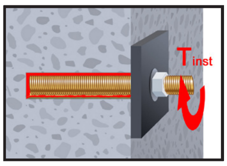
Installation instructions - concrete

	1. Drill a hole into the base material to the size and embedment depth required by the selected anchor.
	2a For diamond drilled holes rinse until clear water appears. Furthermore clean the hole with a mechanical wire brush. After that repeat the step before (rinse until clear water appears).
 or 	2b. Standing water must be removed before cleaning. Starting from the bottom resp. back of the bore hole, blow the hole clean with compressed air or a hand pump a minimum of two times. If the bore hole ground is not reached an extension shall be used. The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger then 20 mm or deeper than 240 mm, compressed air (min. 6 bar) must be used.
	2c. Check the correct brush diameter and brush the hole with an appropriate sized wire brush a minimum of two times. If the bore hole ground is not reached with the brush, a brush extension shall be used.
 or 	2d. Finally blow the hole clean again with compressed air or a hand pump a minimum of two times. If the bore hole ground is not reached an extension shall be used. The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper than 240 mm, compressed air (min. 6 bar) must be used.

Sormat ITH EPOXe

Pure Epoxy

Installation instructions - concrete

	3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For 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.
	5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes (≥ 10 cm) and discard non-uniformly mixed adhesive components until the mortar shows a consistent red color.
	6. Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment depth larger than 190 mm an extension nozzle shall be used. For overhead and horizontal installation in bore holes bigger than 20 mm a piston plug and extension nozzle 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.

Sormat ITH EPOXe

Pure Epoxy

Cleaning of the drill hole - concrete

Brush

Blower

Piston plug

Threaded rod	Rebar	Bore hole-Ø	Brush-Ø	Min. brush-Ø	Piston plug
(mm)	(mm)	(mm)	d_b (mm)	$d_{b,min}$ (mm)	(Nr.)
M 8		10,0	12,0	10,5	not necessary
M 10	8,0	12,0	14,0	12,5	
M 12	10,0	14,0	16,0	14,5	
	12,0	16,0	18,0	16,5	
M 16	14,0	18,0	20,0	18,5	
	16,0	20,0	22,0	20,5	
M 20	20,0	24,0	26,0	24,5	# 24
M 24		28,0	30,0	28,5	# 28
M 27	25,0	32,0	34,0	32,5	# 32
M 30	28,0	35,0	37,0	35,5	# 35
M 33		37,0	39,0	37,5	# 37
	32,0	40,0	41,5	40,5	# 38
M 36		42,0	44,0	42,0	# 42
M 39	36,0	46,0	48,0	46,0	# 46
	40,0	50,0	52,0	50,0	# 50

Sormat ITH EPOXe

Pure Epoxy

Installation parameters - concrete

Anchor size (threaded rod)			M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Edge distance	$C_{cr,N}$	[mm]	113	135	165	188	255	304	342	379	400	436	472
Min. edge distance	C_{min}	[mm]	40	50	60	80	100	120	135	150	165	180	195
Spacing	$S_{cr,N}$	[mm]	226	270	330	375	510	607	683	759	799	872	945
Min. spacing	S_{min}	[mm]	40	50	60	80	100	120	135	150	165	180	195
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210	250	280	320	350	380
Min. base material thickness	h_{min}	[mm]	h_{ef} + 30 mm			h_{ef} + 2d_0							
Anchor diameter	d	[mm]	8	10	12	16	20	24	27	30	33	36	39
Drill diameter	d_0	[mm]	10	12	14	18	24	28	32	35	37	42	46
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	160	180	200	350	500	700

Anchor size (rebar)			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Edge distance	$C_{cr,N}$	[mm]	97	121	139	170	180	219	274	298	330	372	413
Min. edge distance	C_{min}	[mm]	40	50	60	70	80	100	125	140	160	180	200
Spacing	$S_{cr,N}$	[mm]	194	242	277	339	360	438	548	596	661	744	826
Min. spacing	S_{min}	[mm]	40	50	60	70	80	100	125	140	160	180	200
Embedment depth	h_{ef}	[mm]	80	90	110	115	125	170	210	250	280	340	360
Min. base material thickness	h_{min}	[mm]	h_{ef} + 30 mm		h_{ef} + 2d_0								
Anchor diameter	d	[mm]	8	10	12	14	16	20	25	28	32	36	40
Drill diameter	d_0	[mm]	12	14	16	18	20	24	32	35	40	46	50

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (threaded rod)[1)]

in hammer-drilled holes

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

Anchor size[4)]				M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Steel failure														
Characteristic tension resistance, steel, zinc plated or hdg, property class 5.8		$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280	347	409	488
Characteristic tension resistance, steel, zinc plated or hdg, property class 8.8		$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449	555	654	781
Partial safety factor		$\gamma_{Ms,N}$		1,50										
Characteristic tension resistance, stainless steel A4-70 and HCR		$N_{Rk,s}$	[kN]	26	41	59	110	172	247	321	393	486	572	683
Partial safety factor		$\gamma_{Ms,N}$		1,87										
Pullout and concrete cone failure[2)]														
Characteristic bond resistance in concrete C20/25														
24 °C/40 °C[3)]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	30	42	62	88	139	190	254	317	365	435	512
24 °C/40 °C[3)]	cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	15	21	31	41	64	87	117	145	182	218	256
43 °C/60 °C[3)]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	19	27	37	53	85	119	159	198	232	277	326
43 °C/60 °C[3)]	cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	9	13	19	25	37	55	74	92	116	139	163
43 °C/72 °C[3)]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	17	24	33	47	75	111	138	172	199	238	279
43 °C/72 °C[3)]	cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	8	11	17	22	32	48	64	79	100	119	140
Partial safety factor (dry and wet)		$\gamma_{Mp} = \gamma_{Mc}$		1,8				2,1						
Embedment depth		h_{ef}	[mm]	80	90	110	125	170	210	250	280	320	350	380
Edge distance		$c_{cr,N}$	[mm]	113	135	165	188	255	304	342	379	400	436	472
Spacing		$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										
Increasing factors for concrete ψ_c				$(f_{ck}^{0,11})/1,42$										
Splitting failure														
Edge distance		$c_{cr,sp}$	[mm]	$c_{cr,N} \leq 2\,h_{ef}\,(2,5 - h/h_{ef}) \leq 2,4\,h_{ef}$										
Spacing		$s_{cr,sp}$	[mm]	$2 \times c_{cr,sp}$										
Partial safety factor (dry and wet)		γ_{Msp}		1,8				2,1						

The data in this table are intended to use together with the design provisions of ETAG Technical Report TR 029.

1) For more details, as well as values in water filled concrete see ETA-14/0352.

2) Shall be determined acc. to this table or clause 5.2.2.4, EOTA Technical Report TR 029. The smaller value is decisive.

3) Long term temperature / short 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.

4) Sizes M8 and M10 are covered by ETA only in non-cracked concrete. Sizes M33 up to M39 are not covered by ETA's.

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (threaded rod)

in diamond-drilled holes

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

Anchor size			M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Steel failure													
Characteristic tension resistance, steel, zinc plated or hdg, property class 5.8	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280	347	409	488
Characteristic tension resistance, steel, zinc plated or hdg, property class 8.8	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449	555	654	781
Partial safety factor	$\gamma_{Ms,N}$		1,50										
Characteristic tension resistance, stainless steel A4-70 and HCR	$N_{Rk,s}$	[kN]	26	41	59	110	172	247	321	393	486	572	683
Partial safety factor	$\gamma_{Ms,N}$		1,87										
Pullout and concrete cone failure [2]													
Characteristic bond resistance in concrete C20/25													
24 °C/40 °C [3], non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	22	31	41	63	101	143	191	224	282	336	372
43 °C/60 °C [3], non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	14	20	27	38	64	87	117	132	166	198	233
43 °C/72 °C [3], non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	13	17	25	35	53	79	106	119	149	178	210
Partial safety factor (dry and wet)	$\gamma_{Mp} = \gamma_{Mc}$		1,5		1,8								
Embedment depth	h_{ef}	[mm]	80	90	110	125	170	210	250	280	320	350	380
Edge distance	$c_{cr,N}$	[mm]	113	135	165	188	255	304	342	379	400	436	472
Spacing	$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										
Increasing factors for concrete ψ_c			$(f_{ck}^{0,11})/1,42$										
Splitting failure													
Edge distance	$c_{cr,sp}$	[mm]	$c_{cr,N} \leq 2\,h_{ef}\,(2,5 - h/h_{ef}) \leq 2,4\,h_{ef}$										
Spacing	$s_{cr,sp}$	[mm]	$2 \times c_{cr,sp}$										
Partial safety factor (dry and wet)	γ_{Msp}		1,8				2,1						

The data in this table are intended to use together with the design provisions of ETAG Technical Report TR 029.

[2] Shall be determined acc. to this table or clause 5.2.2.4, EOTA Technical Report TR 029. The smaller value is decisive.

[3] Long term temperature / short 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.

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (threaded rod) 1)

in hammer and diamond-drilled holes

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

Anchor size 1)			M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Steel failure without lever arm													
Characteristic shear resistance, steel, zinc plated or hdg, property class 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140	174	205	244
Characteristic shear resistance, steel, zinc plated or hdg, property class 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224	278	327	390
Partial safety factor	$\gamma_{Ms,V}$		1,25										
Characteristic shear resistance, stainless steel A4-70 and HCR	$V_{Rk,s}$	[kN]	13	20	30	55	86	124	161	196	243	286	342
Partial safety factor	$\gamma_{Ms,V}$		1,56										
Steel failure with lever arm													
Characteristic bending moment, steel, zinc plated or hdg, property class 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	560	833	1123	1547	1976	2580
Characteristic bending moment, steel, zinc plated or hdg, property class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	896	1333	1797	2476	3162	4129
Partial safety factor	$\gamma_{Ms,V}$		1,25										
Characteristic bending moment, stainless steel A4-70 and HCR	$M^0_{Rk,s}$	[Nm]	26	52	92	232	454	784	1165	1574	2166	2767	3613
Partial safety factor	$\gamma_{Ms,V}$		1,56										
Concrete pry-out failure													
Factor k			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 used together with the design provisions of EOTA Technical Report TR 029.

1) Sizes M33 up to M39 are not covered by ETA's.

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (rebar) [1)]

in hammer-drilled holes

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

Anchor size [5)]				Ø 8	Ø 10	Ø12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Steel failure														
Characteristic tension resistance, BSt 500 S acc. DIN 488-2:1986 or E DIN 488-2:2006 [2)]		$N_{Rk,s}$	[kN]	28	43	62	85	111	173	270	339	442	560	691
Partial safety factor		$\gamma_{Ms,N}$		1,40										
Pullout and concrete cone failure [3)]														
Characteristic bond resistance in concrete C20/25														
24 °C/40 °C [4)]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$ [5)]	[kN]	28	40	54	66	75	128	181	242	310	423	498
	cracked concrete			15	21	31	35	41	64	91	121	155	211	249
43 °C/60 °C [4)]	non-cracked concrete			17	24	33	40	47	75	115	143	183	250	294
	cracked concrete			9	13	19	20	25	37	58	77	99	135	158
43 °C/72 °C [4)]	non-cracked concrete			15	21	31	35	44	69	99	132	169	231	271
	cracked concrete			8	11	17	18	22	32	49	66	84	115	136
Partial safety factor (dry and wet)		$\gamma_{Mp} = \gamma_{Mc}$		1,8					2,1					
Embedment depth		h_{ef}	[mm]	80	90	110	115	125	170	210	250	280	340	360
Edge distance		$c_{cr,N}$	[mm]	109	135	158	184	188	253	303	339	388	436	484
Spacing		$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										
Increasing factors for concrete ψ_c				$(f_{ck}^{0,11})/1,42$										
Splitting failure														
Edge distance		$c_{cr,sp}$	[mm]	$c_{cr,N} \leq 2\, h_{ef}\, (2,5 - h/h_{ef}) \leq 2,4\, h_{ef}$										
Spacing		$s_{cr,sp}$	[mm]	$2 \times c_{cr,sp}$										
Partial safety factor (dry and wet)		γ_{Msp}		1,8					2,1					

The data in this table are intended to use together with the design provisions of ETAG Technical Report TR 029.

1) For more details, as well as values in water filled concrete see ETA-14/0352.

2) For reinforcing bars which do not comply with DIN 488: the characteristic resistance $N_{Rk,s}$ shall be determined acc. to Technical Report TR 029, equation (5.1).

3) Shall be determined acc. to this table or clause 5.2.2.4, EOTA Technical Report TR 029. The smaller value is decisive.

4) Long term temperature / short 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.

5) Sizes 8 and 10 are covered by ETA only in non-cracked concrete. Sizes 36 and 40 are not covered by ETA's.

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (rebar)

in diamond-drilled holes

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

Anchor size				Ø 8	Ø 10	Ø12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
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	560	691
Partial safety factor		$\gamma_{Ms,N}$		1,40										
Pullout and concrete cone failure [3]														
Characteristic bond resistance in concrete C20/25														
24 °C/40 °C [4]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	22	31	41	51	63	101	148	187	239	327	362
43 °C/60 °C [4]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	14	20	27	33	38	64	91	121	141	192	226
43 °C/72 °C [4]	non-cracked concrete	$N_{Rk,p} = N^0_{Rk,c}$	[kN]	13	17	25	28	35	53	82	110	127	173	204
Partial safety factor (dry and wet)		$\gamma_{Mp} = \gamma_{Mc}$		1,5	1,8									
Embedment depth		h_{ef}	[mm]	80	90	110	115	125	170	210	250	280	340	360
Edge distance		$c_{cr,N}$	[mm]	97	121	139	170	180	219	274	298	330	372	413
Spacing		$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										
Increasing factors for concrete γ_c				$(f_{ck}^{0,11})/1,42$										
Splitting failure														
Edge distance		$c_{cr,sp}$	[mm]	$c_{cr,N} \leq 2\,h_{ef}\,(2,5 - h/h_{ef}) \leq 2,4\,h_{ef}$										
Spacing		$s_{cr,sp}$	[mm]	$2 \times c_{cr,sp}$										
Partial safety factor (dry and wet)		γ_{Msp}		1,8					2,1					

The data in this table are intended to use together with the design provisions of ETAG Technical Report TR 029.

[2] For reinforcing bars which do not comply with DIN 488: the characteristic resistance $N_{Rk,s}$ shall be determined acc. to Technical Report TR 029, equation (5.1).

[3] Shall be determined acc. to this table or clause 5.2.2.4, EOTA Technical Report TR 029. The smaller value is decisive.

[4] Long term temperature / short 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.

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (rebar)

in hammer and diamond-drilled holes

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

Anchor size [3]			Ø 8	Ø10	Ø12	Ø14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Steel failure without lever arm													
Characteristic shear resistance, BSt 500 S acc. to DIN 488-2:1986 or E DIN 488-2:2006 [1]	$V_{Rk,s}$	[kN]	14	22	31	42	55	86	135	169	221	280	346
Partial safety factor	$\gamma_{Ms,V}$		1,5										
Steel failure with lever arm													
Characteristic bending moment, BSt 500 S acc. DIN 488-2:1986 or E DIN 488-2:2006 [2]	$M^0_{Rk,s}$	[Nm]	33	65	112	178	265	518	1012	1422	2123	3023	4147
Partial safety factor	$\gamma_{Ms,V}$		1,5										
Concrete pry-out failure													
Factor k			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 used together with the design provisions of EOTA Technical Report TR 029.

[1] For reinforcing bars which do not comply with DIN 488: the characteristic resistance $V_{Rk,s}$ shall be determined acc. to Technical Report TR 029, equation (5.5).

[2] For reinforcing bars which do not comply with DIN 488: the characteristic resistance $M^0_{Rk,s}$ shall be determined acc. to Technical Report TR 029, equation (5.6b).

[3] Sizes 36 and 40 are not covered by ETA's.

Sormat ITH EPOXe

Pure Epoxy

Capacities - 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 ag • 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 category 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)]	$a_g \cdot S \leq 0{,}05$ g	No additional requirement			
low [b)]	0,05 g $< a_g \cdot S \leq 0{,}1$ g	C1	C1 [d)] or C2 [e)]		C2
> low [b)]	$a_g \cdot S > 0{,}1$ 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)] ag = 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: $R_{k,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot \alpha_{N,seis} \cdot R^0_k$

with $R^0_k = N_{Rk,s}, N_{Rk,p}, N_{Rk,c}, N_{Rk,sp}$ (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 tables

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

with $R^0_k = V_{Rk,s}, V_{Rk,c}, V_{Rk,cp}$ (from design in cracked concrete)
$\alpha_{V,seis}$ = 1,0 for $V_{Rk,c}, V_{Rk,cp}$
$\alpha_{V,seis}$ = for $V_{Rk,s}$ see following tables
α_{gap} = see following tables
α_{seis} = see following tables

Sormat ITH EPOXe

Pure Epoxy

Capacities - concrete (Seismic C1)

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

Anchor size threaded rod [1]			M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Tension load													
Steel failure ($N_{Rk,s}$)	$\alpha_{N,seis}$	[-]	1,0										
Combined pull-out and concrete failure ($N_{Rk,p}$)	$\alpha_{N,seis}$	[-]	0,68					0,69					
Shear load													
Steel failure without lever arm ($V_{Rk,s}$)	$\alpha_{V,seis}$	[-]	0,70										

Anchor size rebar [1]			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Tension load													
Steel failure ($N_{Rk,s}$)	$\alpha_{N,seis}$	[-]	1,0										
Combined pull-out and concrete failure ($N_{Rk,p}$)	$\alpha_{N,seis}$	[-]	0,68						0,69				
Shear load													
Steel failure without lever arm ($V_{Rk,s}$)	$\alpha_{V,seis}$	[-]	0,70										

Loading	Failure modes	α_{gap}	α_{seis} – single fastener	α_{seis} – 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 given in TR 029 Table 4.1.

α_{gap} = 1,0 in case of no clearance between fastener and fixture

[2] NPD = No Performance Determined

ITH EPOXe - PURE EPOXY 3:1

Sormat ITH EPOXe

Pure Epoxy

Recommended loads - concrete

(Threaded rod) in hammer-drilled holes

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

$c \geq c_{cr,N}$ $s \geq s_{cr,N}$ $h \geq 2 \times h_{ef}$

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 (steel quality 5.8) [1]					M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Recommended tension load	24 °C/40 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	8,6	13,8	20,0	28,0	38,1	52,3	67,9	80,5	98,3	113	127
		cracked concrete	$N_{Rec,stat}$		6,0	8,4	12,3	16,2	21,8	29,6	39,7	49,4	62,1	74,1	87,1
			$N_{Rec,seis}$		4,1	5,7	8,4	11,0	14,8	20,4	27,4	34,1	42,8	51,1	60,1
	43 °C/60 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	7,6	10,7	14,8	21,2	29,1	40,4	54,1	67,3	79,0	94,2	111
		cracked concrete	$N_{Rec,stat}$		3,6	5,0	7,4	10,0	12,7	18,8	25,2	31,4	39,5	47,1	55,4
			$N_{Rec,seis}$		2,4	3,4	5,0	6,8	8,6	13,0	17,4	21,7	27,3	32,5	38,2
	43 °C/72 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	6,8	9,5	13,2	18,7	25,4	37,7	46,9	58,3	67,7	80,8	95,0
		cracked concrete	$N_{Rec,stat}$		3,2	4,5	6,6	8,7	10,9	16,2	21,6	26,9	33,9	40,4	47,5
			$N_{Rec,seis}$		2,2	3,1	4,5	5,9	7,4	11,1	14,9	18,6	23,4	27,9	32,8
Recommended shear load without lever arm [2]		non-cracked concrete	$V_{Rec,stat}$	[kN]	5,1	8,6	12,0	22,3	34,9	50,3	65,7	80,0	88,6	102	117
		cracked concrete	$V_{Rec,stat}$		4,8	7,1	9,6	13,7	19,2	24,2	29,1	34,6	40,6	47,0	53,8
			$V_{Rec,seis}$		1,8	3,0	4,2	6,9	9,6	12,1	14,5	17,3	20,3	23,5	26,9
Embedment depth			h_{ef}	[mm]	80	90	110	125	170	210	250	280	320	350	380
Edge distance			$c_{cr,N}$	[mm]	113	135	165	188	255	304	342	379	400	436	472
Spacing			$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										

[1] Sizes M8 and M10 are covered by ETA only in non-cracked concrete. Size M33 up to M39 are not covered by ETA.

[2] Shear load with lever arm acc. TR 029.

$N_{Rec,stat}$, $V_{Rec,stat}$ = recommended load under static and quasi-static action

$N_{Rec,seis}$, $V_{Rec,seis}$ = recommended load under seismic action

Sormat ITH EPOXe

Pure Epoxy

Recommended loads - concrete

(Threaded rod) in diamond-drilled holes

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

$c \geq c_{cr,N}$ $s \geq s_{cr,N}$ $h \geq 2 \times h_{ef}$

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 (steel quality 5.8)					M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Recommended tension load	24 °C/40 °C	non-cracked concrete	N_{Rec}	[kN]	8,6	13,8	16,5	24,9	40,3	56,5	75,7	89,0	111,9	131	148
	43 °C/60 °C	non-cracked concrete	N_{Rec}	[kN]	6,7	9,4	10,7	15,0	25,4	34,6	46,3	52,4	65,8	78,5	92,4
	43 °C/72 °C	non-cracked concrete	N_{Rec}	[kN]	6,2	8,1	9,9	13,7	21,2	31,4	42,1	47,1	59,2	70,7	83,1
Recommended shear load without lever arm [1]		non-cracked concrete	V_{Rec}	[kN]	5,1	8,6	12,0	22,3	34,4	45,1	55,4	63,7	75,3	87,0	95,7
Embedment depth			h_{ef}	[mm]	80	90	110	125	170	210	250	280	320	350	380
Edge distance			$c_{cr,N}$	[mm]	97	121	139	185	225	263	296	319	351	383	403
Spacing			$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										

[1] Shear load with lever arm acc. TR 029.

Sormat ITH EPOXe

Pure Epoxy

Recommended loads - concrete

(Rebar) in hammer-drilled holes

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

$c \geq c_{cr,N}$ $s \geq s_{cr,N}$ $h \geq 2 \times h_{ef}$

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]					Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Recommended tension load	24 °C/40 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	11,2	15,7	21,4	24,7	28,0	38,1	52,3	67,9	80,5	108	117
		cracked concrete	$N_{Rec,stat}$		6,0	8,4	12,3	14,0	13,9	21,8	30,9	41,1	52,7	71,9	83,6
			$N_{Rec,seis}$		4,1	5,7	8,4	9,6	9,4	15,0	21,3	28,4	36,3	49,6	58,4
	43 °C/60 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	6,8	9,5	13,2	16,1	18,7	25,4	39,3	48,6	62,2	85,0	100
		cracked concrete	$N_{Rec,stat}$		3,6	5,0	7,4	8,0	8,5	12,7	19,6	26,2	33,5	45,8	53,9
			$N_{Rec,seis}$		2,4	3,4	5,0	5,5	5,8	8,8	13,5	18,1	23,1	31,6	37,2
	43 °C/72 °C	non-cracked concrete	$N_{Rec,stat}$	[kN]	6,0	8,4	12,3	14,0	17,5	23,6	33,7	44,9	57,4	78,5	92,3
		cracked concrete	$N_{Rec,stat}$		3,2	4,5	6,6	7,0	7,5	10,9	16,8	22,4	28,7	39,2	46,2
			$N_{Rec,seis}$		2,2	3,1	4,5	4,8	5,1	7,5	11,6	15,5	19,8	27,1	31,9
Recommended shear load without lever arm [2]		non-cracked concrete	$V_{Rec,stat}$	[kN]	6,7	10,5	14,8	20,0	26,2	41,0	56,6	67,0	84,0	102	120
		cracked concrete	$V_{Rec,stat}$		4,8	7,1	9,4	11,6	13,7	19,1	25,7	30,5	38,3	46,6	55,2
			$V_{Rec,seis}$		2,3	3,5	4,7	5,8	6,9	9,5	12,8	15,3	19,2	23,3	27,6
Embedment depth			h_{ef}	[mm]	80	90	110	115	125	170	210	250	280	340	360
Edge distance			$c_{cr,N}$	[mm]	109	135	158	173	188	253	303	339	388	436	484
Spacing			$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										

[1] Sizes 8 and 10 are covered by ETA only in non-cracked concrete. Sizes 36 and 40 are not covered by ETA.

[2] Shear load with lever arm acc. TR 029.

$N_{Rec,stat}$, $V_{Rec,stat}$ = recommended load under static and quasi-static action

$N_{Rec,seis}$, $V_{Rec,seis}$ = recommended load under seismic action

Sormat ITH EPOXe

Pure Epoxy

Recommended loads - concrete

(Rebar) in diamond-drilled holes

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

$c \geq c_{cr,N}$ $s \geq s_{cr,N}$ $h \geq 2 \times h_{ef}$

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)					Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Recommended tension load	24 °C/40 °C	non-cracked concrete	N_{Rec}	[kN]	11,2	15,7	21,4	24,7	28,0	38,1	52,3	67,9	80,5	108	117
	43 °C/60 °C	non-cracked concrete	N_{Rec}	[kN]	6,8	9,5	13,2	16,1	18,7	25,4	39,3	48,6	62,2	85,0	100
	43 °C/72 °C	non-cracked concrete	N_{Rec}	[kN]	6,0	8,4	12,3	14,0	17,5	23,6	33,7	44,9	57,4	78,5	92,3
Recommended shear load without lever arm [1]		non-cracked concrete	V_{Rec}	[kN]	6,7	10,5	14,8	20,0	26,2	41,0	60,1	68,0	85	102	116
Embedment depth			h_{ef}	[mm]	80	90	110	115	125	170	210	250	280	340	360
Edge distance			$c_{cr,N}$	[mm]	97	121	139	162	185	225	274	298	341	383	413
Spacing			$s_{cr,N}$	[mm]	$2 \times c_{cr,N}$										

[1] Shear load with lever arm acc. TR 029.

Sormat ITH EPOXe

Pure Epoxy

Fire resistance

(Threaded rod) in hammer-drilled holes

Fire resistance time in combination with threaded rods (M8 to M30) made of zinc plated steel, property class 5.8 or higher as well as stainless steel A4-70.

	Fire resistance time in minutes			
Anchor size	30 max F [kN]	60 max F [kN]	90 max F [kN]	120 max F [kN]
M8	≤ 0,90	≤ 0,50	≤ 0,30	≤ 0,20
M10	≤ 3,20	≤ 1,80	≤ 1,10	≤ 0,75
M12	≤ 4,20	≤ 2,30	≤ 1,40	≤ 0,90
M16	≤ 8,25	≤ 5,30	≤ 3,80	≤ 3,00
M20	≤ 17,25	≤ 10,20	≤ 6,70	≤ 5,00
M24	≤ 24,85	≤ 14,75	≤ 9,70	≤ 7,20
M30	≤ 39,50	≤ 23,40	≤ 15,40	≤ 11,35

The special details acc. to the Test report must be observed.

Sormat ITH EPOXe

Pure Epoxy

Chemical resistance

Chemical Agent	Concentration	Resistant	Not Resistant
Acetic acid	40		•
Laitance		•	
Acetone	10		•
Ammonia, aqueous solution	5	•	
Aniline	100		•
Beer	100	•	
Chlorine	All	•	
Benzol	100		•
Boric Acid, aqueous solution		•	
Calcium carbonate, suspended in water	All	•	
Calcium chloride, suspended in water		•	
Calcium hydroxide, suspended in water		•	
Carbon tetrachloride	100	•	
Caustic soda solution	40	•	
Citric acid	All	•	
Chlorine water, swimming pool	All	•	
Diesel oil	100	•	
Ethyl alcohol, aqueous solution	50		•
Formic acid	100		•
Formaldehyde, aqueous solution	30	•	
Freon		•	
Fuel Oil		•	
Gasoline (premium grade)	100	•	
Glycol (Ethylene glycol)		•	
Hydrochloric acid (Muriatic Acid)	Conc.		•
Hydrogen peroxide	30		•
Isopropyi alcohol	100		•
Lactic acid	All		•
Linseed oil	100	•	
Lubricating oil	100	•	
Magnesium chloride, aqueous solution	All	•	
Methanol	100	•	
Motor oil (SAE 20 W-50)	100	•	
Nitric acid	10		•
Oleic acid	100	•	
Perchloroethylene	100	•	
Petroleum	100	•	
Phenol, aqueous solution	8		•
Phosphoric acid	85	•	
Phosphoric acid	10	•	
Potash lye (Potassium hydroxide, 10% and 40% solution)		•	
Potassium carbonate, aqueous solution	All	•	
Potassium chlorite, aqueous solution	All	•	
Potassium nitrate, aqueous solution	All	•	
Sea water, salty	All	•	
Sodium carbonate	All	•	
Sodium Chloride, aqueous solution	All	•	
Sodium phosphate, aqueous solution	All	•	
Sodium silicate	All	•	
Sulfuric acid	30		•
Tartaric acid	All	•	
Tetrachloroethylene	100	•	
Toluene			•
Trichloroethylene	100		•
Turpentine	100	•	

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).