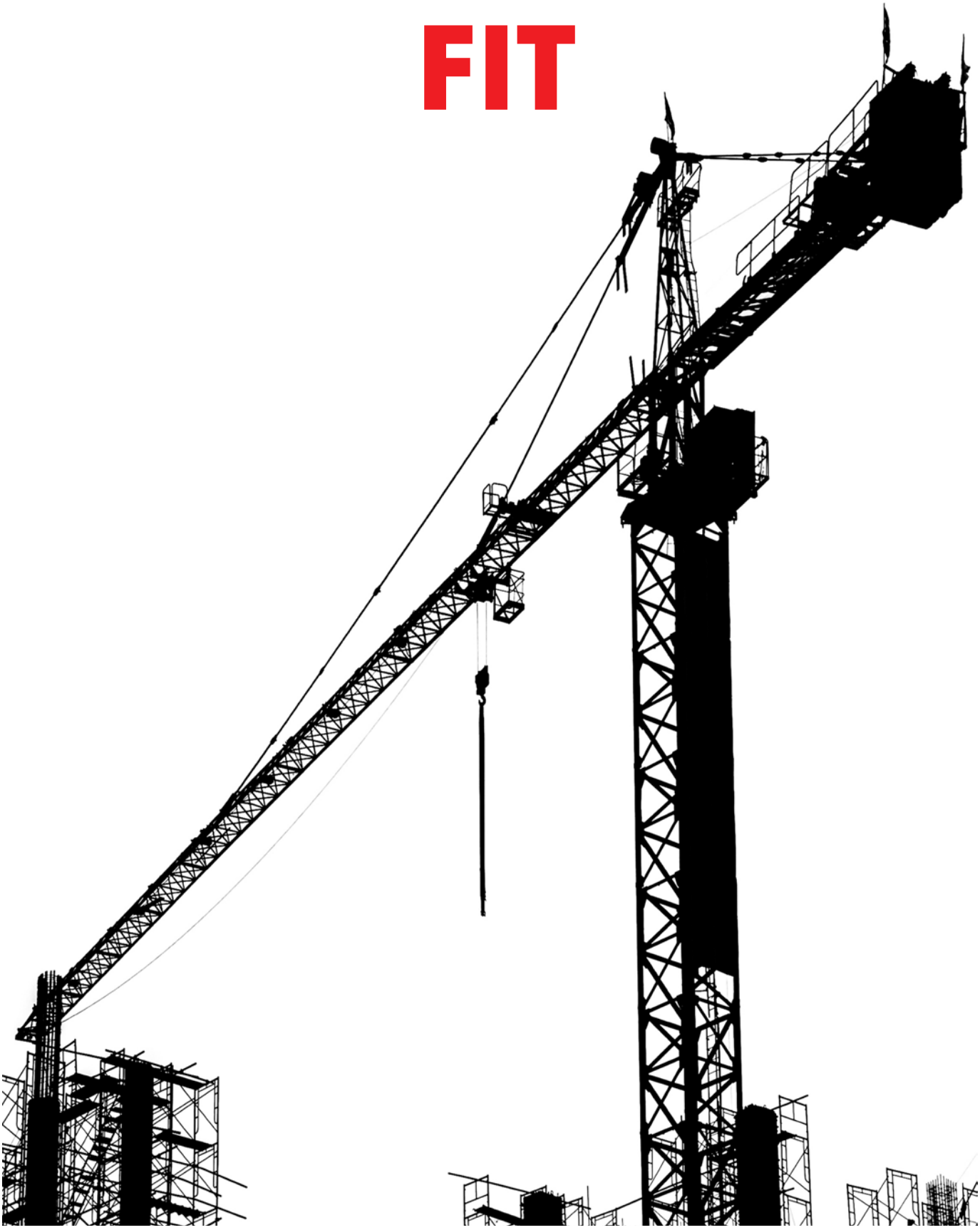
Fix master

FIT



Chemical anchor resins

Technical data sheet FIT-Ve 200 / FIT-Wi 200

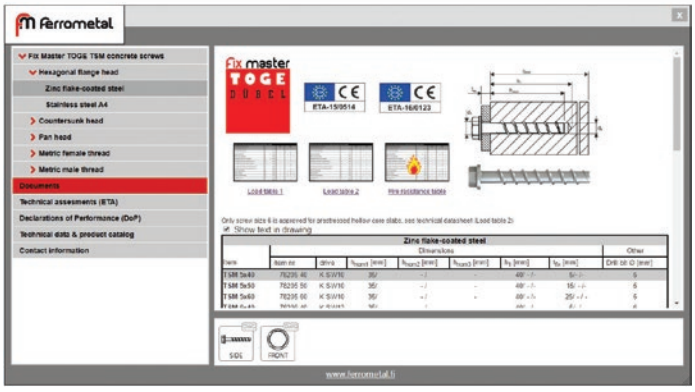
Fix master FIT

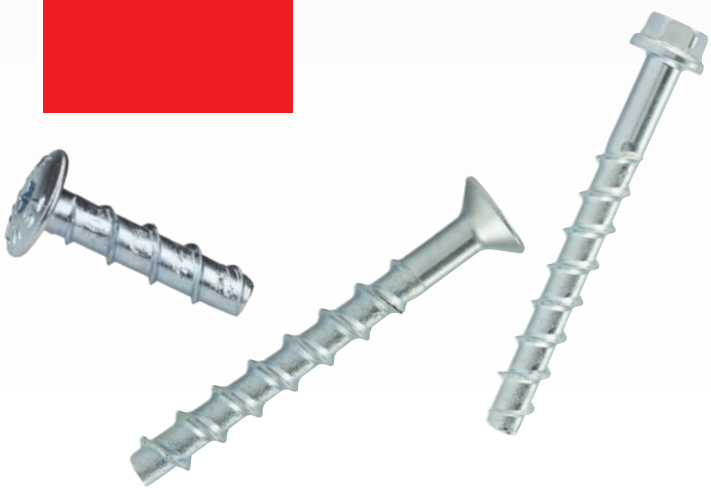
Fix master anchoring technique

Tools from design to implementation

ProdLib

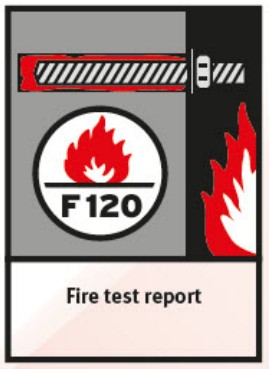
Fix master TOGE DÜBEL





Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free



Content

Technical data sheet

Ferrometal Oy
Karhutie 9
01900 Nurmijärvi
Finland
tel. +358 10 308 11
www-ferrometal.fi

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Product description

The Fix Master FIT-Ve 200 and FIT-Wi 200 are a 2-component reaction resin mortar based on a vinylester resin styrene-free and will be delivered in a 2-c cartridge (standard cartridge, foil tube cartridge) 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) as well as masonry. Based on the excellent standing behaviour the usability in combination with a special plastic sleeve in hollow material is given. The Fix master FIT mortar product is characterised, by a huge range of applications with an installation temperature from -10°C and an application temperature up to 80°C as well as by high chemical resistance for applications in extreme ambiences 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 Technical Assessment acc. to ETAG 029 for use in masonry: ETA-16/0701
- European Technical Assessment acc. to ETAG 001-5 for use concrete: ETA-08/0237
- European Technical Assessment acc. to ETAG 001-5 - TR 023 (rebar): ETA-09/0277
- US-approval acc. to AC 308 in concrete (ICC-ES): ESR-2539
- Certificated for drinking water applications acc. to NSF Standard 61
- For heavy anchoring - doweling and post-installed rebar connection
- Fire resistance test report: 3290/0966
- Overhead application; waterfilled bore holes
- 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 profils, 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 up to 25 °C (FIT-Ve 200), from -20 up to +25 °C (FIT-Wi 200)
- **Shelf life:** 18 months for cartridges, 12 months for foil tubes

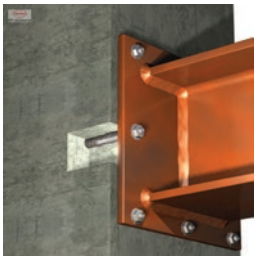
Technical data sheet

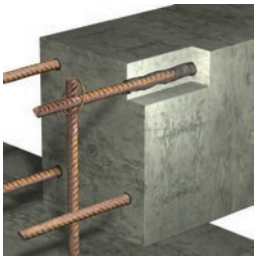
Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Applications and intended use

- **Underground:** cracked and non-cracked concrete, light-concrete, porous-concrete, solid masonry, hollow brick, 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:** -10°C up to +40°C installation temperature, cartridge temperature min. +5°C; optimal +20°C, -40°C to +120°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		120 °C
pH-value		> 12
Density		1,77 kg / dm³
Compressive strength	EN 196 Osa1	100 N / mm²
Flexural strength	EN 196 Osal1	15 N / mm²
E modulus	EN 196 Osa1	14000 N / mm²
Shrinkage		< 0,3 %
Hardness Shore D		90
Electrical resistance	IEC 93	3,6 109 Ω m
Thermal conductivity	IEC 60093	0,65 W/m·K

Technical data sheet

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Reactivity

Fix Master FIT-Ve 200			
Temperature of base material	Gelling- and working time	Full curing time in dry base material	Full curing time in wet base material
-10 °C to -6°C[1)]	90 Min.	24 h	48 h
-5 °C to -1°C	90 Min.	14 h	28 h
0 °C to +4°C	45 Min.	7 h	14 h
+5 °C to +9°C	25 Min.	2 h	4 h
+10 °C to +19°C	15 Min.	80 Min.	160 Min.
+20 °C to +29°C	6 Min.	45 Min.	90 Min.
+30 °C to +34°C	4 Min.	25 Min.	50 Min.
+35 °C to +39°C	2 Min.	20 Min.	40 Min.
+40°C	1,5 Min.	15 Min.	30 Min.
For installations in base material temperature between -10°C and -6°C the cartridge temperature must be conditioned to between +15°C and +25°C.			

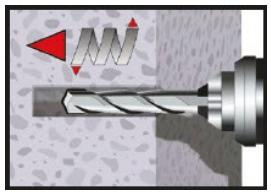
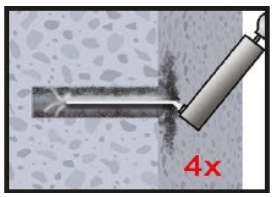
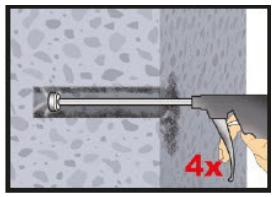
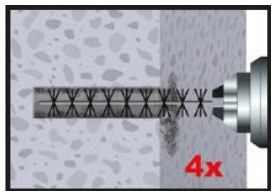
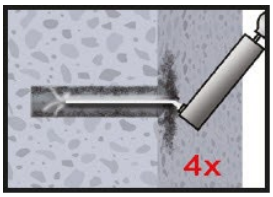
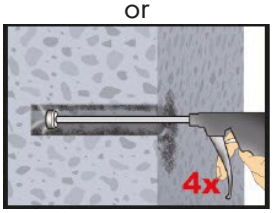
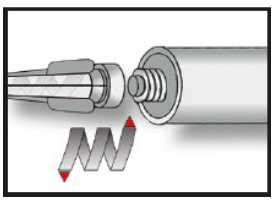
Fix Master FIT-Wi 200			
Temperature of base material	Gelling- and working time	Full curing time in dry base material	Full curing time in wet base material
-20°C - -6°C	75 Min.	24 h	48 h
-15 °C - -11°C	55 Min.	16 h	32 h
-10 °C - -6°C	35 Min.	10 h	20 h
-5 °C - -1°C	20 Min.	5 h	10 h
0 °C - +4°C	10 Min.	2,5 h	5 h
+5 °C to +29°C	6 Min.	80 Min.	160 Min.
+10 °C	6 Min.	60 Min.	120 Min.
Cartridge temperature	-20°C - +10°C		

Technical data sheet

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester 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 (see page 8). In case of aborted drill hole: the drill hole shall be filled with mortar
 tai 	**Attention! Standing water must be removed before cleaning.** **2a.** Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) or a hand pump (see page 8) a minimum of four times. If the bore hole ground is not reached an extension shall be used. The hand pump [1] can only be used in uncracked concrete either for anchor sizes up to bore hole diameter 20 mm or embedment depth up to 240mm. Compressed air (min. 6 bar) can be used for all sizes in cracked and uncracked concrete. [1] It is permitted to blow bore holes with diameter between 14mm and 20mm and an embedment depth up to 240mm also in cracked concrete with hand pump.
	**2b.** Check brush diameter (page 8) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (see page 8) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used.
 or 	**2c.** Finally blow the hole clean again with compressed air (min. 6 bar) or a hand pump a minimum of four times. If the bore hole ground is not reached an extension shall be used. The hand pump [1] can only be used in uncracked concrete either for anchor sizes up to bore hole diameter 20 mm or embedment depth up to 240mm. Compressed air (min. 6 bar) can be used for all sizes in cracked and uncracked concrete. 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. [1] It is permitted to blow bore holes with diameter between 14mm and 20mm and an embedment depth up to 240mm also in cracked concrete with hand pump.
	**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 staticmixer shall be used.

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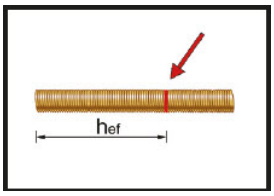
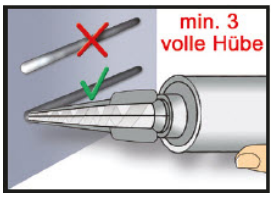
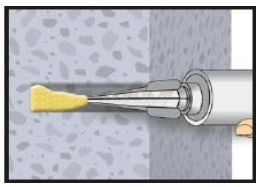
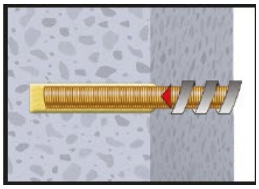
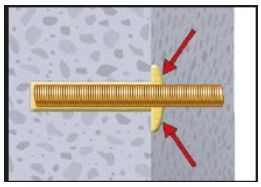
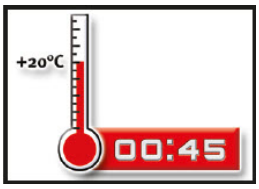
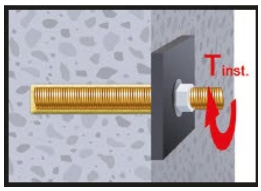
Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

	**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 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.

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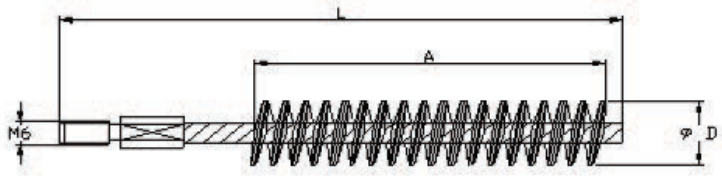
Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Cleaning of the drill hole - concrete



Brush:
⌀ 0,20 mm (A2) Steel wire
Brush length: 80 mm
M6 thread for drilling machine connection

Blower

Threaded rod (mm)	Rebar (mm)	Bore hole ∅ (mm)	Brush ∅ d_b (mm)	Min. brush ∅ $d_{b,min}$ (mm)	Piston plug (Nro)
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
	32,0	40,0	41,5	40,5	# 38

Setting parameter

Anchor size (Threaded rod)				M8	M10	M12	M16	M20	M24
Edge distance	1,0 x h_{ef}	$C_{cr,N}$	[mm]	80	90	110	125	170	210
Min. edge distance	5,0 x d	C_{min}	[mm]	40	50	60	80	100	120
Axial distance	2,0 x h_{ef}	$S_{cr,N}$	[mm]	160	180	220	250	340	420
Min. axial distance	5,0 x d	S_{min}	[mm]	40	50	60	80	100	120
Embedment depth		h_{ef}	[mm]	80	90	110	125	170	210
Min. part thickness		h_{min}	[mm]	h_{ef} + 30 mm			h_{ef} + 2d_0		
Anchor diameter		d	[mm]	8	10	12	16	20	24
Drill diameter		d_0	[mm]	10	12	14	18	24	28
Max. installation torque		$T_{inst.}$	[Nm]	10	20	40	60	120	150

Technical data sheet

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Setting parameters - concrete

Anchor size (Threaded rod)				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Edge distance		$C_{cr\ N}$	[mm]	92	126	152	188	253	291	312	329
Min. edge distance	5,0 x d	C_{min}	[mm]	40	50	60	80	100	120	135	150
Axial distance		$S_{cr\ N}$	[mm]	184	252	304	376	506	582	624	658
Min. axial distance	5,0 x d	S_{min}	[mm]	40	50	60	80	100	120	135	150
Embedment depth		h_{ef}	[mm]	80	90	110	125	170	210	250	270
Min. part thickness		h_{min}	[mm]	h_{ef} + 30 mm			h_{ef} + $2d_0$				
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
Max. installation torque		$T_{inst.}$	[Nm]	10	20	40	60	120	150	200	250

Anchor size (Rebar)				**8**	**10**	**12**	**14**	**16**	**20**	**25**	**28**	**32**
Edge distance		$C_{cr\ N}$	[mm]	92	126	152	173	188	253	303	323	341
Min. edge distance	5,0 x d	C_{min}	[mm]	40	50	60	70	80	100	125	140	160
Axial distance		$S_{cr\ N}$	[mm]	184	252	304	346	376	506	606	646	682
Min. axial distance	5,0 x d	S_{min}	[mm]	40	50	60	70	80	100	125	140	160
Embedment depth		h_{ef}	[mm]	80	90	110	115	125	170	210	250	270
Min. part 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
Drill diameter		d_0	[mm]	12	14	16	18	20	24	32	35	40
Max. installation torque		$T_{inst.}$	[Nm]	10	20	40	50	60	120	150	200	250

Technical data sheet

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester 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		$N_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
Partial safety factor		$\gamma_{Ms,N}$		2,0							
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 5.8		$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280
Characteristic tension resistance, Steel, zinc plated or hot dip, property class 8.8		$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449
Partial safety factor		$\gamma_{Ms,N}$		1,5							
Characteristic tension resistance, Stainless steel A4 and HCR		$N_{Rk,s}$	[kN]	26	41	59	110	171	247	230	281
Partial safety factor		$\gamma_{Ms,N}$		1,87						2,86	
Pullout and concrete cone failure [2)]											
Characteristic bond resistance in concrete C20/25											
40/24°C [3)]	uncracked concrete	$N_{Rk,p}=N_{0\ Rk,c}$	[kN]	20,1	33,9	49,7	75,4	128	174	212	229
	cracked concrete			8,0	14,1	22,8	34,6	58,7	87,1	138	165
80/50°C [3)]	uncracked concrete			15,1	25,4	37,3	56,5	96,1	135	159	165
	cracked concrete			5,0	9,9	16,6	25,1	42,7	63,3	95,4	115
120/72°C [3)]	uncracked concrete			11,1	18,4	27,0	40,8	69,4	103	117	127
	cracked concrete			4,0	7,1	12,4	18,8	32,0	47,5	74,2	89,1
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$		1,5				1,8			
Embedment depth		h_{ef}	[mm]	80	90	110	125	170	210	250	270
Edge distance		$c_{cr,N}$	[mm]	92	126	152	188	253	291	312	329
Axial distance		$s_{cr,N}$	[mm]	2 x $c_{cr,N}$							
Increasing factors for concrete y_c				$(f_{ck0,11})/1,42$							
Splitting failure											
Edge distance		$c_{cr,sp}$	[mm]	$c_{cr,N}$ O 2 h_{ef} (2,5 - h/h_{ef}) O 2,4 h_{ef}							
Axial distance		$s_{cr,sp}$	[mm]	2 x $c_{cr,sp}$							
Partial safety factor		γ_{Msp}		1,5				1,8			

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

1) For more details, as well as values in water filled concrete see ETA 17 / 0444.
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

Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester 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	$V_{Rk,s}$	[kN]	7	12	17	31	49	71	92	112
Partial safety factor	$_{\gamma}Ms, V$		1,67							
Characteristic shear resistance, Steel, zinc plated or hot dip, property class 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
Partial safety factor	$_{\gamma}Ms, V$		1,25							
Characteristic shear resistance, Stainless steel A4 and HCR	$V_{Rk,s}$	[kN]	13	20	30	55	86	124	115	140
Partial safety factor	$_{\gamma}Ms, V$		1,56						2,38	
Steel failure with leaver arm										
Characteristic bending moment, Steel, zinc plated or hot dip, property class 4.6	$M^0_{Rk,s}$	[kN]	15	30	52	133	260	449	666	900
Partial safety factor	$_{\gamma}Ms, V$		167							
Characteristic bending moment, Steel, zinc plated or hot dip, property class 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	$M^0_{Rk,s}$	[kN]	30	60	105	266	519	896	1333	1797
Partial safety factor	$_{\gamma}Ms, V$		1,25							
Characteristic bending moment, Stainless steel A4 and HCR	$M^0_{Rk,s}$	[kN]	26	52	92	232	454	784	832	1125
Partial safety factor	$_{\gamma}Ms, V$		1,56						2,38	
Concrete Pryout failure										
Factor k in equation (5.7) of TR 029			2							
Partial safety factor	Y_{Msp} [1)]		1,5							
Concrete edge failure										
Partial safety factor	Y_{Msp}		1,5							

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

1) For more details, as well as values in water filled concrete see ETA 17 / 0444

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Performance data - concrete (Rebar)[1)]

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

Anchor size (Rebar)				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
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		$\gamma_{Ms,N}$		1,87							2,86	
Pullout and concrete cone failure [3)]												
Characteristic bond resistance in concrete C20/25												
40 °C / 24 °C [3)]	uncracked concrete	$N_{Rk,p}=N_{0\ Rk,c}$	[kN]	20,1	33,9	49,8	60,7	75,4	128	181	220	231
	cracked concrete			8	14,1	22,8	27,8	34,6	58,7	90,7	143	176
80 °C / 50 °C [3)]	uncracked concrete			15,1	25,4	37,3	45,5	56,5	96,1	132	154	163
	cracked concrete			5	9,9	16,6	20,2	25,1	42,7	66	99	122
120/72 °C [3)]	uncracked concrete			11,1	18,4	27	32,9	40,8	69,4	99	110	122
	cracked concrete			4	7,1	12,4	15,2	18,8	32	49,5	77	95
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$		1,5	1,8							
Embedment depth		h_{ef}	[mm]	80	90	110	115	125	170	210	250	270
Edge distance		$c_{cr,N}$	[mm]	92	126	152	173	188	253	303	323	341
Axial distance		$s_{cr,N}$	[mm]	2 x $c_{cr,N}$								
Increasing factors for concrete ψ_c				$(f_{ck0,11})/1,42$								
Splitting failure												
Edge distance		$c_{cr,sp}$	[mm]	$c_{cr,N}$ O 2 h_{ef} (2,5 – h/h_{ef}) O 2,4 h_{ef}								
Axial distance		$s_{cr,sp}$	[mm]	2 x $c_{cr,sp}$								
Partial safety factor		γ_{Msp}		1,5	1,8							

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

1) For more details, as well as values in water filled concrete see ETA 17/0445.
2) For reinforcing bars which do not comply with DIN 488: The characteristic resistance NRk,s shall be determined acc. to Technical Report TR 029, equation (5.1)
3) Shall be determined acc. to this table or to TR 029. The smaller value is decisive.
4) 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.

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Performance data - concrete (Rebar)[1)]

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

Anchor size (Rebar)			ø 8	ø 10	ø 12	ø 14	ø 16	ø 20	ø 25	ø 28	ø 32
Steel failure without leaver arm											
Characteristic shear resistance, BSt 500 S acc. to DIN 488-2:1986 or E DIN 488-2:20062)2)	$V_{Rk,s}$	[kN]	14	22	31	42	55	86	135	169	221
Partial safety factor	$\gamma_{Ms,V}$		1,5								
Steel failure with leaver arm											
Characteristic bending moment, BSt 500 S acc. to DIN 488-2:1986 or E DIN 488-2:20063)3)	$M^0_{Rk,s}$	[kN]	33	65	112	178	265	518	1 012	1 422	2 123
Partial safety factor	$\gamma_{Ms,V}$		1,5								
Concrete Pryout failure											
Factor k in equation (5.7) of TR 029			2								
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 TR029.

1) For more details, as well as values in water filled concrete see ETA 17 / 0445.
2) For reinforcing bars which do not comply with DIN 488: The characteristic resistance VRk,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 M0Rk,s shall be determined acc. to Technical Report TR 029, equation (5.5b).

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Performance data - concrete (Seismic C1)

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 • S c)	I	II	III	IV
very low b)	a_g • S ≤ 0,05 g	No additional requirement			
low b)	0,05 g < a_g • S ≤ 0,1 g	C1	C1 d) tai C2 e)		C2
> low b)	a_g • 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: $R_{k,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot R^0_k$

mit $R^0_k = N_{Rk,s}$, $N_{Rk,p}$, NRk,c, $N_{Rk,sp}$ (from design in cracked concrete)
α_{gap} = see following Tables
α_{seis} = see following Tables

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

mit $R^0_k = V_{Rk,s}$, $V_{Rk,c}$, $V_{Rk,cp}$ (from design in cracked concrete)
α_{gap} = see following Tables
α_{seis} = see following Tables

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Performance data - concrete (Seismic C1)

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

Loading	Failure modes	α_{gap}	α_{seis} – single fastener	α_{seis} – fastener group
Tension	Steel failure	1	1	1
	Pull-out failure	1	1	0,85
	Combined pull-out and concrete failure	1	1	0,85
	Concrete cone failure	1	0,85	0,75
	Splitting failure	1	1	0,85
Shear	Steel failure without lever arm	0,5 1)	1	0,85
	Steel failure with lever arm	NPD 2)	NPD 2)	NPD 2)
	Concrete edge failure	0,5 1)	1	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) No Performance Determined

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Recommended loads - concrete

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

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

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 (property class 5.8)					M8	M10	M12	M16	M20	M24	M27	M30
Recommended tension load	40/24 °C 2)	uncracked concrete	$N_{Rec,stat}$	[kN]	8,6	12,8	19,7	28	44,4	61	79,2	93,9
		cracked concrete	$N_{Rec,stat}$	[kN]	3,4	5,3	9,1	13,7	23,3	34,6	54,7	66,9
			$N_{Rec,seis}$		2,2	3,3	6,2	9,3	15,9	23,8	37,7	47,1
	80/50 °C 2)	uncracked concrete	$N_{Rec,stat}$	[kN]	6,5	9,6	14,8	22,4	38,1	53,4	63,1	68,1
		cracked concrete	$N_{Rec,stat}$	[kN]	2,2	3,7	6,6	10	17	25,1	37,9	47,1
			$N_{Rec,seis}$		1,4	2,3	4,5	6,8	11,5	17,3	26,1	32,5
	120/72 °C2)	uncracked concrete	$N_{Rec,stat}$	[kN]	4,7	6,9	10,7	16,2	27,6	40,8	46,3	52,4
		cracked concrete	$N_{Rec,stat}$	[kN]	1,7	2,7	4,9	7,5	12,7	18,8	29,5	36,7
			$N_{Rec,seis}$		1,1	1,7	3,4	5,1	8,6	13	20,3	25,1
Recommended shear load without leaver arm1)		uncracked concrete	$V_{Rec,stat}$	[kN]	5,1	8,6	12	22,9	35,4	50,9	65,7	80,6
		cracked concrete	$V_{Rec,stat}$	[kN]	5,1	8,6	12	18,6	30,4	42,8	56,5	68
			$V_{Rec,seis}$ 3)		3,6	6	8,4	16	24,8	35,6	46	56,4
Embedment depth			h_{ef}	[mm]	80	90	110	125	170	210	250	270
Edge distance			$c_{cr,N}$	[mm]	92	126	152	188	253	291	312	329
Axial distance			$s_{cr,N}$	[mm]	2 x $c_{cr,N}$							

1) Shear load with leaver arm acc. TR 029, for seismic load acc. to TR 045
2) Short term temperature/ Long term temperature
3) Gap between anchor rod and clearance hole must be filled with mortar; if not α_{gap} must be considered, see ETA

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

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Fix Master FIT-Ve 200 / FIT-Wi 200

2K Reaction resin mortar based on vinylester resin styrene-free

Recommended loads - concrete

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

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

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 (B 500)					Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Recommended tension load	40/24 °C 2)	uncracked concrete	$N_{Rec,stat}$	[kN]	8,6	12,8	19,7	24,1	28	44,4	61	79,2	88,9
		cracked concrete	$N_{Rec,stat}$		3,4	5,3	9,1	11	13,7	23,3	36	56,5	63,4
			$N_{Rec,seis}$		2,2	3,3	6,2	7,5	9,3	16,1	24,8	39,1	48,3
	80/50 °C 2)	uncracked concrete	$N_{Rec,stat}$		6,5	9,6	14,8	18,1	22,4	38,1	52,4	61,1	64,6
		cracked concrete	$N_{Rec,stat}$		2,2	3,7	6,6	8	10	17	26,2	39,3	48,5
			$N_{Rec,seis}$		1,4	2,3	4,5	5,5	6,8	11,7	18,1	27,1	33,4
	120/72 °C2)	uncracked concrete	$N_{Rec,stat}$		4,7	6,9	10,7	13	16,2	27,6	39,3	43,6	48,5
		cracked concrete	$N_{Rec,stat}$		1,7	2,7	4,9	6	7,5	12,7	19,6	30,5	37,7
			$N_{Rec,seis}$		1,1	1,7	3,3	4,1	5,1	8,5	13,7	20,9	26
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	$V_{Rec,stat}$		3,4	6,4	11,8	14,5	18	30,4	43,1	56,8	65
			$V_{Rec,seis\ 3)}$		1,9	3,5	6,7	8,2	10,2	17,3	28	42,7	52,7
Embedment depth			h_{ef}	[mm]	80	90	110	115	125	170	210	250	270
Edge distance			$c_{cr,N}$	[mm]	92	126	152	173	188	253	303	323	341
Axial distance			$s_{cr,N}$	[mm]	2 x $c_{cr,N}$								

1) Shear load with leaver arm acc. TR 029, for seismic load acc. to TR 045
2) Short term temperature/ Long term temperature
3) Gap between anchor rod and clearance hole must be filled with mortar; if not α_{gap} must be considered, see ETA

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

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Fire resistance

Fire resistance times 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	**h_{ef} [mm]**	30 max F [kN]	60 max F [kN]	90 max F [kN]	120 max F [kN]
M8	≥ 90	≦ 1,65	≦ 1,12	≦ 0,59	≦ 0,33
M10	≥ 100	≦ 2,60	≦ 1,77	≦ 0,94	≦ 0,52
M12	≥ 110	≦ 3,35	≦ 2,59	≦ 1,82	≦ 1,44
M16	≥ 125	≦ 6,25	≦ 4,82	≦ 3,40	≦ 2,69
M20	≥ 170	≦ 9,75	≦ 7,52	≦ 5,30	≦ 4,19
M24	≥ 210	≦ 14,04	≦ 10,84	≦ 7,64	≦ 6,04
M30	≥ 250	≦ 18,26	≦ 14,10	≦ 9,94	≦ 7,86

The special details acc. to the Test report 3290/0966 must be observed.

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Anchorage in masonry

Fix master FIT-Ve 200 and Wi 200 can also be used for anchorages in masonry, both hollow and solid bricks. For application in hollow bricks perforated sleeves need to be used.

solid bricks			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
nominal drill hole diameter	d_0	[mm]	10	12	14	18	10	12	16
embedment depth	h_{ef}	[mm]	80	90	100	100	90	100	100
bore hole depth	h_0	[mm]	80	90	100	100	90	100	100
diameter of clearance hole in fixture	d_f	[mm]	9	12	14	18	7	9	12
diameter of steel brush	$d_b \geq$	[mm]	12	14	16	20	12	14	18

hollow and solid bricks			M8	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
perforated sleeve			12x80	16x85 16x130 16x200	16x85 16x130 16x200	20x85 20x130 20x200	20x85 20x130 20x200	16x85 16x130 16x200	20x85 20x130 20x200	20x85 20x130 20x200
nominal drill hole diameter	d_0	[mm]	12	16	16	20	20	16	20	20
embedment depth	h_{ef}	[mm]	80	85 130 200	85 130 200	85 130 200	85 130 200	85 130 200	85 130 200	85 130 200
bore hole depth	h_0	[mm]	85	90 135 205	90 135 205	90 135 205	90 135 205	90 135 205	90 135 205	90 135 205
diameter of clearance hole in fixture	d_f	[mm]	9	9	12	14	18	7	9	12
diameter of steel brush	$d_b \geq$	[mm]	14	18	18	22	22	18	22	22

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Chemical resistance

Chemical Agent	Concentration	Resistant	Not Resistant
Accumulator acid		•	
Acetic acid	40		•
Acetic acid	10	•	
Acetone	10		•
Ammonia, aqueous solution	5	•	
Aniline	100		•
Beer		•	
Benzene (kp 100-140°F)	100	•	
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	10	•	
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)		•	
Hydraulic fluid	conc.	•	
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		•

Chemical Agent	Concentration	Resistant	Not Resistant
Oleic acid	100	•	
Perchloroethylene	100	•	
Petroleum	100	•	
Phenol, aqueous solution	8		•
Phosphoric acid	85	•	
Potash lye (Potassium hydroxide)	10	•	
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	•	
Standard Benzine	100	•	
Sulfuric acid	10	•	
Sulfuric acid	70		•
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).

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