

TP VSF

Reaction Resin Mortar Based on Vinylester Styrene-Free Resin

■ Product Description



TP VSF mortar is a 2-component reaction resin mortar based on a vinylester resin styrene-free and will be delivered in a 2-c cartridge (ST - Standard cartridge; PM - Pre-Mix cartridge; SF - 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 behavior, the usability in combination with a special plastic sleeve in hollow material is given. TP VSF mortar product is characterized 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 ambiances, e.g. in swimming pools (chlorine) or in closeness to the sea (salt). The wide range of certificates, as well as national and international approvals, allows nearly every application.

Item Number	Description	Size
TP 1124-2	TP VSF Vinylester styrene free with two Ring Mixer	420ml

■ Approvals / Certificates



* Informations sur le niveau d'émission de substances volatiles dans l'air intérieur, présentant un risque de toxicité par inhalation, sur une échelle de classe allant de A+ (très faibles émissions) à C (fortes émissions).



■ Properties and Benefits

- European Technical Assessment for use in concrete: ETA-10/0354
- European Technical Assessment for post installed rebar: ETA-10/0355
- Certificated for drinking water applications acc. to NSF Standard 61
- For heavy anchoring - doweling and post-installed rebar connection
- Fire resistance test report: EBB 170019_15en
- National approval in masonry
- Overhead application; water-filled 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

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), 12 months for foil tubes (SF)

■ 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); hammer-drilled holes (hollow material shall be drilled without hammer-drilled mode)

- 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:

Installation temperature: -10°C up to +40°C

Cartridge temperature: min. +5°C; optimal +20°C

Base material temperature after full curing: -40°C to +120°C

■ Reactivity

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° C1)	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.

1) For installations in base material temperature between -10°C and -6°C, the cartridge temperature must be conditioned between +15°C and +25°C.

■ 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 / dm ³
Compressive strength	EN 196 Teil 1	100 N / mm ²
Flexural strength	EN 196 Teil 1	15 N / mm ²
E modulus	EN 196 Teil 1	14000 N / mm ²
Shrinkage	-	< 0,3%
Hardness Shore D	-	90
Electrical resistance	IEC 93	3,6 x 10 ⁹ Ω m
Thermal conductivity	IEC 60093	0,65 W/m.K

■ Setting Parameter - 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	$5,0 \times d$	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	$5,0 \times d$	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]	$h_{ef} + 30 \text{ mm}$				$h_{ef} + 2 d_o$			
Anchor diameter		d	[mm]	8	10	12	16	20	24	27	30
Drill diameter		d_o	[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)				ø8	ø10	ø12	ø14	ø16	ø20	ø25	ø28	ø32
Edge distance		$C_{cr,N}$	[mm]	92	126	152	173	188	253	303	323	341
Min. edge distance	$5,0 \times d$	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	$5,0 \times d$	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]	$h_{ef} + 30 \text{ mm}$				$h_{ef} + 2 d_o$				
Anchor diameter		d	[mm]	8	10	12	14	16	20	25	28	32
Drill diameter		d_o	[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

■ Recommended Loads - Concrete

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

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

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 (steel quality 5.8) ¹⁾				M8	M10	M12	M16	M20	M24	M27	M30	
Recommended tension load	40°C/24°C ²⁾	uncracked concrete	$N_{Rec,stat}^{3)}$	[kN]	8,6	12,8	19,7	28,0	44,4	61,0	79,2	93,9
		cracked concrete	$N_{Rec,stat}$		3,4	5,3	9,1	13,7	23,3	34,6	54,7	66,9
			$N_{Rec,seis}^{3)}$		2,2	3,3	6,2	9,3	15,9	23,8	37,7	47,1
	80°C/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	$N_{Rec,stat}$		2,2	3,7	6,6	10,0	17,0	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°C/72°C ²⁾	uncracked concrete	$N_{Rec,stat}$	[kN]	4,7	6,9	10,7	16,2	27,6	40,8	46,3	52,4
		cracked concrete	$N_{Rec,stat}$		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	13,0	20,3	25,1
Recommended shear load without lever arm ¹⁾	uncracked concrete	cracked concrete	$V_{Rec,stat}^{3)}$	[kN]	5,1	8,6	12,0	22,9	35,4	50,9	65,7	80,6
			$V_{Rec,stat}$		5,1	8,6	12,0	18,6	30,4	42,8	56,5	68,0
			$V_{Rec,seis}^{3)}$		3,6	6,0	8,4	16,0	24,8	35,6	46,0	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]	$2 \times C_{cr,N}$							

1) Shear load with lever 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

■ Recommended Loads - Concrete

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

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

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	40°C/24°C ²⁾	uncracked concrete	$N_{Rec,stat}^{3)}$	[kN]	8,6	12,8	19,7	24,1	28,0	44,4	61,0	79,2	88,9
		cracked concrete	$N_{Rec,stat}$		3,4	5,3	9,1	11,0	13,7	23,3	36,0	56,5	63,4
			$N_{Rec,seis}^{3)}$		2,2	3,3	6,2	7,5	9,3	16,1	24,8	39,1	48,3
	80°C/50°C ²⁾	uncracked concrete	$N_{Rec,stat}$	[kN]	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	8,0	10,0	17,0	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°C/72°C ²⁾	uncracked concrete	$N_{Rec,stat}$	[kN]	4,7	6,9	10,7	13,0	16,2	27,6	39,3	43,6	48,5
		cracked concrete	$N_{Rec,stat}$		1,7	2,7	4,9	6,0	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	26,0
Recommended shear load without lever arm ¹⁾	uncracked concrete	$V_{Rec,stat}^{3)}$	[kN]	8,0	12,6	17,7	22,7	26,2	42,9	60,8	80,3	91,8	
	cracked concrete	$V_{Rec,stat}$		6,9	10,6	14,7	16,1	18,6	30,4	43,1	56,8	65,0	
		$V_{Rec,seis}^{3)}$		3,7	6,7	12,4	15,1	18,6	30,4	43,1	56,8	65,0	
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]	$2 \times C_{cr,N}$									

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

2) Short term temperature/ Long term temperature

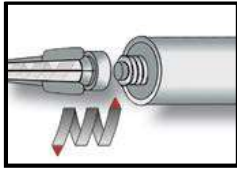
3) Gap between anchor rod and clearance hole must be filled with mortar; if not α_{gap} must be considered, see ETA

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

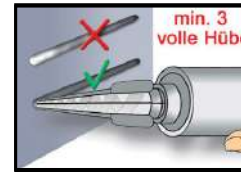
$N_{Rec,seis} + V_{Rec,seis}$ = Recommended Load under seismic action

■ Installation instructions in Masonry blocks

■ Preparation of cartridge

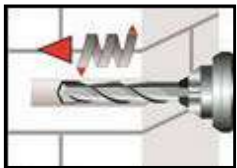


1. Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. In case of a foil tube cartridge, cut off the clip before use. For every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used.

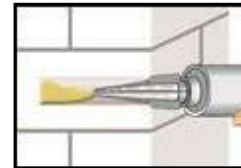


2. Initial adhesive is not suitable for fixing the anchor. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes, for foil tube cartridges six full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.

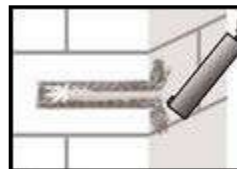
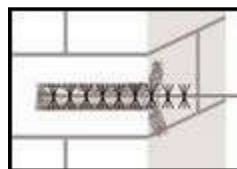
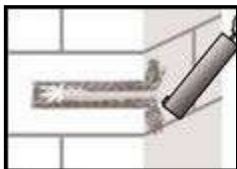
■ Installation in solid masonry (without sleeve)



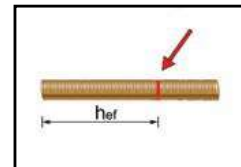
3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole into the base material, with nominal drill hole diameter and bore hole depth according to the size and embedment depth required by the selected anchor. In case of aborted drill hole the drill hole shall be filled with mortar.



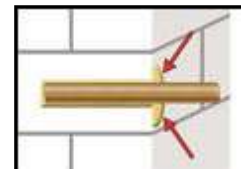
5. Starting from the bottom or the back of the cleaned anchor hole, fill the hole up to min two-thirds with adhesive. Slowly withdraw the static minxing nozzle will avoid creating air pockets. Observe the gel-/ working times.



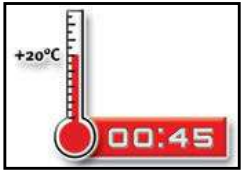
4. Blow out from the bottom of the bore hole two times. Attach the brush to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.



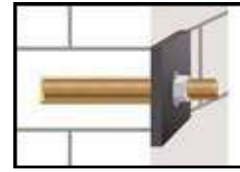
6. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



7. Be sure that the annular gap is fully filled with mortar. If no excess mortar is visible at the top of the hole, the application has to be renewed.

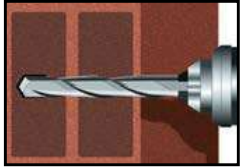


8. Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured.

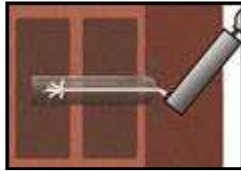
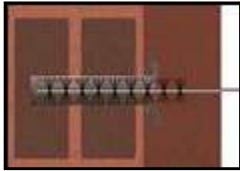
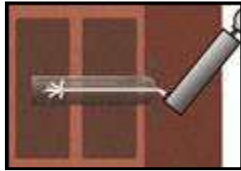
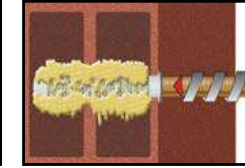
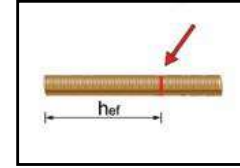


9. After full curing, the fixture can be installed with up to the max. installation torque (see parameters of brick) by using a calibrated torque wrench.

■ **Installation in solid and hollow masonry (with sleeve)**



3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, into the base material, with nominal drill hole diameter and bore hole depth according to the size and embedment depth required by the selected anchor.

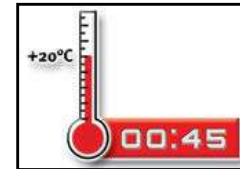


4. Blow out from the bottom of the bore hole two times. Attach the brush to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

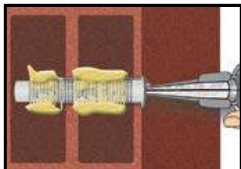
7. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



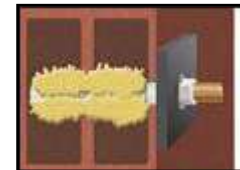
5. Insert the perforated sleeve flush with the surface of the masonry or plaster. Only use sleeves that have the right length. Never cut the sleeve.



8. Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured.



6. Starting from the bottom or back fill the sleeve with adhesive. For embedment depth equal to or larger than 130 mm an extension nozzle shall be used. For quantity of mortar attend cartridges label installation instructions. Observe the gel-/ working times.



9. After full curing, the fixture can be installed with up to the max. installation torque (see parameters of brick) by using a calibrated torque wrench.