TP E SD+

Reaction Resin Mortar Based On Pure Epoxy

Product Description

The TP E SD+ mortar is a 2-component reaction 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. It was designed
especially for the anchoring of threaded rods, reinforcing bars or internal threaded anchor rod into concrete (also porous and light).

The TP E SD+ mortar product is characterized, by a huge range of applications with an installtion temperature from +0°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, national and international approvals, allows nearly every application.

Item Number	Description	Size
TP 1155-1	TP ESD+ Pure Epoxy with one Ring Mixer + Extension	585ml

Approvals / Certificates

Certified to NSF/ANSI/CAN 61

Properties and Benefits

- European Assessment acc. to EAD 330499-01-0601 (Option 1, Annex E - TR 049, Seismic C1 and C2): ETA-21/0172
- European Assessment acc. to EAD 330499-01-0601 (Annex C - Additional provisions for working life of 100 years): ETA-21/0172
- European Assessment acc. to EAD 330087-00-0601 (rebar): ETA-21/0171
- US-approval listing acc. to AC 308 in concrete (ICC-ES): ESR-4832, ASTM C881
- Certificated for drinking water applications acc. to NSF Standard 61
- For heavy anchoring - anchoring and post-installed rebar connection
- Fire resistance Test Report 22124, tests performed acc. to DIN EN 1363-1:2012 and Technical Report 020
- Overhead application
- Suitable for attachment points with small edge- and axial distances due to an anchoring free of expansion forces
- High chemical resistance
- VOC Tests: acc. to Leed, French Décret n°2011-321;
- Less critical ingredients; future-proof for more strict REACH regulation

Free off	**Phenol (CAS#: 108-95-2)** **DETA / TETA (CAS#: 111-40-0)** **Benzyl alcohole (CAS#: 100-51-6)** **Bisphenol-A (CAS#: 80-05-7)**

- 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 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 for cartridges

Mortar Properties

Properties	Test Method	Results
Compressive strength	EN 196-1	122 N / mm^2
Flexural strength	EN 196-1	66,0 N / mm^2
Axial tensile strength	DIN EN ISO 527-2	44,2 N / mm^2
E modulus	DIN EN ISO 527-2	6.300 N / mm^2
Elongation at fracture	DIN EN ISO 527-2	1%
Degree of shrinkage	DIN 52450	≤ 1,4%
Hardness Shore A	DIN EN ISO 868	99,4
Hardness Shore D	DIN EN ISO 868	86,1
Density		≤ 1,50 kg / dm^3
Thermal conductivity	DIN EN 993-15	0,50 W/mK
Heat capacity	DIN EN 993-15	1.350 J / kg K
Electrical resistance	DIN IEC 93	8,0 10^{12} Ω

Reactivity

Concrete temperature	Gelling working time	Minimum curing time in dry concrete	Minimum curing time in wet concrete
0 °C* to +4 °C*	80 min.	122 h	244 h
+5 °C to +9 °C	80 min.	48 h	96 h
+10 °C to +14 °C	60 min.	28 h	56 h
+15 °C to +19 °C	40 min.	18 h	36 h
+20 °C to +24 °C	30 min.	12 h	24 h
+25 °C to +34 °C	12 min.	9 h	18h
+35 °C to +39 °C	8 min.	6 h	12 h
+40 °C	8 min.	4 h	8 h
Cartridge temperature	+5 °C to +40 °C		

*outside scope of ETA

Applications and Intended use

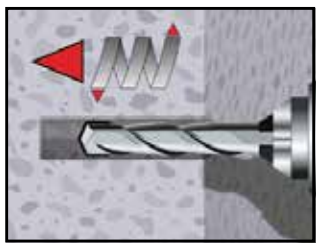
- **Base material:**
  cracked and non-cracked concrete, light-concrete, porous-concrete, natural stone (Attention!
  natural stone can discolour; shall be checked in advance)

- **Anchor elements:**
  Threaded rods (zinc plated or hot dip, stainless steel and high corrosion resistance steel),
  reinforcing bars, internal threaded rods, profiled rod, steel section with undercuts (e.g. perforated section)

- **Temperature range:**
  +5°C up to +40°C installation temperature
  cartridge temperature min. +5°C; optimal +40°C
  -40°C to +72°C base material temperature after full curing

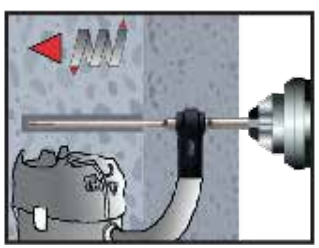
Usage Instructions - Concrete (for Threaded Rod and Rebar)

Drilling of the bore hole (HD, HDB, CD)



1a. Hammer (HD) or compressed air drilling (CD) Drill a hole into the base material to the size and embedment depth required by the selected anchor. Proceed with Step 2.

In case of aborted drill hole, the drill hole shall be filled with mortar.

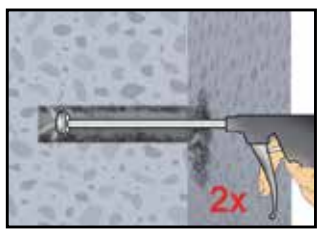


1b. Hollow drill bit system (HDB) Drill a hole into the base material to the size and embedment depth required by the selected anchor.
This drilling system removes the dust and cleans the bore hole during drilling. Proceed with Step 3.

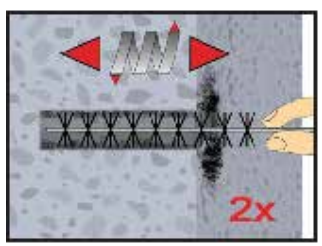
In case of aborted drill hole, the drill hole shall be filled with mortar.

Attention! Standing water in the bore hole must be removed before cleaning

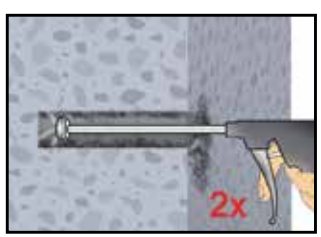
CAC: Cleaning for dry, wet and water filled bore holes with all diameter in uncracked and cracked concrete



2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticable dust. If the bore hole ground is not reached, an extension must be used.



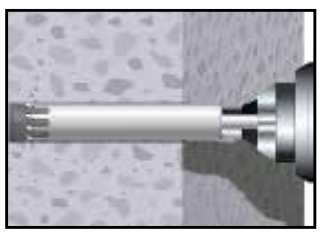
2b. Check brush diameter. Brush the hole with an appropriate sized wire brush > db,min a minimum of two times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension must be used.



2c. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticable dust. If the bore hole ground is not reached, an extension must be used.

After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispending 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.

Drilling of the bore hole (DD)

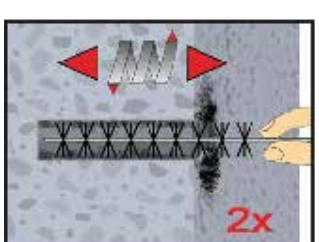


1a. Diamond drilling (DD)
Drill with diamond drill a hole into the base material to the size and embedment depth required by the selected anchor. Proceed with Step 2.

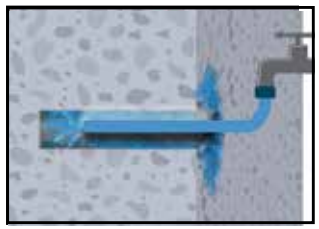
In case of aborted drill hole, the drill hole shall be filled with mortar.

SPCAC; Cleaning for dry, wet and water-filled bore holes with all diameter in uncracked concrete

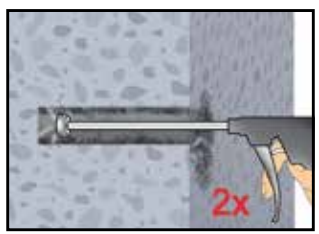
2a. Attention! Standing water in the bore hole must be removed before cleaning. Rinsing with water until clear water comes out.



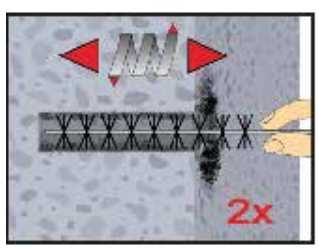
2b. Check brush diameter. Brush the hole with an appropriate sized wire brush > $d_{b,min}$ a minimum of two times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension must be used.



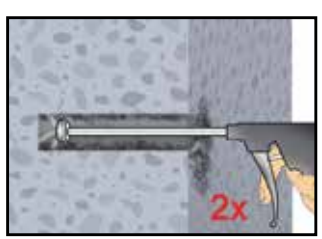
2c. Rinsing again with water until clear water comes out.



2d. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached, an extension must be used.

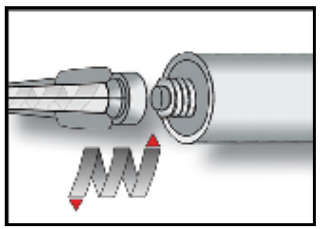


2e. Check brush diameter. Brush the hole with an appropriate sized wire brush > $d_{b,min}$ a minimum of two times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension must be used.

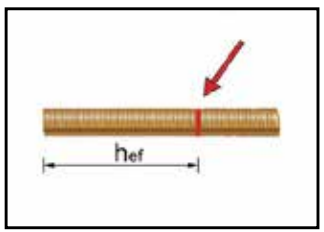


2f. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached, an extension must be used.

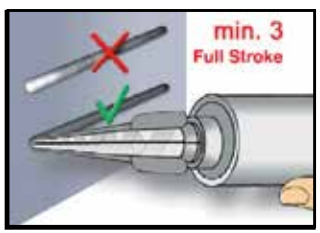
After cleaning, the bore hole has to be protected agains re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning has to be repeated directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.



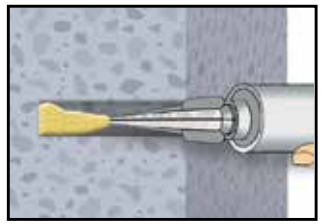
3. Attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used.



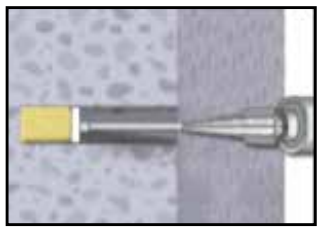
4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods.



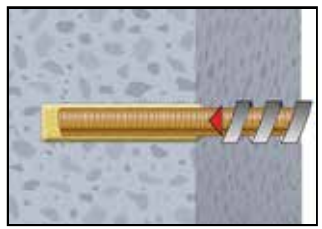
5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey or red colour.



6. Starting from the bottom or 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. If the bottom or back of the anchor hole is not reached, an appropriate extension nozzle must be used. Observe the gel-/ working times given.

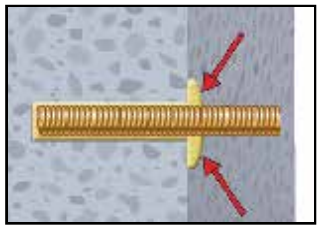


7. Piston plugs and mixer nozzle extensions shall be used for the following applications:
Horizontal assembly (horizontal direction) and ground erection (vertical downwards direction) Drill bit-Ø $d_0 \geq 18$ mm and embedment depth $h_{ef} > 250$mm
Overhead assembly (vertical upwards direction): Drill bit-Ø $d_0 \geq 18$ mm

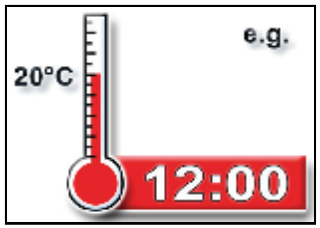


8. Push the threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

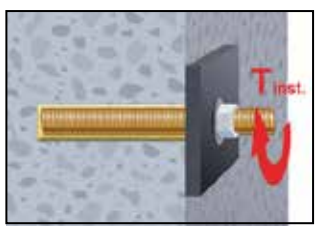
The anchor shall be free of dirt, grease, oil or other foreign material.



9. After inserting the anchor, the annular gab between anchor rod and concrete, in case of a push through installation additionally also the fixture, must be completely filled with mortar. If excess mortar is not visible at the top of the hole, the requirement is not fulfilled and the application has to be renewed. For overhead application the anchor rod shall be fixed (e.g. wedges).



10. 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.



11. After full curing, the add-on part can be installed with up to the maximum torque by using a calibrated torque wrench. In case of prepositioned installation, the annular gab between anchor and fixture can be optional filled with mortar.

Therefore substitute the washer by the filling washer and connect the mixer reduction nozzle to the tip of the mixer. The annular gap is filled with mortar, when mortar oozes out of the washer.

Setting parameter - concrete

Anchor size (threaded rod)			M8	M10	M12	M16	M20	M24	M27	M30
Diameter of element	$d=d_{nom}$	[mm]	8	10	12	16	20	24	27	30
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	22	28	30	35
Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
Diameter of clearence hole in the fixture [1]	Prepositioned instalation d_f	[mm]	9	12	14	18	22	26	30	33
	Push through instalation d_f	[mm]	12	14	16	20	24	30	33	40
Maximum torque moment	$T_{inst} \leq$	[Nm]	10	20	40 [2]	60	100	170	250	300
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm $\geq$ 100 mm			h_{ef} + $2d_0$				
Minimum spacing	S_{min}	[mm]	40	50	60	75	95	115	125	140
Minimum edge distance	C_{min}	[mm]	35	40	45	50	60	65	75	80

1) For application under seismic loading the diameter of clearance hole in the fixture shall be at maximum d1 + 1 mm or alternatively the annular gap between fixture and anchor rod shall be filled force-fit with mortar.

2) Maximum Torque moment for M12 with steel Grade 4.6 is 35 Nm

Anchor size (Rebar)			**ø 8**[1]		**ø 10**[1]		**ø 12**[1]		**ø14**	**ø16**	**ø20**	**ø 24**[1]		**ø 25**[1]		**ø28**	**ø32**
Diameter of element	$d=d_{nom}$	[mm]	8		10		12		14	16	20	24		25		28	32
Nominal drill hole diameter	d_0	[mm]	10	12	12	14	14	16	18	20	25	30	32	30	32	35	40
Effective embedment depth	$h_{ef,min}$	[mm]	60		60		70		75	80	90	96		100		112	128
	$h_{ef,max}$	[mm]	160		200		240		280	320	400	480		500		560	640
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm $\geq$ 100 mm				$h_{ef} + 2d_0$										
Minimum spacing	S_{min}	[mm]	40		50		60		70	75	95	120		120		130	150
Minimum edge distance	C_{min}	[mm]	35		40		45		50	50	60	70		70		75	85

1) both nominal drill hole diameter d_0 can be used

Recommended loads - concrete

Threaded rods

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

- $c \geq 1{,}5 \times h_{ef}$ $s \geq 3{,}0 \times h_{ef}$ $h \geq 2 \times h_{ef}$
- $\Psi_{sus} = 1{,}0$; percentage of permanent action load / total acting load $\leq \Psi_{sus}^{0}$ see table below
- Cleaning: Compressed Air Cleaning - CAC
- The recommended loads have been calculated using the partial safety factors for resistances stated in ETA(s) and with a partial safety factor for actions of $\gamma_f = 1.4$.
  The partial safety factor for seismic action is $\gamma_f = 1{,}0$.

If the conditions are not fulfilled, the loads must be calculated acc. to EN 1992-4.
For further details observe ETA-21/0172.

Recomended loads for a service life of 50 years - Steel quality 8,8 - Concrete - C20/25 - **Hammer (HD) and compressed air drilled (CD)** - Dry, wet concrete						M8	M10	M12	M16	M20	M24	M27	M30
Combined pull-out and concrete failure	40˚C/24˚C 1)	Ψ_{sus}^0 = 0.80	uncracked	$N_{Rec,stat}$	[kN]	13,8	20,0	27,0	32,7	51,9	71,3	92,6	103,9
			cracked	$N_{Rec,stat}$	[kN]	6,7	9,4	16,8	22,9	36,3	49,9	64,8	72,7
				$N_{Rec,eq,c1}$	[kN]	6,7	9,4	16,8	22,9	36,3	49,9	64,8	72,7
				$N_{Rec,eq,c2}$	[kN]	NPA	NPA	16,0	20,1	35,6	49,9	NPA	NPA
	72˚C/50˚C 1)	Ψ_{sus}^0 = 0.68	uncracked	$N_{Rec,stat}$	[kN]	13,8	20,0	27,0	32,7	51,9	71,3	92,6	103,9
			cracked	$N_{Rec,stat}$	[kN]	5,7	8,1	13,8	20,9	35,6	49,9	64,8	72,7
				$N_{Rec,eq,c1}$	[kN]	5,7	8,1	13,8	20,9	35,6	49,9	64,8	72,7
				$N_{Rec,eq,c2}$	[kN]	NPA	NPA	13,8	17,2	30,6	46,4	NPA	NPA
Shear load without lever arm 2)3)			uncracked	$V_{Rec,stat}$	[kN]	8,6	13,1	18,6	23,4	38,4	54,1	71,4	81,3
			cracked	$V_{Rec,stat}$	[kN]	7,7	9,5	13,2	16,6	27,2	38,3	50,6	57,6
				$V_{Rec,eq,c1}$	[kN]	7,7	9,5	13,2	16,6	27,2	38,3	50,6	57,6
				$V_{Rec,eq,c2}$	[kN]	NPA	NPA	13,2	16,6	27,2	38,3	NPA	n. a
Embedment depth				h_{ef}	[mm]	80	90	110	125	170	210	250	270
Edge distance				c ≥	[mm]	120	135	165	188	255	315	375	405
Axial distance				s ≥	[mm]	240	270	330	375	510	630	750	810

1) Short term temperature/ Long term temperature.

2) Shear loads are valid for the specified temperature ranges.

3) Gap between anchor rod and clearance hole of fixture must be filled with mortar; if not a_{gap} must be considered, see ETA-21/0172.

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

$N_{Rec,eq}$, $V_{Rec,eq}$ = Recommended load under seismic action

NPA = No performance assessed

Recommended loads - concrete

Rebar

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

- $c \geq 1{,}5 \times h_{ef}$ $s \geq 3{,}0 \times h_{ef}$ $h \geq 2 \times h_{ef}$
- $\Psi_{sus} = 1{,}0$; percentage of permanent action load / total acting load $\leq \Psi_{sus}^{0}$ see table below
- Cleaning: Compressed Air Cleaning - CAC
- The recommended loads have been calculated using the partial safety factors for resistances stated in ETA(s) and with a partial safety factor for actions of $\gamma_f = 1.4$.

The partial safety factor for seismic action is $\gamma_f = 1{,}0$.

If the conditions are not fulfilled, the loads must be calculated acc. to EN 1992-4.

For further details observe ETA-21/0172.

Recomended loads for a service life of 50 years - BSt 500 - Concrete - C20/25 - **Hammer (HD) & compressed air drilled (CD)** - Dry, wet concrete						ø8	ø10	ø12	ø14	ø16	ø20	ø24	ø25	ø28	ø32
Combined pull-out and concrete failure	40˚C/24˚C 1)	Ψ^0_{sus} = 0,80	uncracked	$N_{Rec,stat}$	[kN]	14,3	20,0	27,0	28,9	32,7	51,9	68,8	71,3	92,6	103,9
			cracked	$N_{Rec,stat}$	[kN]	6,7	9,4	16,8	20,2	22,9	36,3	48,1	49,9	64,8	72,7
				$N_{Rec,eq,c1}$	[kN]	6,7	9,4	16,8	20,2	22,9	36,3	48,1	49,9	64,8	NPA
				$N_{Rec,eq,c2}$	[kN]	NPA									
	72˚C/50˚C 1)	Ψ^0_{sus} = 0,68	uncracked	$N_{Rec,stat}$	[kN]	11,5	16,2	23,7	28,9	32,7	51,9	68,8	71,3	92,6	103,9
			cracked	$N_{Rec,stat}$	[kN]	5,7	8,1	13,8	16,9	20,9	35,6	48,1	49,9	64,8	72,7
				$N_{Rec,eq,c1}$	[kN]	5,7	8,1	13,8	16,9	20,9	35,6	48,1	49,9	64,8	NPA
				$N_{Rec,eq,c2}$	[kN]	NPA									
Shear load without lever arm 2)3)			uncracked	$V_{Rec,stat}$	[kN]	6,7	10,5	14,8	20,3	23,4	38,4	52,2	54,4	71,8	82,1
			cracked	$V_{Rec,stat}$	[kN]	6,7	9,5	13,2	14,4	16,6	27,2	36,9	38,5	50,8	58,2
				$V_{Rec,eq,c1}$	[kN]	6,5	9,5	13,2	14,4	16,6	27,2	36,9	38,5	50,8	58,2
				$V_{Rec,eq,c2}$	[kN]	NPA									
Embedment				h_{ef}	[mm]	80	90	110	115	125	170	205	210	250	270
Edge distance				c ≥	[mm]	120	135	165	173	188	255	308	315	375	405
Axial distance				s ≥	[mm]	240	270	330	345	375	510	615	630	750	810

1) Short term temperature/ Long term temperature.

3) Shear loads are valid for the specified temperature ranges.

4) Gap between anchor rod and clearance hole of fixture must be filled with mortar; if not a_{gap} must be considered, see ETA-21/0172.

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

$N_{Rec,eq}$, $V_{Rec,eq}$ = Recommended load under seismic action

NPA = No performance assessed