

# TP THROUGH BOLT ANCHORS

TP Mechanical Through Bolt Anchor - TP MTH - Option 7



## ■ Characteristics

- TP MTH is used in non-cracked concrete
- European Technical Approval (ETA) Option 7 for non-cracked Concrete
- It is made up of zinc plated material. Available in zinc plated & Stainless steel (A4)
- Assessed for two installation depths
- TP MTH has friction working principle. Easy to install by using a controlled torque
- Previous installation, or through the fixture
- Used for high loads, static or quasi-static loads
- TP MTH is used in dry conditions
- Available in variety of lengths and sizes, assembly flexibility. Size range M6 – M20
- DIN 440 for fixing wood structures to concrete

## ■ Application

- TP MTH is used in Structural applications in non-cracked concrete
- Uses to fix safety barriers, billboards, machinery, boilers, signals, steel beams, etc.
- Fixing wood structures in concrete

## ■ Anchor Material

No.	Designation	Material for TP MTH	Material for TP MTH-A4
1	Anchor Body	Carbon steel wire rod, electro zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2, cold forged	Stainless steel, grade A4
2	Washer	DIN 125 or DIN 9021 electro zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2	DIN 125 or DIN 9021, stainless steel grade A4
3	Nut	DIN 934 electro zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2, class 6	DIN 934, stainless steel grade A4
4	Expansion Clip	Carbon steel strip, electro zinc plated $\geq 5 \mu\text{m}$ ISO 4042 A2	Stainless steel, grade A4

## ■ TP MTH zinc plated - option 7



Item Number	Description	Size*	Approval
TP 6022	TP MTH Option 7 - Non Cracked Concrete	M6x60	ETA
TP 6023	TP MTH Option 7 - Non Cracked Concrete	M6x70	ETA
TP 6024	TP MTH Option 7 - Non Cracked Concrete	M6x80	ETA
TP 6025	TP MTH Option 7 - Non Cracked Concrete	M6x90	ETA
TP 6026	TP MTH Option 7 - Non Cracked Concrete	M6x100	ETA
TP 6027	TP MTH Option 7 - Non Cracked Concrete	M6x110	ETA
TP 6028	TP MTH Option 7 - Non Cracked Concrete	M6x120	ETA
TP 6029	TP MTH Option 7 - Non Cracked Concrete	M6x130	ETA
TP 6030	TP MTH Option 7 - Non Cracked Concrete	M6x140	ETA
TP 6031	TP MTH Option 7 - Non Cracked Concrete	M6x150	ETA
TP 6032	TP MTH Option 7 - Non Cracked Concrete	M6x160	ETA
TP 6033	TP MTH Option 7 - Non Cracked Concrete	M6x170	ETA
TP 6034	TP MTH Option 7 - Non Cracked Concrete	M6x180	ETA
TP 6036	TP MTH Option 7 - Non Cracked Concrete	M8x60	ETA
TP 6037	TP MTH Option 7 - Non Cracked Concrete	M8x75	ETA
TP 6038	TP MTH Option 7 - Non Cracked Concrete	M8x90	ETA
TP 6039	TP MTH Option 7 - Non Cracked Concrete	M8x115	ETA
TP 6040	TP MTH Option 7 - Non Cracked Concrete	M8x130	ETA
TP 6041	TP MTH Option 7 - Non Cracked Concrete	M8x155	ETA
TP 6042	TP MTH Option 7 - Non Cracked Concrete	M10x70	ETA
TP 6043	TP MTH Option 7 - Non Cracked Concrete	M10x90	ETA
TP 6044	TP MTH Option 7 - Non Cracked Concrete	M10x120	ETA
TP 6045	TP MTH Option 7 - Non Cracked Concrete	M10x150	ETA
TP 6046	TP MTH Option 7 - Non Cracked Concrete	M10x170	ETA
TP 6047	TP MTH Option 7 - Non Cracked Concrete	M10x210	ETA
TP 6048	TP MTH Option 7 - Non Cracked Concrete	M10x230	ETA
TP 6050	TP MTH Option 7 - Non Cracked Concrete	M12x90	ETA
TP 6051	TP MTH Option 7 - Non Cracked Concrete	M12x110	ETA
TP 6052	TP MTH Option 7 - Non Cracked Concrete	M12x140	ETA
TP 6053	TP MTH Option 7 - Non Cracked Concrete	M12x160	ETA
TP 6054	TP MTH Option 7 - Non Cracked Concrete	M12x180	ETA
TP 6055	TP MTH Option 7 - Non Cracked Concrete	M12x220	ETA
TP 6056	TP MTH Option 7 - Non Cracked Concrete	M12x250	ETA
TP 6059	TP MTH Option 7 - Non Cracked Concrete	M14x120	ETA
TP 6060	TP MTH Option 7 - Non Cracked Concrete	M14x145	ETA
TP 6061	TP MTH Option 7 - Non Cracked Concrete	M14x170	ETA

\*(Diameter) x (Length) - mm

## ■ TP MTH zinc plated - option 7



Item Number	Description	Size*	Approval
TP 6062	TP MTH Option 7 - Non Cracked Concrete	M14x220	ETA
TP 6063	TP MTH Option 7 - Non Cracked Concrete	M14x250	ETA
TP 6065	TP MTH Option 7 - Non Cracked Concrete	M16x125	ETA
TP 6066	TP MTH Option 7 - Non Cracked Concrete	M16x145	ETA
TP 6067	TP MTH Option 7 - Non Cracked Concrete	M16x170	ETA
TP 6068	TP MTH Option 7 - Non Cracked Concrete	M16x220	ETA
TP 6069	TP MTH Option 7 - Non Cracked Concrete	M16x250	ETA
TP 6070	TP MTH Option 7 - Non Cracked Concrete	M16x280	ETA
TP 6072	TP MTH Option 7 - Non Cracked Concrete	M20x170	ETA
TP 6073	TP MTH Option 7 - Non Cracked Concrete	M20x220	ETA
TP 6074	TP MTH Option 7 - Non Cracked Concrete	M20x270	ETA

\*(Diameter) x (Length) - mm

## ■ TP MTH-A4 - option 7 (Stainless Steel)

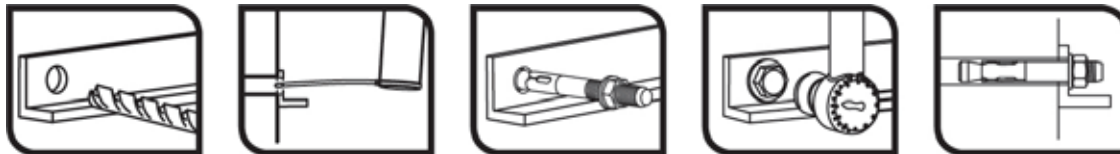


Item Number	Description	Size*	Approval
TP 6077	TP MTH-A4 Option 7 - Non Cracked Concrete	M6x45	
TP 6078	TP MTH-A4 Option 7 - Non Cracked Concrete	M6x60	ETA
TP 6079	TP MTH-A4 Option 7 - Non Cracked Concrete	M6x80	ETA
TP 6080	TP MTH-A4 Option 7 - Non Cracked Concrete	M8x50	
TP 6081	TP MTH-A4 Option 7 - Non Cracked Concrete	M8x75	ETA
TP 6082	TP MTH-A4 Option 7 - Non Cracked Concrete	M8x90	ETA
TP 6083	TP MTH-A4 Option 7 - Non Cracked Concrete	M8x115	ETA
TP 6084	TP MTH-A4 Option 7 - Non Cracked Concrete	M10x70	ETA
TP 6085	TP MTH-A4 Option 7 - Non Cracked Concrete	M10x90	ETA
TP 6086	TP MTH-A4 Option 7 - Non Cracked Concrete	M10x120	ETA
TP 6087	TP MTH-A4 Option 7 - Non Cracked Concrete	M10x150	ETA
TP 6088	TP MTH-A4 Option 7 - Non Cracked Concrete	M12x75	
TP 6089	TP MTH-A4 Option 7 - Non Cracked Concrete	M12x90	ETA
TP 6090	TP MTH-A4 Option 7 - Non Cracked Concrete	M12x110	ETA
TP 6091	TP MTH-A4 Option 7 - Non Cracked Concrete	M12x140	ETA
TP 6092	TP MTH-A4 Option 7 - Non Cracked Concrete	M16x90	
TP 6093	TP MTH-A4 Option 7 - Non Cracked Concrete	M16x145	ETA
TP 6094	TP MTH-A4 Option 7 - Non Cracked Concrete	M16x170	ETA
TP 6095	TP MTH-A4 Option 7 - Non Cracked Concrete	M20x120	
TP 6096	TP MTH-A4 Option 7 - Non Cracked Concrete	M20x170	ETA
TP 6097	TP MTH-A4 Option 7 - Non Cracked Concrete	M20x220	ETA

\*(Diameter) x (Length) - mm

## ■ Installation Procedure

- The concrete to be well compacted, e.g. without significant voids
- Base material temperatures during installation:  $-5 / + 50^{\circ}\text{C}$  ( $80^{\circ}\text{C}$  in a short period of time). Anchors to be installed ensuring not less than the specified embedment depth, the edge distance and spacing to be kept to the specified values, no minus tolerances to be allowed
- Drill to the minimum depth and diameter specified, maintaining perpendicular to the surface of the base material. Fixture holes themselves can be used as template
- When drilling holes, care to be taken not to damage reinforcement in close proximity to the hole's position. Action to be taken in the event that drilling is aborted, e.g. due to encountering reinforcement. It is recommended to either install the anchors immediately beside the aborted drill hole, provided that anchoring depth is increased by the depth of the aborted drill hole, or make a new drilling at a minimum distance away of two the depth of the aborted hole. Alternatively, a smaller distance may be chosen, provided the aborted drill hole is filled with high strength mortar. However, unless the aborted drill hole is filled with mortar, it is not permissible under a shear or oblique tension load to be closer than the installation depth  $h_{nom}$  in the direction of load application
- Thoroughly clean hole from dust and drilling fragments. For holes to be subjected to temperatures below  $0^{\circ}\text{C}$ , measures to be taken to avoid the ingress of water into the hole and subsequent risk of local cracking of the concrete due to ice expansion
- To introduce the anchor into the hole up to the embedment depth through the fixture. A hammer can be used to ensure this depth. Do not apply any intermediate layer between the fixture and the washer (sealant, etc.). Apply the specified torque with a torque wrench
- In case of fixture holes with diameters higher than specified, use washers of bigger diameter and thickness, but in this case it is not assured a correct distribution of shear loads amongst all the anchors of a same group. The shear load will be applied on those anchors with the correct diameter on the fixture

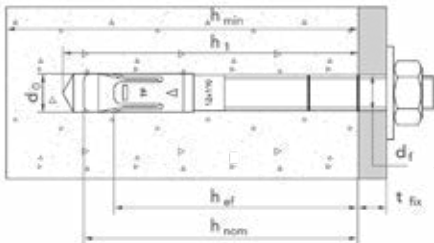


# ■ Installation Parameters

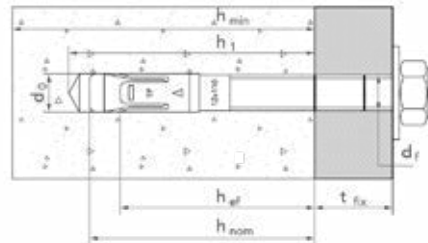


## TP MTH A4 (Stainless steel)

Item Number	General Installation Parameters					Standard installation depth/Reduced installation depth --/--				
	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete thickness	Depth of drill hole $\geq$	Installation depth	Effective anchorage depth	Thickness of fixture $\leq$
	do (mm)	df (mm)	Tinst [Nm]	Smin (mm)	Cmin (mm)	hmin (mm)	h1 (mm)	hnom (mm)	hef (mm)	tfix (mm)
TP 6077	6	7	7	50	50	--/100	--/40	--/35	--/25	-
TP 6078						100/--	55/--	49.5/--	40/--	2/-
TP 6079										22/-
TP 6080	8	9	20	65	65	--/100	--/40	--/35	--/23	-
TP 6081										5/18
TP 6082						100/100	65/50	59.5/46.5	48/35	20/33
TP 6083										45/58
TP 6084						--/100	--/60	--/53.5	--/42	-/3
TP 6085										10/23
TP 6086	10	12	35	70	70	110/100	75/60	66.5/53.5	55/42	40/53
TP 6087										70/83
TP 6088						--/100	--/60	--/55	--/43	-
TP 6089						--/100	--/70	--/62	--/50	-/13
TP 6090						130/100	85/70	77/62	65/50	18/33
TP 6091										48/63
TP 6092	16	18	120	110	110	--/100	--/75	--/69	--/49	-
TP 6093						168/--	110/--	103.5/--	84/--	23/-
TP 6094										48/-
TP 6095						--/145	--/105	--/93	--/71	-
TP 6096						20	22	240	135	135
TP 6097					73/-					



Standard embedment depth



Reduce embedment depth (M8, M10 and M12)

## ■ Installation Parameters



### TP MTH (Zinc electroplated steel)

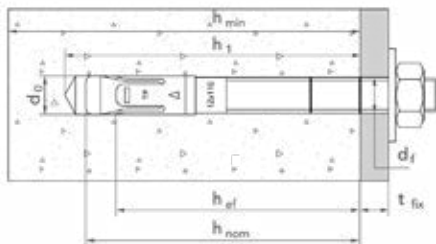
Item Number	General Installation Parameters					Standard installation depth/Reduced installation depth --/--				
	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete thickness	Depth of drill hole $\geq$	Installation depth	Effective anchorage depth	Thickness of fixture $\leq$
	do (mm)	df (mm)	Tinst [Nm]	Smin (mm)	Cmin (mm)	hmin (mm)	h1 (mm)	hnom (mm)	hef (mm)	tfix (mm)
TP 6022	6	7	7	50	50	100/--	55/--	49.5/--	40/--	2/-
TP 6023										12/-
TP 6024										22/-
TP 6025										32/-
TP 6026										42/-
TP 6027										52/-
TP 6028										62/-
TP 6029										72/-
TP 6030										82/-
TP 6031										92/-
TP 6032	102/-									
TP 6033	112/-									
TP 6034	122/-									
TP 6036	8	9	20	65	65	100/100	65/50	59.5/46.5	48/35	-/3
TP 6037										5/18
TP 6038										20/33
TP 6039										45/58
TP 6040										60/73
TP 6041										85/98
TP 6042										-/3
TP 6043										10/23
TP 6044	40/53									
TP 6045	10	12	35	70	70	110/100	75/60	66.5/53.5	55/42	70/83
TP 6046										90/103
TP 6047										130/143
TP 6048										150/163

# ■ Installation Parameters

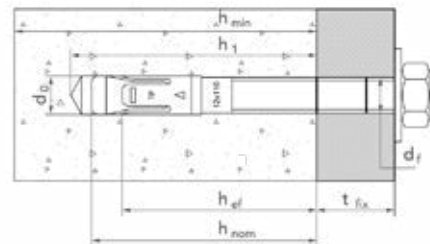


## TP MTH (Zinc electroplated steel)

Item Number	General Installation Parameters					Standard installation depth/Reduced installation depth --/--				
	Drill bit diameter	Fixture clearance hole	Torque	Minimum allowable spacing	Minimum allowable edge distance	Minimum concrete thickness	Depth of drill hole $\geq$	Installation depth	Effective anchorage depth	Thickness of fixture $\leq$
	$d_o$ (mm)	$d_f$ (mm)	$T_{inst}$ [Nm]	$S_{min}$ (mm)	$C_{min}$ (mm)	$h_{min}$ (mm)	$h_1$ (mm)	$h_{nom}$ (mm)	$h_{ef}$ (mm)	$t_{fix}$ (mm)
TP 6050	12	14	60	85	85	130/100	85/70	77/62	65/50	-/13
TP 6051										18/33
TP 6052										48/63
TP 6053										68/83
TP 6054										88/103
TP 6055										128/143
TP 6056										158/173
TP 6059										12/-
TP 6060										37/-
TP 6061	14	16	90	100	100	150/--	100/--	91/--	75/--	62/-
TP 6062										112/-
TP 6063										142/-
TP 6065	16	18	120	110	110	168/--	110/--	103.5/--	84/--	3/-
TP 6066										23/-
TP 6067										48/-
TP 6068										98/-
TP 6069										128/-
TP 6070										158/-
TP 6072	20	22	240	135	135	206/--	135/--	125/--	103/--	23/-
TP 6073										73/-
TP 6074										123/-



Standard embedment depth



Reduce embedment depth (M8, M10 and M12)

## ■ Characteristic Resistance

Characteristic resistances\* in concrete C20/25\*\* for an isolated anchor (without spacing and edge distances effects)

Characteristic Resistance			M6	M8	M10	M12	M14	M16	M20	
TP MTH										
Zinc plated steel	Standard	Tension $N_{R,k}$	KN	<u>7.7</u>	12.0	16.0	25.0	30.0	35.0	50.0
		Shear $V_{R,k}$	KN	<u>5.1</u>	<u>9.3</u>	<u>14.7</u>	<u>20.6</u>	<u>28.1</u>	<u>38.4</u>	<u>56.3</u>
	Reduced	Tension $N_{R,k}$	KN	-	9.0	12.0	16.0	-	-	-
		Shear $V_{R,k}$	KN	-	10.4	13.7	17.8	-	-	-
TP MTH-A4										
Stainless steel, grade A4	Standard	Tension $N_{R,k}$	KN	<u>10.1</u>	<u>12.0</u>	16.0	25.0	-	35.0	50.0
		Shear $V_{R,k}$	KN	<u>6.0</u>	<u>10.9</u>	<u>17.4</u>	<u>25.2</u>	-	<u>47.1</u>	<u>73.5</u>
	Reduced	Tension $N_{R,k}$	KN	-	9.0	12.0	16.0	-	-	-
		Shear $V_{R,k}$	KN	-	10.4	13.7	17.8	-	-	-

\* The characteristic resistance of an anchor that has a 95% probability to be achieved in a tension test. It depends on the mean ultimate resistance, the number of tests and the scatter of the results.

\*\* Concrete C20/25 per ENV206: characteristic resistance for a specimen  $\geq 28$  days old:

Cylindrical sample  $\phi 150$  mm x 300 height  $\geq 20$  N/mm<sup>2</sup>  
Cubic sample 150 mm side  $\geq 25$  N/mm<sup>2</sup>

Underlined values correspond to steel failure.

Characteristic resistance for tension and shear must be considered separately.

## ■ Recommended Safety Factor

Characteristic Resistance		Resistance safety coefficients		Load increase safety coefficient
		Concrete failure	Steel failure	
Zinc plated steel	Tension	1.8	1.4	1.4
	Shear	1.5	1.25	
Stainless steel, grade A4	Tension	1.8	1.68	

## ■ Calculation example

Fixing a load tension of 2,000 kg  $\approx 20$  KN.  
Using two MTH M14 anchors

Increasing coefficient for loads: 1.4  
Pull load characteristic resistance for standard depth MTH M14 anchor: 30.0 KN  
Concrete reduction for resistances coefficient: 1.8

**Verification:** Increased load  $\leq$  reduced resistance = 20 KN  $\times$  1.4  $\leq$  2  $\times$  30.0 KN / 1.8 = 28KN  $\leq$  33.3KN

**Result:** The fixing is safe.



## ■ Recommended Load

			Standard Depth						Reduced Embedment Depth			
			M6	M8	M10	M12	M14	M16	M20	M8	M10	M12
Tension	Steel Failure	Characteristic (KN)	7.70	16.40	25.60	35.40	51.70	65.00	104.40	16.40	25.60	35.40
		gamma s	1.40	1.40	1.40	1.43	1.43	1.43	1.47	1.40	1.40	1.43
		Design (KN)	5.50	11.71	18.29	24.76	36.15	45.45	71.02	11.71	18.29	24.76
	Pull-out	Characteristic (KN)	-	12.00	16.00	25.00	30.00	35.00	50.00	9.00	12.00	16.00
		gamma s	-	1.50	1.80	1.80	1.80	1.80	1.80	1.50	1.50	1.50
		Design (KN)	-	8.00	8.89	13.89	16.67	19.44	27.78	6.00	8.00	10.67
	Concrete	Characteristic (KN)	12.70	16.70	20.50	26.40	32.70	38.80	52.60	10.40	13.70	17.80
		gamma s	1.50	1.50	1.80	1.80	1.80	1.80	1.80	1.50	1.80	1.80
		Design (KN)	8.47	11.13	11.39	14.67	18.17	21.56	29.22	6.93	7.61	9.89
Failure			5.50	8.00	8.89	13.89	16.67	19.44	27.78	6.00	7.61	9.89
			Standard Depth						Reduced Embedment Depth			
Shear	Steel Failure	Characteristic (KN)	5.10	9.30	14.70	20.60	28.10	38.40	56.30	9.30	14.70	20.60
		gamma s	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
		Design (KN)	4.08	7.44	11.76	16.48	22.48	30.72	45.04	7.44	11.76	16.48
	Steel failure with lever arm	Characteristic (KN)	7.70	19.10	38.10	64.10	102.20	163.10	298.50	19.10	38.10	64.10
		gamma s	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
		Design (KN)	6.16	15.28	30.48	51.28	81.76	130.48	238.80	15.28	30.48	51.28
	Pry-out	K	1.00	1.00	1.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
		Characteristic (KN)	12.70	16.70	20.50	52.80	65.40	77.60	105.20	10.40	13.70	17.80
		gamma s	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Design (KN)	8.47	11.13	13.67	35.20	43.60	51.73	70.13	6.93	9.13	11.87		
Failure			4.08	7.44	11.76	16.48	22.48	30.72	45.04	6.93	9.13	11.87
			Standard Depth						Reduced Embedment Depth			
Catalogue Recommended Loads	Tension (KN)		4.00	5.82	6.47	10.11	12.14	14.16	20.23	4.37	5.54	7.20
	Shear (KN)		2.97	5.42	8.56	12.00	16.37	22.37	32.79	5.05	6.65	8.64