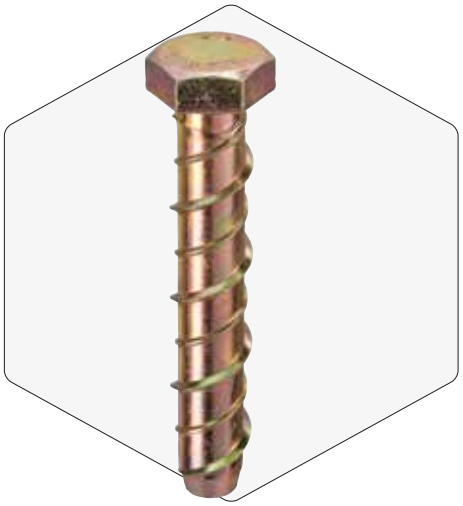
THUNDERBOLT®



INFORMATION

The ETA Ankerbolt is a zinc and yellow plated self-tapping concrete screw for use in a variety of base materials and structures subject to dry internal conditions.

The undercutting action provides a positive anchorage with no expansion forces.

The wide range of sizes gives flexibility of choosing the correct anchor according to the fixture thickness.

BASE MATERIAL

- Concrete C20/25 to C50/60
- Cracked/Non-Cracked Concrete
- Hollow Concrete Planks
- Solid Brickwork
- Concrete Block
- Natural Stone

FEATURES

- Undercutting Action
- Fast And Secure Installation
- Expansion Free
- Through Fixing
- High Performance
- Zinc and Yellow Plated
- Minimum 5µm *(For Dry, Internal Applications Only)*
- Mechanical Galvanised Minimum 40µm
- Reaction To Fire Class A1
- Fire Resistant Loading

APPROVALS

European Technical Assessment
Option 1 Cracked Concrete

ETA-15/0040
Fire Resistance

ETA-15/0040

RANGE AND LOAD DATA

RANGE DATA										
Article Number	Drill Hole Diameter (d_0)	Thread Diameter (d_{nom})	Anchor Length (L)	Fixture Clearance Hole (d_f)	Max Fixture Thickness (t_{fix})	Min Hole Depth (h_1)	Embedment Depth (h_{nom})	Min Structure Thickness (h_c)	Width Across Flats (A/F)	Tightening Torque (T_{inst})
	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm
V35156CE	8	10	80	12	5	90	75	120	15	40
V35157CE			100		25					
V35158CE			130		55					
V35159CE			150		75					
V35162CE	10	12	100	14	15	100	85	125	17	60
V35163CE			130		45					
V35164CE			150		65					
V35166CE	12	14	100	16	5	110	95	140	19	80
V35167CE			130		35					
V35168CE			150		55					
V35169CE			200		105					
V35171CE	16	18	150	20	30	145	120	190	27	100
V35172CE			200		80					

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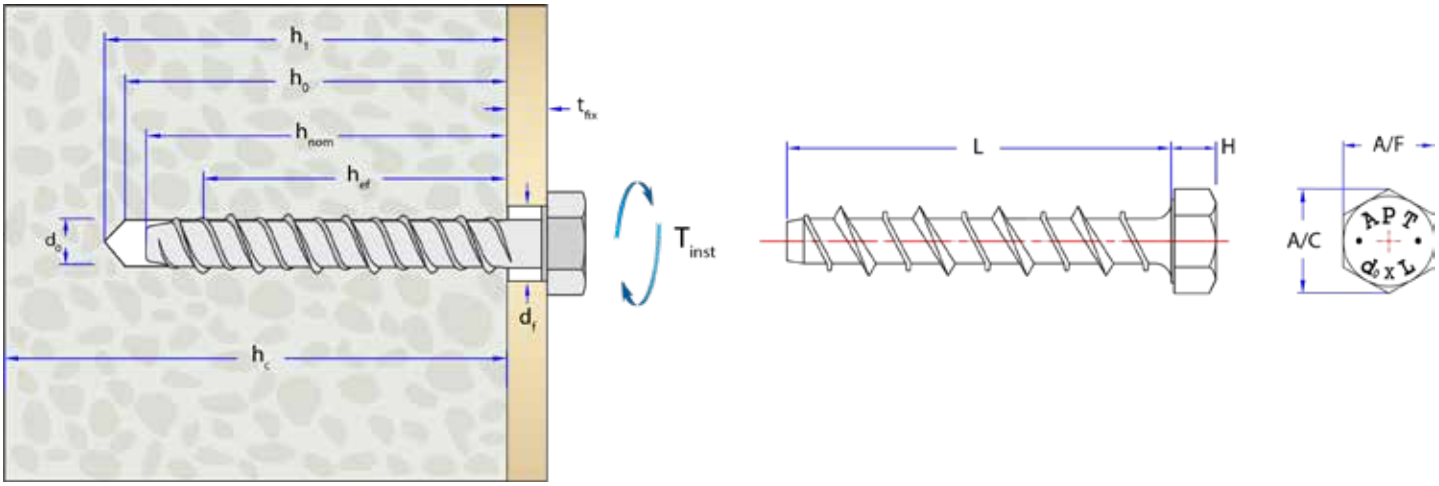

NON-CRACKED CONCRETE

Performance Data (C20/25 Non-Cracked Concrete)												
Drill Diam (d_0)	Overall Embedment Depth (h_{nom})	Minimum Concrete Thickness (h_{min})	Characteristic Resistance		Design Resistance		Approved Resistance		Design Spacing (s)		Design Edge Distance (c)	
			Tensile (N_{Rk})	Shear (V_{Rk})	Tensile (N_{Rd})	Shear (V_{Rd})	Tensile(N_{Ra})	Shear (V_{Ra})	Tensile	Shear	Tensile	Shear
mm	mm	mm	kN	kN	kN	kN	kN	kN	mm	mm	mm	mm
8	75	120	12.0	20.5	6.6	11.3	4.7	8.0	50	170	50	130
10	85	125	16.0	49.3	8.8	27.3	6.2	19.5	60	190	60	330
12	95	140	20.0	57.8	11.1	32.1	7.9	22.9	80	210	70	360
14	110	170	35.0	70.9	19.4	39.3	13.8	28.0	230	240	130	390
16	120	190	40.0	80.5	22.2	44.7	15.8	31.9	260	260	130	420

CRACKED CONCRETE

Performance Data (C20/25 Cracked Concrete)												
Drill Diam (d_0)	Overall Embedment Depth (h_{nom})	Minimum Concrete Thickness (h_{min})	Characteristic Resistance		Design Resistance		Approved Resistance		Design Spacing (s)		Design Edge Distance (c)	
			Tensile (N_{Rk})	Shear (V_{Rk})	Tensile (N_{Rd})	Shear (V_{Rd})	Tensile(N_{Ra})	Shear (V_{Ra})	Tensile	Shear	Tensile	Shear
mm	mm	mm	kN	kN	kN	kN	kN	kN	mm	mm	mm	mm
8	75	120	7.5	14.6	4.1	8.1	2.9	5.7	50	170	50	130
10	85	125	12.0	35.1	6.6	19.5	4.7	13.9	70	190	60	330
12	95	140	16.0	41.2	8.8	22.8	6.2	16.2	120	210	80	360
14	110	170	20.0	50.5	11.1	28.0	7.9	20.0	140	240	90	390
16	120	190	25.0	57.4	13.8	31.8	9.8	22.7	190	260	110	420

FIRE RESISTANCE DATA

Fire Resistance Data (C20/25 to C50/60 Cracked or Non-Cracked Concrete)*										
Drill Diam (d_0)	Overall Embedment Depth (h_{nom})	Minimum Concrete Thickness (h_{min})	Design Resistance				Approved Resistance			
			Tensile ($N_{Rd,fi}$) or Shear ($V_{Rd,fi}$) (kN)				Tensile ($N_{Ra,fi}$) or Shear ($V_{Ra,fi}$) (kN)			
mm	mm	mm	30min (R30)	60min (R60)	90min (R90)	120min (R120)	30min (R30)	60min (R60)	90min (R90)	120min (R120)
8	75	120	0.4	0.4	0.3	0.2	0.28	0.28	0.21	0.14
10	85	125	1.1	0.9	0.7	0.6	0.78	0.64	0.50	0.42
12	95	140	2.0	1.5	1.3	1.0	1.42	1.07	0.92	0.71
14	110	170	2.8	2.1	1.8	1.4	2.00	1.50	1.28	1.00
16	120	190	3.7	2.8	2.4	1.8	2.64	2.00	1.71	1.28

* The determination covers anchors with a fire attack from one side only. If the fire attack is from more than one side, the design method may be taken only, if the edge distance of the anchor is $c \geq 300$ mm and $\geq 2\ h_{ef}$.

SUPPLEMENTARY DATA

Influence Of Concrete Strength (Cracked/Non-Cracked Concrete)					
Concrete strength		C20/25	C30/37	C40/50	C50/60
Cylinder	N/mm^2	20	30	40	50
Cube	N/mm^2	25	37	50	60
Factor	M8, M10, M12	1.0	1.17	1.32	1.42
	M14, M16	1.0	1.22	1.41	1.55

Important Note:
When using concrete factors ensure that loads do not exceed Steel Design Resistance.

Steel Failure						
Drill Diam (d_0)	Tensile Resistance			Shear Resistance		
	Characteristic Resistance ($N_{Rk,s}$)	Design Resistance ($N_{Rd,s}$)*	Approved Resistance ($N_{Ra,s}$)	Characteristic Resistance ($V_{Rk,s}$)	Design Resistance ($V_{Rd,s}$)**	Approved Resistance ($V_{Ra,s}$)
mm	kN	kN	kN	kN	kN	kN
8	44.2	31.6	22.6	28.5	19.0	13.6
10	70.1	50.1	35.8	46.4	30.9	22.1
12	101.2	72.3	51.6	57.2	38.1	27.2
14	140.0	100.0	71.4	80.4	53.6	38.3
16	183.9	131.4	93.8	84.4	56.3	40.2

* A partial safety factor (γ_{MS}) equal to 1.4 is included.
** A partial safety factor (γ_{MS}) equal to 1.5 is included.

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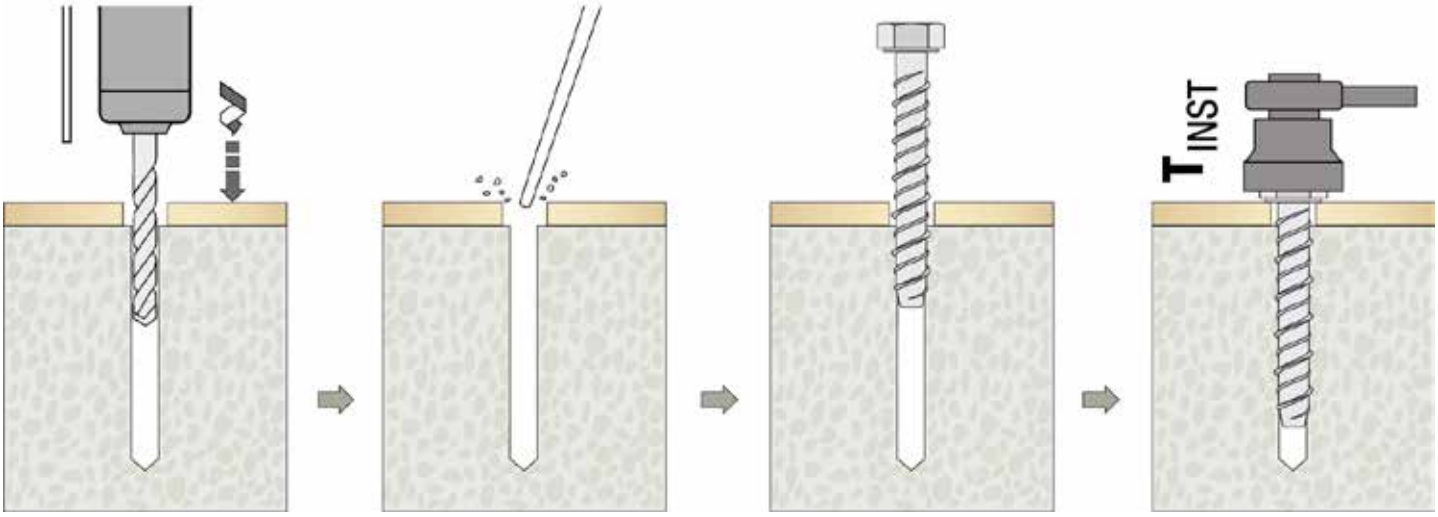
INSTALLATION INSTRUCTIONS



- Position fixture and drill correct diameter hole to corresponding depth by using the rotary hammer drilling mode

- Clean hole by blowing three times to remove drilling debris and dust

- Insert anchor through fixture into concrete using electrical impact drivers Bosch GD18E or Makita 6905H. Other suitable impact driver with equivalent force and performance may be used.

- Tighten with torque wrench to recommended torque