

INFORMATION

The Thunderbolt is a zinc and yellow plated or galvanised self-tapping anchor for use in a variety of base materials.

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

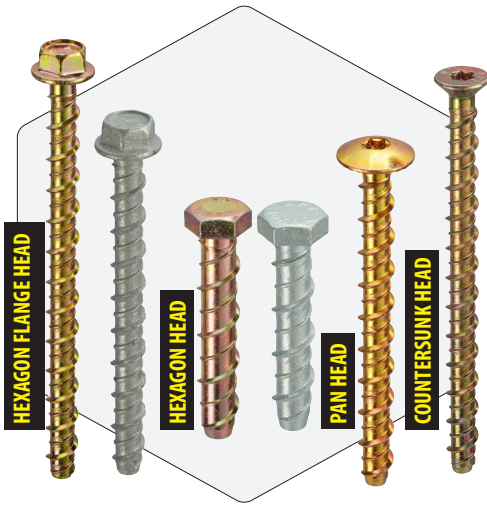
The wide range of types and sizes gives flexibility of choosing the correct anchor according to the fixture thickness.

BASE MATERIAL

- Concrete C20/25 to C50/60
- 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



RANGE AND LOAD DATA

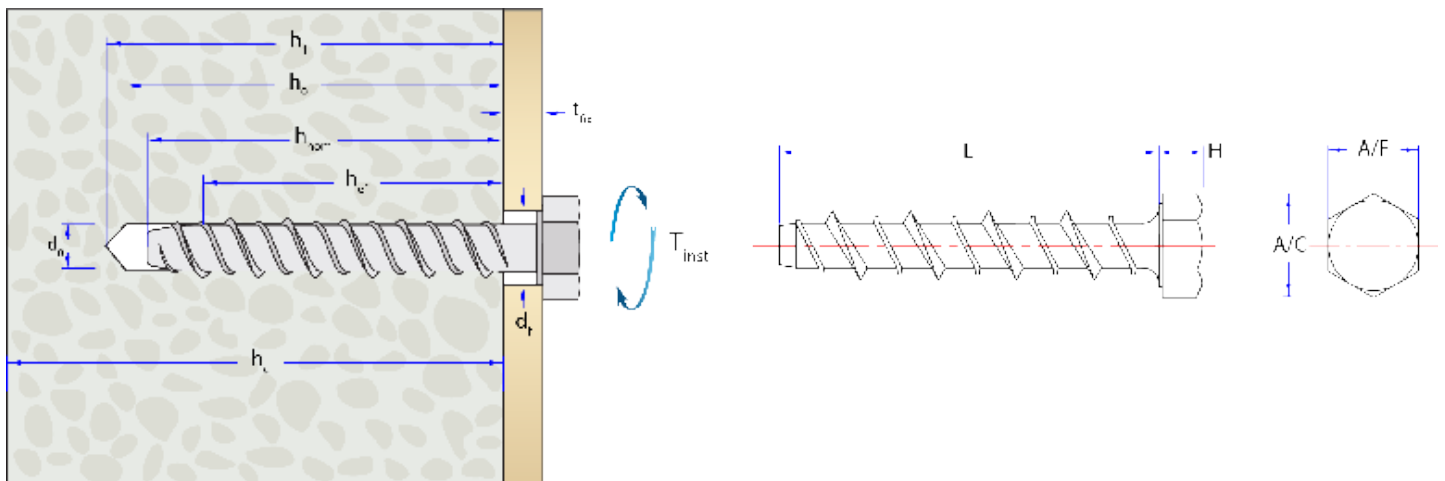
RANGE DATA

Article Number	Drill Hole Diameter (d _o)	Thread Diameter (d _{nom})	Anchor Length (L)	Fixture Clearance Hole (d _f)	Shallow Embedment			Deep Embedment			Min Structure Thickness (h _c)	Width Across Flats (A/F)	Tightening Torque (T _{inst})
					Max Fixture Thickness (t _{fx})	Min Hole Depth (h _i)	Embedment Depth (h _{nom})	Max Fixture Thickness (t _{fx})	Min Hole Depth (h _i)	Embedment Depth (h _{nom})			
					mm	mm	mm	mm	mm	mm			
HEXAGON FLANGE HEAD													
V35147	5	6	50	8	25	35	25	13	50	37	100	8	15
V35148			75		50			38					
V35149			100		75			63					
V35173	6	8	30	10	5	40	30	N/A	55	45	100	10	25
V35150			50		20			5					
V35151			75		45			30					
V35152			100		70			55					
V35153			130		100			85					
V35154			150		120			105					
V71783*			50		20			5					
V71784*			75		45			30					
V71785*			100		70			55					
HEXAGON HEAD													
V35155	8	10	60	12	20	55	40	N/A	75	60	120	15	40
V35156			75		35			15					
V35157			100		60			40					
V35158			130		90			70					
V35159			150		110			90					
V71786*			60		20			N/A					
V71787*			100		60			15					
V71788*			150		110			40					

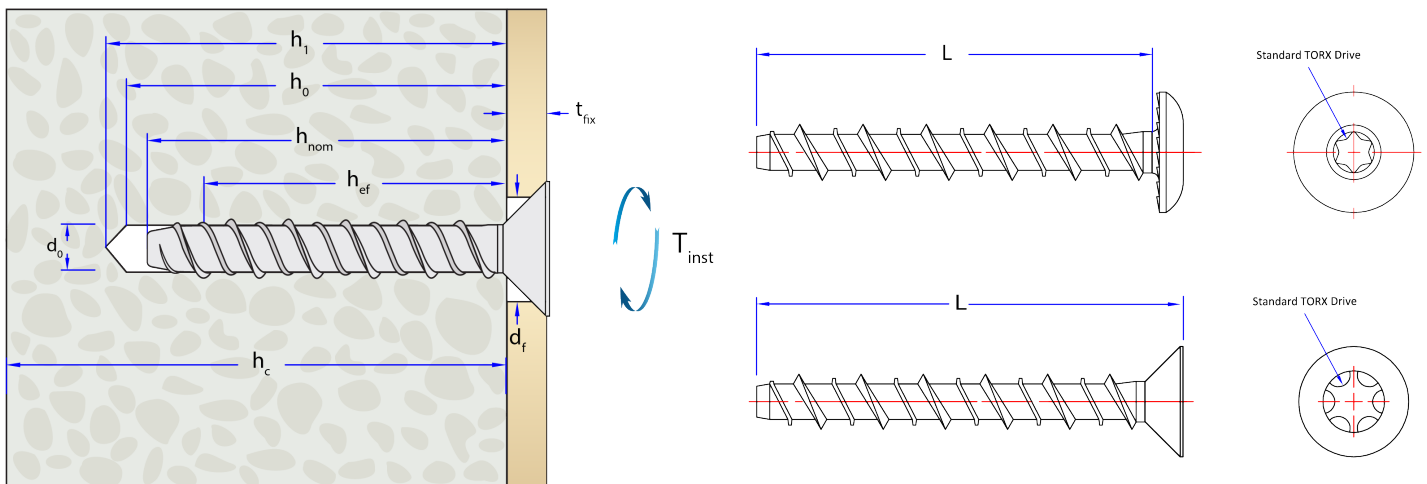
* Mechanical Galvanised minimum 40µm.

RANGE DATA													
Article Number	Drill Hole Diameter (d_p)	Thread Diameter (d_{nom})	Anchor Length (L)	Fixture Clearance Hole (d_f)	Shallow Embedment			Deep Embedment			Min Structure Thickness (h_c)	Width Across Flats (A/F)	Tightening Torque (T_{inst})
					Max Fixture Thickness (t_{fix})	Min Hole Depth (h_1)	Embedment Depth (h_{nom})	Max Fixture Thickness (t_{fix})	Min Hole Depth (h_1)	Embedment Depth (h_{nom})			
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm
HEXAGON HEAD													
V35160	10	12	60	14	10	70	50	N/A	95	75	125	17	60
V35161			75		25			N/A					
V35162			100		50			25					
V35163			130		80			55					
V35164			150		100			75					
V71789			60		10			N/A					
V71790			100		50			25					
V71791			150		100			75					
V35165			12		14			75					
V35166	100	40		10									
V35167	130	70		40									
V35168	150	90		60									
V35169	200	140		110									
V71792	100	40		10									
V71793	150	90		60									
V71794	200	140		110									
V35174	14	16		75		18	5	100	70	N/A	125	95	170
V35175			100	30	5								
V35176			130	60	35								
V35177			150	80	55								
V35178			200	130	105								
V35170*	16	18	100	20	20	110	80	N/A	145	115	190	27	100
V35171*			150		70			35					
V35172*			200		120			85					

* Mechanical Galvanised minimum 40µm.



RANGE DATA													
Article Number	Drill Hole Diameter (d_o)	Thread Diameter (d_{nom})	Anchor Length (L)	Fixture Clearance Hole (d_f)	Shallow Embedment			Deep Embedment			Min Structure Thickness (h_c)	Driver Size	Tightening Torque (T_{inst})
					Max Fixture Thickness (t_{fx})	Min Hole Depth (h_1)	Embedment Depth (h_{nom})	Max Fixture Thickness (t_{fx})	Min Hole Depth (h_1)	Embedment Depth (h_{nom})			
					mm	mm	mm	mm	mm	mm			
PAN HEAD													
V35201	5	6	50	8	25	35	25	13	50	37	100	Torx Drive T25	15
V35202			75		38								
V35203			100		63								
V35205	6	8	30	10	5	40	30	N/A	55	45	100	Torx Drive T30	25
V35206			50		20			40					
V35207			75		45			30					
V35208			100		70			55					
COUNTERSUNK													
V35137	5	6	30	8	5	35	25	N/A	50	37	100	Torx Drive T25	15
V35138			50		25			13					
V35139			75		50			38					
V35140			100		75			63					
V35141	6	8	50	10	20	40	30	5	55	45	100	Torx Drive T30	25
V35142			75		45			30					
V35143			100		70			55					
V35144			130		100			85					
V35145			150		120			105					



NON-CRACKED CONCRETE - SHALLOW EMBEDMENT

Performance Data (C20/25 Non-Cracked Concrete)

Drill Diam (d _o)	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
5	25	100	3.1	3.2	1.7	2.0	1.2	1.4	50	50	30	40
6	30	100	3.9	3.8	2.1	2.5	1.5	1.7	60	60	40	40
8	40	100	6.3	6.3	3.4	4.2	2.4	3.0	70	80	50	50
10	50	100	9.3	9.1	5.0	6.0	3.5	4.2	100	100	60	70
12	60	100	12.5	12.7	6.9	8.4	4.9	6.0	120	120	70	90
14	70	100	15.3	15.2	8.4	10.3	6.0	7.3	130	140	80	110
16	80	105	19.0	18.9	10.3	12.4	7.3	8.8	160	160	110	120

NON-CRACKED CONCRETE - DEEP EMBEDMENT

Performance Data (C20/25 Non-Cracked concrete)

Drill Diam (d _o)	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
5	37	100	5.0	6.6	2.7	4.4	1.9	3.1	40	80	30	60
6	45	100	7.5	8.7	4.1	5.6	2.9	4.0	70	90	40	70
8	60	120	10.0	13.7	5.5	9.1	3.9	6.5	70	130	50	90
10	75	125	15.0	20.0	8.3	13.1	5.9	9.3	90	160	60	120
12	90	140	19.0	40.5	10.5	32.3	7.5	23.0	90	160	70	300
14	95	170	22.0	54.1	12.2	35.7	8.7	25.5	130	200	80	300
16	115	190	34.0	74.9	18.8	49.9	13.4	35.6	200	250	110	390

Performance Data (20N/mm ² Solid Brickwork)											
Drill Diam (d _o)	Overall Embedment Depth (h _{nom})	Minimum Brick 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
mm	mm	mm	kN	kN	kN	kN	kN	kN	mm	mm	mm
5	25	100	0.7	1.2	0.35	0.57	0.25	0.4	75	It is recommended to fix at least one brick in from an edge and 3 courses down from the top of a wall	
6	30	100	0.9	1.5	0.43	0.71	0.31	0.51	90		
8	40	100	1.9	1.7	0.90	0.80	0.64	0.57	120		
10	50	100	2.4	2.4	1.14	1.14	0.81	0.81	Only 1 fixing per brick		
12	60	100	3.5	3.4	1.66	1.62	1.19	1.15			

(Tests were carried out in standard 230 x 110 x 60 mm solid bricks)

Performance Data (7N/mm ² Dense Concrete Blocks)											
Drill Diam (d _o)	Overall Embedment Depth (h _{nom})	Minimum Brick 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
mm	mm	mm	kN	kN	kN	kN	kN	kN	mm	mm	mm
5	25	100	1.1	1.7	0.52	0.80	0.37	0.57	75	It is recommended to fix at least one block in from an edge and 1 course down from the top of a wall	
6	30	100	1.3	3.4	0.62	1.61	0.44	1.15	90		
8	40	100	1.7	6.7	0.80	3.19	0.57	2.27	120		
10	50	100	3.1	7.3	1.47	3.47	1.05	2.47	150		
12	60	100	3.8	10.1	1.80	4.80	1.28	3.42	180		

(Tests were carried out in 700 x 500 x 200 mm solid blocks)

Due to the variable nature of bricks and blocks the above figures are for guidance only.
For critical applications a site test is recommended

SUPPLEMENTARY DATA

Influence Of Concrete Strength (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:

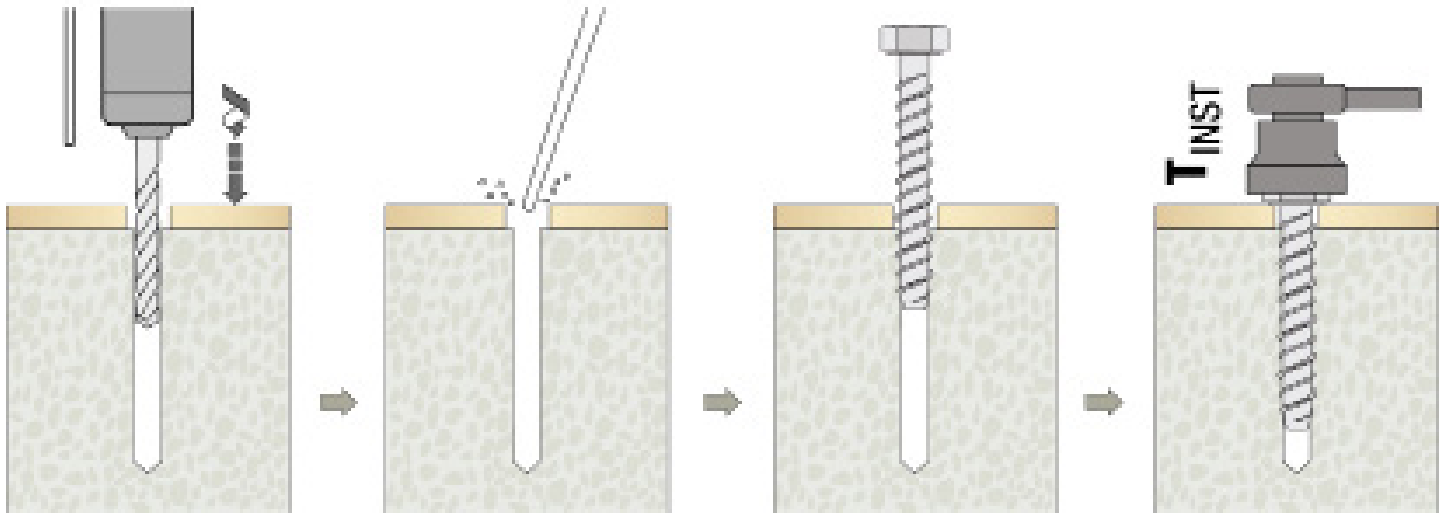
When using concrete factors ensure that loads do not exceed Steel Design Resistance.

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.

INSTALLATION INSTRUCTIONS



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

- Clean hole by blowing to remove drilling debris and dust

- Insert anchor through fixture into concrete using suitable impact wrench and stop before the anchor touches the fixture

- Finish by tightening with torque wrench to recommended torque

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