SuperCap

Spin-In Capsule

Product Data Sheet

STAHLFIX

PROFESSIONAL CHEMICAL ANCHOR

Structural Anchoring System with ETA Approval Option 8 For Non-Cracked Concrete

ETA OPTION 8

CE

10/2014

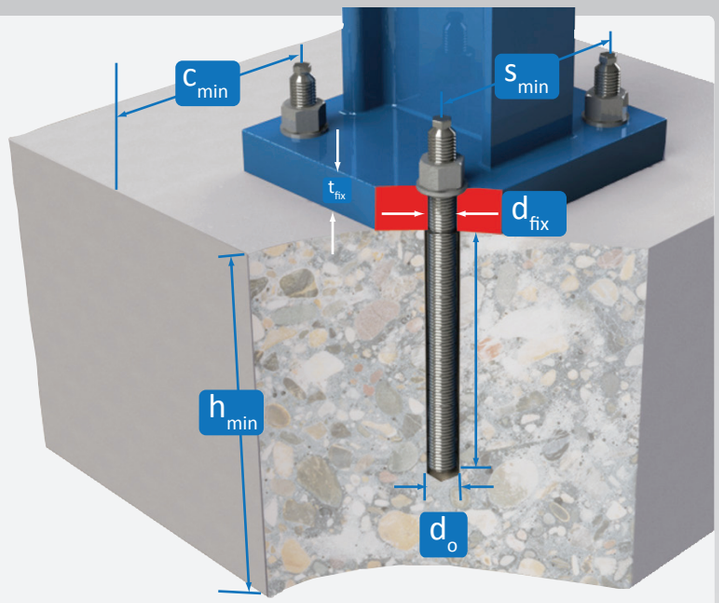
SuperCap

Spin-In Capsule

STAHLFIX

Features & Application Range

- *Pressure Free Fixing*
- *Low Edge Distances*
- *Safe Long-Term Behaviour*
- *Favourable Performance in Case of Combustion*
- *Safe Mixing of Component A + B*
- *Low Shrinkage*
- *High Pull-Out Values*
- *Appropriate for Concrete and Natural Stone*
- *ETA approved glass capsule for non cracked concrete*
- *Fixing Anchor holes are drilled with either Rotary Drill Hammers or Diamond Drill Rigs.*
- *For Horizontal, Vertical or Overhead applications*
- *For use with M8 - M30 Anchor Studs Carbon Steel 5.8, 8.8 + Stainless Steel Grades*
- *Vinylester Styrene Free*



Typical Applications

- *Infrastructure Construction (Roads, Viaducts, Sound Barriers, Crash Barriers, Harbours, High Rise Construction, Steel Construction)*
- *Production Facilities (Crane Installation , Robot Installation etc.)*

Parameters

- *Range of Loading 3.0kN to 60.0kN*
- *Range of Concrete Quality C12/15 to C50/60 +*
- *Used in Cracked or Uncracked Concrete*
- *ETA available in English or German upon request*

Sizes

- *M8 - M10 - M12 - M16 - M20 - M24 - M30*
- *Vp = Volume per Capsule*
- *Vs = Required Volume per cm Depth*
- *M30 not part of ETA.*

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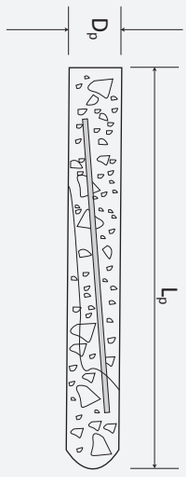
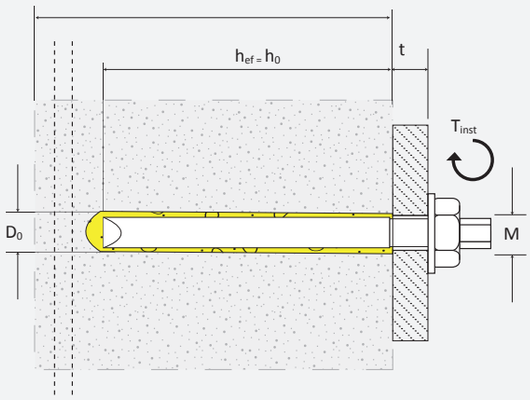
Capsule Specifications

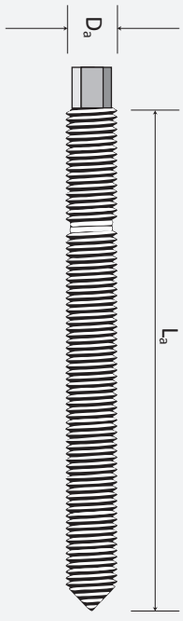
D_a	L_a (mm)	Capsule Type	D_p (mm)	L_p (mm)	V_p cc	V_s cc/cm
M8	110	V-E	9	80	4.0	0.40
M10	130	V-E	11	80	5.5	0.52
M12	160	V-E	13	95	9.0	0.66
M16	190	V-E	17	95	15.8	0.95
M20	260	V-E	22	175	53.0	2.40
M24	300	V-E	24	210	76.0	2.54
M30*	360	V-E	33	265	191.0	3.88





Setting Dimensions

D_a	d_0 (mm)	h_0 (mm)	d_r (mm)	h_{min} (mm)	t_{fix} (mm)	T_{inst} Nm
M8	10	80	9	110	20	10
M10	12	90	12	120	30	20
M12	14	110	14	140	37	40
M16	18	125	18	160	49	80
M20	25	170	22	220	75	120
M24	28	210	26	260	67	180
M30*	35	280	33	350	52	300



Basic Performance Data

Performance data for single anchor without influence of edge distance and spacing

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	80.0	90.0	110.0	125.0	170.0	210.0	270.0
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	21.6	34.8	50.4	75.5	119.2	158.4	239.6
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	28.9	35.9	55.7	75.5	119.2	158.4	239.6
METRIC THREADED RODS - A4	[kN]	28.9	35.9	55.7	75.5	119.2	158.4	239.6
SHEAR LOAD $V_{Ru,m}$								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29.0	42.2	78.5	122.5	176.5	280.5
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.3	46.4	67.4	125.6	196.0	282.4	448.8
METRIC THREADED RODS - A4	[kN]	25.6	40.6	59.0	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.0	29.0	42.0	60.0	95.0	140.0	200.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	25.0	30.0	50.0	60.0	95.0	140.0	200.0
METRIC THREADED RODS - A4	[kN]	25.0	30.0	50.0	60.0	95.0	140.0	200.0
SHEAR LOAD V_{Rk}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12.0	16.7	27.8	33.3	52.8	77.8	111.1
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	13.9	16.7	27.8	33.3	52.8	77.8	111.1
METRIC THREADED RODS - A4	[kN]	13.9	16.7	27.8	33.3	52.8	77.8	111.1
SHEAR LOAD V_{Rd}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	8.57	11.9	19.8	23.8	37.7	55.6	79.4
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.92	11.9	19.8	23.8	37.7	55.6	79.4
METRIC THREADED RODS - A4	[kN]	9.92	11.9	19.8	23.8	37.7	55.6	79.4
SHEAR LOAD V_{rec}								
METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.00	12.0	22.3	34.9	50.3	80.0
METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Design Performance Data

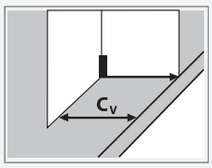
Standard embedment depth

Size			M8	M10	M12	M16	M20	M24	M30
Embedment depth	h_{ef}	[mm]	80.0	90.0	110.0	125.0	170.0	210.0	270.0
TENSION LOAD									
STEEL FAILURE; STEEL CLASS 5.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	18.0	29.0	42.0	78.0	122.0	176.0	280.0
Design resistance γ_{Ms}= 1.5	$N_{Rd,s}$	[kN]	12.0	19.3	28.0	52.0	81.3	117.3	186.7
STEEL FAILURE; STEEL CLASS 8.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	29.0	46.0	67.0	126.0	196.0	282.0	449.0
Design resistance γ_{Ms}= 1.5	$N_{Rd,s}$	[kN]	19.3	30.7	44.7	84.0	130.7	188.0	299.3
STEEL FAILURE; STEEL GRADE A4-70									
Characteristic resistance	$N_{Rk,s}$	[kN]	26.0	41.0	59.0	110.0	171.0	247.0	393.0
Design resistance γ_{Ms}= 1.87	$N_{Rd,s}$	[kN]	13.9	21.9	31.6	58.8	91.4	132.1	210.2
PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25 (40°C/24°C)									
Characteristic resistance	$N_{Rk,p}$	[kN]	25.0	30.0	50.0	60.0	95.0	140.0	200.0
Design resistance γ_{Mp}= 1.8	$N_{Rd,p}$	[kN]	13.9	16.7	27.8	33.3	52.8	77.8	111.1
Increasing factors for $N_{Rd,p}$ - C30/37	Ψ_c	-	1.04	1.04	1.04	1.04	1.04	1.00	1.00
Increasing factors for $N_{Rd,p}$ - C40/50	Ψ_c	-	1.07	1.07	1.07	1.07	1.07	1.00	1.00
Increasing factors for $N_{Rd,p}$ - C50/60	Ψ_c	-	1.09	1.09	1.09	1.09	1.09	1.00	1.00
Spacing	$s_{cr,N}$	[mm]	240.0	270.0	330.0	375.0	510.0	630.0	675.0
Edge distance	$c_{cr,N}$	[mm]	120.0	135.0	165.0	190.0	255.0	315.0	340.0
SHEAR LOAD									
CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25									
Edge distance	c_1	[mm]	40.0	45.0	55.0	63.0	85.0	105.0	135.0
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	5.60	7.00	9.84	12.8	21.1	30.1	46.1
Design resistance γ_{Mc}= 1.5	$V_{Rd,c}$	[kN]	3.73	4.67	6.56	8.53	14.1	20.1	30.7
STEEL FAILURE; STEEL CLASS 5.8									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	9.00	14.0	21.0	39.0	61.0	88.0	140.0
Design resistance γ_{Ms}= 1.25	$V_{Rd,s}$	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
STEEL FAILURE; STEEL CLASS 8.8									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
Design resistance γ_{Ms}= 1.25	$V_{Rd,s}$	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
STEEL FAILURE; STEEL GRADE A4-70									
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
Design resistance γ_{Ms}= 1.56	$V_{Rd,s}$	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6

Design Performance Data

Reduction / increasing resistance factors for edge distance and spacing

Edge distance (shear)



Tables only valid for one edge
$>c_{min}$ and $s \geq 3c_v$

Increasing factors for edge distance $>C_{min}$ applicable to $V_{Rd,c}$ for non-cracked concrete from 'Design Performance' table

c_v [mm]	M8		M10		M12		M16		M20		M24		M30	
	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}	$h \geq 1.5c_v$	h_{min}
40	1,00	1,00												
45	1,19	1,19	1,00	1,00										
55	1,61	1,61	1,35	1,35	1,00	1,00								
63	1,98	1,98	1,66	1,66	1,23	1,23	1,00	1,00						
85	3,10	2,88	2,60	2,52	1,92	1,92	1,57	1,57	1,00	1,00				
105	4,25	3,55	3,56	3,11	2,64	2,49	2,15	2,13	1,37	1,37	1,00	1,00		
120		4,06	4,35	3,56	3,22	2,84	2,63	2,44	1,68	1,68	1,22	1,22		
135			5,20	4,00	3,85	3,20	3,14	2,74	2,00	2,00	1,46	1,46	1,00	1,00
150				4,44	4,50	3,55	3,67	3,05	2,34	2,31	1,71	1,71	1,17	1,17
180					5,92	4,26	4,83	3,66	3,08	2,77	2,24	2,23	1,54	1,54
225						5,33	6,75	4,57	4,31	3,46	3,14	2,78	2,15	2,15
250							7,90	5,08	5,04	3,85	3,67	3,09	2,52	2,40
300								6,10		4,62	4,83	3,71	3,31	2,88
350								7,12				4,33	4,17	3,36
400												4,95	5,10	3,84
450														4,32
500														4,80
550														5,28

Design Performance Data

Edge distance (tension)

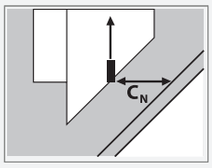


Table only valid for one edge
$<C_{cr,N}$ and $S \geq S_{cr,N}$

Reduction factors for edge distance $<C_{cr,N}$ applicable to N_{Rd} or N_{rec} for cracked and non-cracked concrete from 'Basic Performance' table

c_N [mm]	M8		M10		M12		M16		M20	M24	M30	
	$h \geq 1.28h_{min}$	h_{min}	$h \geq 1.31h_{min}$	h_{min}	$h \geq 1.35h_{min}$	h_{min}	$h \geq 1.38h_{min}$	h_{min}	$\geq h_{min}$		$h \geq 1.36h_{min}$	h_{min}
40	0,53	0,48										
45	0,56	0,50	0,53	0,48								
55	0,61	0,53	0,58	0,51	0,53	0,50						
63	0,65	0,56	0,62	0,54	0,56	0,52	0,53	0,50				
85	0,78	0,65	0,72	0,61	0,65	0,59	0,61	0,56	0,53			
105	0,90	0,73	0,83	0,68	0,73	0,66	0,68	0,62	0,58	0,53		
120	1,00	0,80	0,91	0,74	0,79	0,71	0,73	0,66	0,62	0,56		
135		0,84	1,00	0,80	0,86	0,76	0,79	0,71	0,66	0,59	0,57	0,55
165		0,91		0,87	1,00	0,88	0,91	0,80	0,74	0,65	0,63	0,60
190		0,98		0,92		0,93	1,00	0,88	0,81	0,71	0,68	0,64
200		1,00		0,94		0,95	1,00	0,90	0,83	0,73	0,70	0,66
225				1,00		1,00		0,95	0,91	0,78	0,75	0,70
255								1,00	1,00	0,85	0,81	0,75
315										1,00	0,95	0,87
340											1,00	0,92
405												1,00

Design Performance Data

Spacing

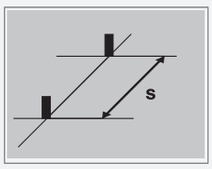
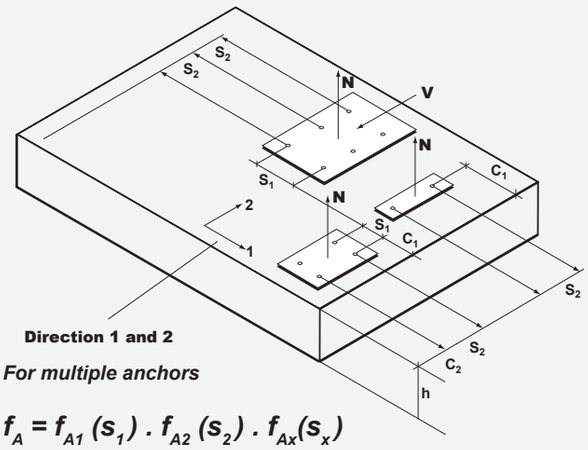


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$

Reduction factors for spacing $<S_{cr,N}$ applicable to N_{Rd} / V_{Rd} or N_{rec} / V_{rec} for non-cracked concrete from 'Basic Performance' table

s [mm]	M8		M10		M12		M16		M20	M24	M30	
	$h \geq 1.28h_{min}$	h_{min}	$h \geq 1.31h_{min}$	h_{min}	$h \geq 1.35h_{min}$	h_{min}	$h \geq 1.38h_{min}$	h_{min}	$\geq h_{min}$		$h \geq 1.36h_{min}$	h_{min}
40	0,58	0,55										
45	0,59	0,56	0,58	0,55								
55	0,61	0,57	0,60	0,56	0,58	0,56						
63	0,63	0,58	0,62	0,57	0,60	0,57	0,58	0,56				
85	0,68	0,61	0,66	0,59	0,63	0,60	0,61	0,59	0,58			
105	0,72	0,63	0,69	0,62	0,66	0,62	0,64	0,61	0,60	0,58		
135	0,78	0,67	0,75	0,65	0,70	0,65	0,68	0,64	0,63	0,61	0,60	0,58
150	0,81	0,69	0,78	0,67	0,73	0,67	0,70	0,65	0,65	0,62	0,61	0,59
200	0,92	0,75	0,87	0,72	0,80	0,73	0,77	0,70	0,70	0,66	0,65	0,62
250	1,00	0,81	0,96	0,78	0,88	0,78	0,83	0,75	0,75	0,70	0,69	0,65
300		0,88	1,00	0,83	0,95	0,84	0,90	0,80	0,79	0,74	0,72	0,69
350		0,94		0,89	1,00	0,90	0,97	0,85	0,84	0,78	0,76	0,72
400		1,00		0,94		0,95	1,00	0,90	0,89	0,82	0,80	0,75
450				1,00		1,00		0,95	0,94	0,86	0,83	0,78
510								1,00	1,00	0,90	0,88	0,81
550										0,94	0,91	0,84
600										0,98	0,94	0,87
680										1,00	1,00	0,92
810												1,00

Recommended Tension and Shear Loads for multiple anchors (Anchor Theory)



Direction 1 and 2

For multiple anchors

$$FR_N = \frac{N_{rd}}{1.4} \cdot f_B \cdot f_{RN} \cdot f_A \qquad \textit{(tensile)}$$

$$FR_v = \frac{V_{rd}}{1.4} \cdot f_B \cdot f_{RV} \cdot f_A \qquad \textit{(shear)}$$

FR_α *(shear + tensile)*

$$FR_\alpha = FR_N - (FR_N - FR_V) \frac{\alpha}{90}$$

f_B = *Resistance factor of Concrete*

$f_B = 1 + 0.02\,(1 - \frac{\alpha}{90}) \cdot (f_{cc,eff} - 25)$

$[15 \le f_{cc,eff} \le 55]$

α = *Angle of load*

f_A = *factor "Spacing"*

f_{cc} = *Resistance on cube N/mm²*

f_R = *factor "edge distance"*

$$f_A = f_{A1}(s_1) \cdot f_{A2}(s_2) \cdot f_{Ax}(s_x)$$

$$f_{RN} = f_{RN1}(c_1) \cdot f_{RN2}(c_2) \cdot f_{RNx}(c_x)$$

$$f_{RV} = f_{RV1}(c_1) \cdot f_{RV2}(c_2) \cdot f_{RVx}(c_x)$$

$h = h_{nom} + 40mm$

h_{nom} = *embedment depth*

N_{rd} , V_{rd} = *design performance data (see page 3)*

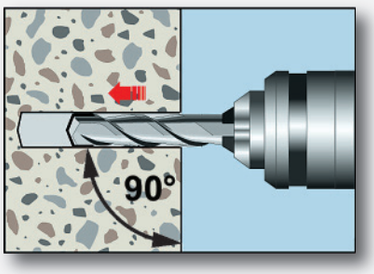
FR_N , FR_V , FR_α = *Recommended loads*

SuperCap

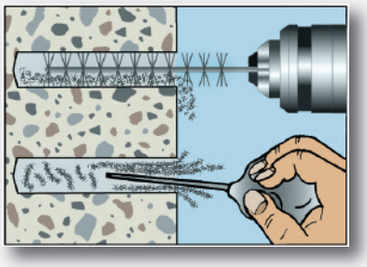
Spin-In Capsule

STAHLFIX

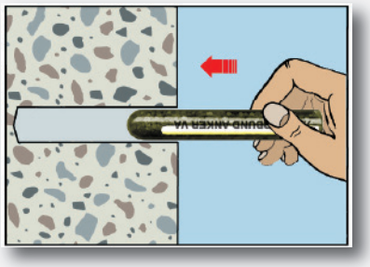
Installation Instructions



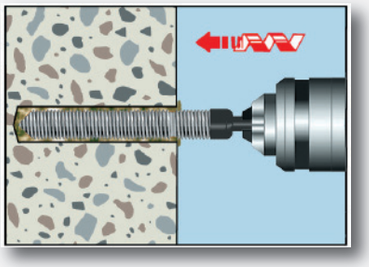
1 Drill the anchor hole with a rotary hammer according to the dimensions in the Installation Dimensions Table.



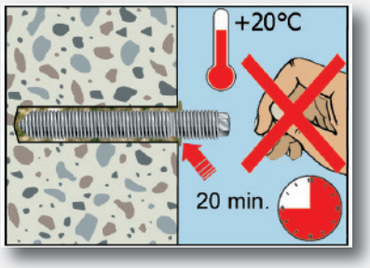
2 Clean anchor hole thoroughly by min. 2x blowing out min 2 x brushing and min. 2x blowing out. Remove any remaining water from drill hole.



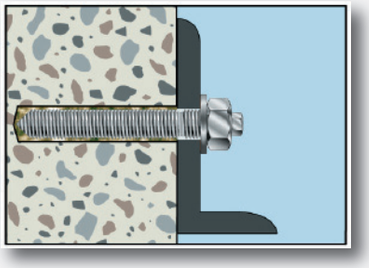
3 Insert the capsule to the bottom of the cleaned hole.



4 Install a clean anchor rod (free of any oil, grease or oxidation) with a rotary hammer (250-500 rpm). Stop rotating immediately upon reaching the bottom of the anchor hole.



5 The installation is correct when the marking on the anchor rod is level with the concrete surface and the void around the anchor rod is filled completely.



6 Observe curing times before loading the anchor. Do not disturb or load the anchor rod until the specified curing time has elapsed.

SuperCap

Spin-In Capsule

STAHLFIX

Typical Curing Times

Concrete Temperature	Dry Holes (mins)	Damp Holes (mins)
30°C	10	20
25°C	20	40
15°C	60	120
5°C	300	600

Drill Hole Cleaning Accessories

Blow Out Pump	drill hole Ø	body length	box qty	weight ea.
190mm	12-35mm	190mm	24	0.15kg
280mm	12-35mm	280mm	24	0.225kg
400mm	12-35mm	400mm	24	0.5kg

Steel Brush	drill hole Ø	hole depth	box qty	weight ea.
10mm Ø handle 200mm head 80mm	8 -10mm	250mm	100	0.02kg
13mm Ø handle 200mm head 80mm	12-16mm	250mm	100	0.02kg
18mm Ø handle 200mm head 80mm	18-24mm	250mm	72	0.025kg
28mm Ø handle 200mm head 80mm	28-35mm	250mm	36	0.025kg

SuperCap

Spin-In Capsule

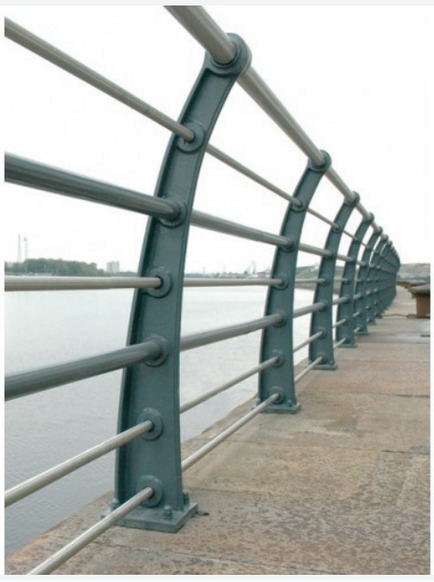
STAHLFIX

M8 - M30 sizes available

Spin-In or Hammer-In Type available

Bespoke Capsule Printing

Manufactured to ISO 9002



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