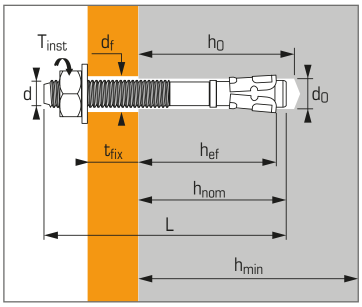
Torque controlled expansion anchor, for use in non-cracked concrete



APPLICATION

- Steel and timber framework and beams
- Lift guide rails
- Industrial doors and gates
- Brickwork support angles
- Storage systems

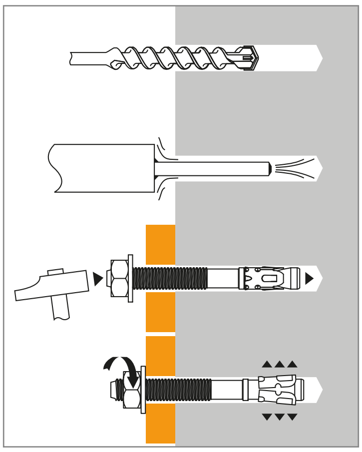
MATERIAL

- Hot dip galvanised: 45 µm
  NF EN ISO 1460 -1461
  Salt spray: >350 hours

Technical data

Anchor size	Letter marking	Minimum anchorage depth: min. anchor depth (mm) h_{ef}	Embed. depth (mm) h_{nom}	Max. thick. of part to be fixed (mm) t_{fix}	Drilling depth (mm) h_0	Min. thick. of base material (mm) h_{min}	Maximum anchorage depth: max. anchor depth (mm) h_{ef}	Embed. depth (mm) h_{nom}	Max. thick. of part to be fixed (mm) t_{fix}	Drilling depth (mm) h_0	Min. thick. of base material (mm) h_{min}	Thread diameter (mm) d	Drilling diameter (mm) d_0	Clearance diameter (mm) d_f	Total anchor length (mm) L	Tighten torque (Nm) T_{inst}	Code
8X70/20-7	C			20					7						70		050310
8X90/40-27	E	35	42	40	52	100	48	55	27	65	100	8	8	9	90	15	050320
8X110/60-47	F			60					47						110		050329
8X130/80-67	H			80					67						130		050330
10X75/15-5	C			15					5						75		050350
10X95/36-26	E			36					26						96		050360
10X120/60-50	G	42	50	60	62	100	52	60	50	72	104	10	10	12	120	30	050340
10X140/80-70	I			80					70						140		050370
10X160/100-90	J			100					90						160		050341
12X80/5	-			5					-						80		055351
12X100/25-8	E			25					8						100		055352
12X115/40-23	G	50	60	40	75	100	68	78	23	93	136	12	12	14	115	50	055395
12X140/65-48	I			65					48						140		050400
12X180//105-88	L			105					88						180		050410
16X125/30-8	G			30					8						125		050440
16X150/55-33	I	64	78	55	95	128	86	100	33	117	172	16	16	18	150	100	050354
16X170/75-53	K			75					53						170		050450

INSTALLATION



Anchor mechanical properties

Anchor size		M8	M10	M12	M16
Cross-section above cone					
f_{uk} (N/mm^2)	Min. tensile strength	700	700	700	600
f_{yk} (N/mm^2)	Yield strength	580	580	580	500
As (mm^2)	Stressed cross-section	23,76	40,72	55,42	103,87
Threaded part					
f_{uk} (N/mm^2)	Min. tensile strength	600	600	600	500
f_{yk} (N/mm^2)	Yield strength	480	480	480	400
As (mm^2)	Stressed cross-section	36,6	58	84,3	157
W_{el} (mm^3)	Elastic section modulus	31,23	62,3	109,17	277,47
$M^0_{rk,s}$ (Nm)	Characteristic bending moment	22	45	79	166
M (Nm)	Recommended bending moment	9,0	18,4	32,2	67,8

FIX II - HDG

hot dip galvanised version

The loads specified on this page allow judging the product's performances, but cannot be used for the designing.
The data given in the pages "CC method" have to be applied (3/4 and 4/4).

Ultimate ($N_{Ru,m}$, $V_{Ru,m}$) and characteristic loads (N_{Rk}, V_{Rk}) in kN

Mean Ultimate loads are derived from test results in admissible service conditions, and characteristic loads are statistically determined.

TENSILE

Anchor size	M8	M10	M12	M16
Minimum anchorage depth				
h_{ef}	**35**	**42**	**50**	**64**
$N_{Ru,m}$	13,4	14,0	23,6	30,6
N_{Rk}	8,1	9,9	15,9	22,9
Maximum anchorage depth				
h_{ef}	**48**	**52**	**68**	**86**
$N_{Ru,m}$	17,8	18,7	32,7	51,0
N_{Rk}	15,1	15,5	26,0	39,9

SHEAR

Anchor size	M8	M10	M12	M16
$V_{Ru,m}$	10,8	18,2	30,8	44,7
V_{Rk}	5,3	15,6	25,6	30,4

Design loads (N_{Rd}, V_{Rd}) for one anchor without edge or spacing influence in kN

$$N_{Rd} = \frac{N_{Rk}^{*}}{\gamma_{Mc}}$$

*Derived from test results

$$V_{Rd} = \frac{V_{Rk}^{*}}{\gamma_{Ms}}$$

TENSILE

Anchor size	M8	M10	M12	M16
Minimum anchorage depth				
h_{ef}	**35**	**42**	**50**	**60**
N_{Rd}	4,5	5,5	8,8	12,7
Maximum anchorage depth				
h_{ef}	**48**	**52**	**68**	**86**
N_{Rd}	8,4	8,6	14,4	22,1

$\gamma_{Mc} = 1{,}8$

SHEAR

Anchor size	M8	M10	M12	M16
V_{Rd}	5,8	9,2	13,3	24,8

$\gamma_{Ms} = 1{,}25$

Recommended loads (N_{rec}, V_{rec}) for one anchor without edge or spacing influence in kN

$$N_{rec} = \frac{N_{Rk}^{*}}{\gamma_M \cdot \gamma_F}$$

*Derived from test results

$$V_{rec} = \frac{V_{Rk}^{*}}{\gamma_M \cdot \gamma_F}$$

TENSILE

Anchor size	M8	M10	M12	M16
Minimum anchorage depth				
h_{ef}	**35**	**42**	**50**	**64**
N_{rec}	3,2	3,9	6,3	9,0
Maximum anchorage depth				
h_{ef}	**48**	**52**	**68**	**86**
N_{rec}	6,0	6,1	10,3	15,8

$\gamma_F = 1{,}4$; $\gamma_{Mc} = 1{,}8$

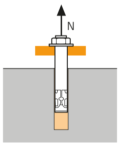
SHEAR

Anchor size	M8	M10	M12	M16
V_{rec}	3,0	8,9	14,6	17,4

$\gamma_F = 1{,}4$; $\gamma_{Ms} = 1{,}25$

SPIT CC Method

TENSILE in kN

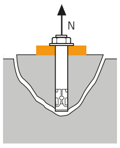


Pull-out resistance

$N_{Rd,p} = N^0_{Rd,p} \cdot f_b$

$N^0_{Rd,p}$		Design pull-out resistance			
Anchor size		M8	M10	M12	M16
Minimum anchorage depth					
h_{ef}		**35**	**42**	**50**	**64**
$N^0_{Rd,p}$	(C20/25)	3,3	5,0	8,9	13,9
Maximum anchorage depth					
h_{ef}		**48**	**52**	**68**	**86**
$N^0_{Rd,p}$	(C20/25)	5,0	6,7	11,1	22,2

$\gamma_{Mc} = 1,8$

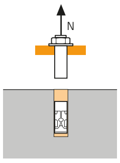


Concrete cone resistance

$N_{Rd,c} = N^0_{Rd,c} \cdot f_b \cdot \Psi_s \cdot \Psi_{c,N}$

$N^0_{Rd,c}$		Design cone resistance			
Anchor size		M8	M10	M12	M16
Minimum anchorage depth					
h_{ef}		**35**	**42**	**50**	**64**
$N^0_{Rd,c}$	(C20/25)	5,8	7,6	9,9	14,3
Maximum anchorage depth					
h_{ef}		**48**	**52**	**68**	**86**
$N^0_{Rd,c}$	(C20/25)	9,3	10,5	15,7	22,3

$\gamma_{Mc} = 1,8$

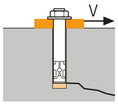


Steel resistance

$V_{Rd,s}$	Steel design tensile resistance			
Anchor size	M8	M10	M12	M16
$V_{Rd,s}$	9,3	16	22	34

$\gamma_{Ms} = 1,5$

SHEAR in kN

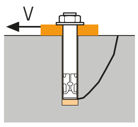


Concrete edge resistance

$V_{Rd,c} = V^0_{Rd,c} \cdot f_b \cdot f_{\beta,V} \cdot \Psi_{S\text{-}C,V}$

$V^0_{Rd,c}$		Design concrete edge resistance at minimum edge distance (C_{min})			
Anchor size		M8	M10	M12	M16
Minimum anchorage depth					
h_{ef}		**35**	**42**	**50**	**64**
C_{min}		55	75	100	100
S_{min}		45	65	100	100
$V^0_{Rd,c}$	(C20/25)	2,9	5,1	8,7	10,1
Maximum anchorage depth					
h_{ef}		**48**	**52**	**68**	**86**
C_{min}		60	65	90	105
S_{min}		50	55	75	90
$V^0_{Rd,c}$	(C20/25)	3,7	4,4	8,2	11,8

$\gamma_{Mc} = 1,5$

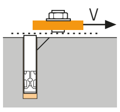


Pryout failure

$V_{Rd,cp} = V^0_{Rd,cp} \cdot f_b \cdot \Psi_s \cdot \Psi_{c,N}$

$V^0_{Rd,cp}$		Design pryout resistance			
Anchor size		M8	M10	M12	M16
Minimum anchorage depth					
h_{ef}		**35**	**42**	**50**	**64**
$V^0_{Rd,cp}$	(C20/25)	7,0	9,1	11,9	34,4
Maximum anchorage depth					
h_{ef}		**48**	**52**	**68**	**86**
$V^0_{Rd,cp}$	(C20/25)	11,2	12,6	37,7	53,6

$\gamma_{Mcp} = 1,5$



Steel resistance

$V_{Rd,s}$	Steel design shear resistance			
Anchor size	M8	M10	M12	M16
$V_{Rd,s}$	3,8	11,2	18,2	18,9

$\gamma_{Ms} = 1,25$

$$N_{Rd} = \min(N_{Rd,p}\ ;\ N_{Rd,c}\ ;\ N_{Rd,s})$$
$$\beta_N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c}\ ;\ V_{Rd,cp}\ ;\ V_{Rd,s})$$
$$\beta_V = V_{Sd} / V_{Rd} \leq 1$$

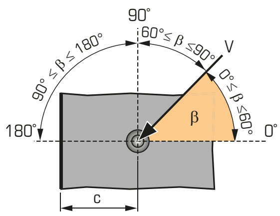
$$\beta_N + \beta_V \leq 1,2$$

f_b INFLUENCE OF CONCRETE

Concrete class	f_b	Concrete class	f_b
C25/30	1,1	C40/50	1,41
C30/37	1,22	C45/55	1,48
C35/45	1,34	C50/60	1,55

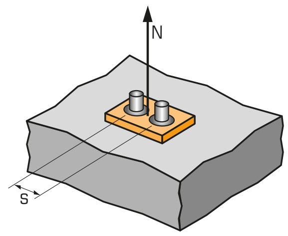
$f_{\beta,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

Angle β [°]	$f_{\beta,V}$
0 to 55	1
60	1,1
70	1,2
80	1,5
90 to 180	2



SPIT CC Method

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_s = 0{,}5 + \frac{s}{6.h_{ef}}$$

$s_{min} < s < s_{cr,N}$

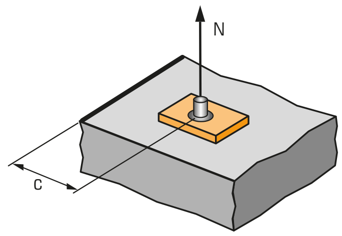
$s_{cr,N} = 3.h_{ef}$

Ψ_s must be used for each spacing influenced the anchors group

SPACING S	Reduction factor Ψ_s Minimum anchorage depth			
Anchor size	M8	M10	M12	M16
45	0,71			
65	0,81	0,76		
100	0,98	0,90	0,83	0,76
110	1,00	0,94	0,87	0,79
125		1,00	0,92	0,83
150			1,00	0,89
180				0,97
192				1,00

SPACING S	Reduction factor Ψ_s Maximum anchorage depth			
Anchor size	M8	M10	M12	M16
50	0,67			
55	0,69	0,68		
75	0,76	0,74	0,68	
90	0,81	0,79	0,72	0,67
105	0,86	0,84	0,76	0,70
145	1,00	0,96	0,86	0,78
180		1,00	0,94	0,85
205			1,00	0,90
240				0,97
280				1,00

$\Psi_{c,N}$ INFLUENCE OF EDGE FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_{c,N} = 0{,}23 + 0{,}51 \cdot \frac{c}{h_{ef}}$$

$c_{min} < c < c_{cr,N}$

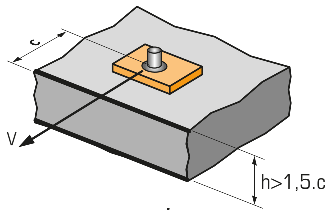
$c_{cr,N} = 1{,}5.h_{ef}$

$\Psi_{c,N}$ must be used for each distance influenced the anchors group.

EDGE C	Reduction factor $\Psi_{c,N}$ Minimum anchorage depth			
Anchor size	M8	M10	M12	M16
55	1,00			
65		1,00		
100			1,00	
100				1,00

EDGE C	Reduction factor $\Psi_{c,N}$ Maximum anchorage depth			
Anchor size	M8	M10	M12	M16
60	0,87			
65	0,92	0,87		
70	0,97	0,92		
90	1,00	1,00	0,90	
100			0,98	0,82
125			1,00	0,97
130				1,00

$\Psi_{s\text{-}c,V}$ INFLUENCE OF SPACING AND EDGE DISTANCE FOR CONCRETE EDGE RESISTANCE IN SHEAR LOAD

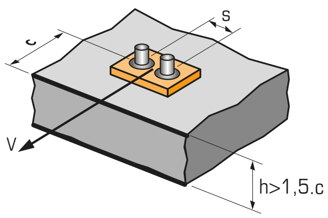


$$\Psi_{s\text{-}c,V} = \frac{c}{c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

Reduction factor $\Psi_{s\text{-}c,V}$
Non-cracked concrete

$\frac{c}{c_{min}}$	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4	2,6	2,8	3,0	3,2
$\Psi_{s\text{-}c,V}$	1,00	1,31	1,66	2,02	2,41	2,83	3,26	3,72	4,19	4,69	5,20	5,72

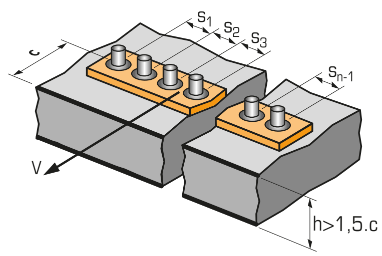


$$\Psi_{s\text{-}c,V} = \frac{3.c + s}{6.c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For 2 anchors fastening

Reduction factor $\Psi_{s\text{-}c,V}$
Non-cracked concrete

$\frac{s}{c_{min}}$ \ $\frac{c}{c_{min}}$	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4	2,6	2,8	3,0	3,2
1,0	0,67	0,84	1,03	1,22	1,43	1,65	1,88	2,12	2,36	2,62	2,89	3,16
1,5	0,75	0,93	1,12	1,33	1,54	1,77	2,00	2,25	2,50	2,76	3,03	3,31
2,0	0,83	1,02	1,22	1,43	1,65	1,89	2,12	2,38	2,63	2,90	3,18	3,46
2,5	0,92	1,11	1,32	1,54	1,77	2,00	2,25	2,50	2,77	3,04	3,32	3,61
3,0	1,00	1,20	1,42	1,64	1,88	2,12	2,37	2,63	2,90	3,18	3,46	3,76
3,5		1,30	1,52	1,75	1,99	2,24	2,50	2,76	3,04	3,32	3,61	3,91
4,0			1,62	1,86	2,10	2,36	2,62	2,89	3,17	3,46	3,75	4,05
4,5				1,96	2,21	2,47	2,74	3,02	3,31	3,60	3,90	4,20
5,0					2,33	2,59	2,87	3,15	3,44	3,74	4,04	4,35
5,5						2,71	2,99	3,28	3,71	4,02	4,33	4,65
6,0						2,83	3,11	3,41	3,71	4,02	4,33	4,65



For 3 anchors fastening and more

$$\Psi_{s\text{-}c,V} = \frac{3.c + s_1 + s_2 + s_3 + ... + s_{n-1}}{3.n.c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$