

SPIT MAXIMA

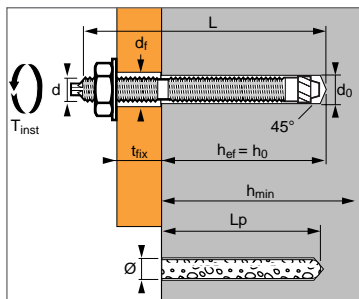
Stainless steel



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ETA Option 7
n° 03/0008



➤ Bonded anchor in glass capsule

Technical data

SPIT MAXIMA A4	Max. anchor depth (mm)	Max. thick of part to be fixed (mm)	Min thick of base material (mm)	Ø thread (mm)	Drilling depth (mm)	Ø drill bit (mm)	Ø clearance (mm)	Total rod length (mm)	Total capsule torque (mm)	Max. tighten (Nm)	Code rod	Code capsule
	h_{ef}	t_{fix}	h_{min}	d	h_0	d_0	d_f	L	L_p	T_{inst}		
MAXIMA M8	80	15	120	8	80	10	9	110	80	10	052400	051500
MAXIMA M10	90	20	130	10	90	12	12	130	85	20	052410	051510
MAXIMA M12	110	25	160	12	110	14	14	160	107	30	052420	051520
MAXIMA M16	125	35	175	16	125	18	18	190	107	60	052440	051530
MAXIMA M20	170	65	220	20	170	25	22	260	162	120	052450	051540
MAXIMA M24	210	63	270	24	210	28	26	300	200	200	052470	051550
MAXIMA M30	280	70	340	30	280	35	33	380	260	400	052490	051560

Anchor mechanical properties

		M8	M10	M12	M16	M20	M24	M30
Threaded part								
f_{uk} (N/mm ²)	Min. tensile strength	700	700	700	700	700	700	500
f_{yk} (N/mm ²)	Yield strength	350	350	350	350	350	350	200
A_s (mm ²)	Stressed cross-section	32,7	52,8	77	145,3	227	326,9	522,8
W_{el} (mm ³)	Elastic section modulus	26,4	54,1	95,3	247,0	482,4	833,7	1686,0
$M^{0}_{Rk,s}$ (Nm)	Characteristic bending moment	22	45	80	207	405	700	1011
M (Nm)	Recommended bending moment	9,0	18,4	32,7	84,5	165,3	285,7	412,7

Setting time before tightening torque and applying a load

Ambient temperature (°C)	SPIT MAXIMA resin	
	Dry concrete	Wet concrete
$T \geq 20^\circ\text{C}$	20 min.	40 min.
$10^\circ\text{C} < T < 20^\circ\text{C}$	30 min.	60 min.
$0^\circ\text{C} < T \leq 10^\circ\text{C}$	1 hour	2 hours
$-5^\circ\text{C} < T \leq 0^\circ\text{C}$	5 hours	10 hours

Chemical resistance of the SPIT MAXIMA anchor

Chemical substances	Concentration (%)	Resistance	Chemical substances	Concentration (%)	Resistance
Nitric acid	< 20	(+)	Ethylene glycol	100	(+)
Nitric acid	20 - 70	(o)	Heptane	100	(o)
Phosphoric acid	< 10	(+)	Hexane	100	(o)
Sulphurous acid	100	(o)	Methanol	≤ 15	(o)
Sulphuric acid	≤ 30	(+)	Carbon monoxide	100	(+)
Ethyl alcohol	≤ 15	(+)	Washing powder	100	(+)
Beer	100	(+)	Perchloroethylene	100	(o)
Carbon dioxide	100	(+)	Hydrogen peroxide	≤ 40	(o)
Engine petrol without benzene	100	(o)	Caustic potash	100	(+)
Hydrogen fluoride	≤ 20	(+)	Cement in suspension	saturated solution	(+)
Ammonia	100	(+)			

Resistant (+): the samples in contact with the substances did not show any visible damage such as cracks, attacked surfaces, burst corners nor large swelling.

Sensitive (o): use with care regarding exposure of the field of usage, precautions to be taken. The samples in contact with the substance slightly attacked the material.

* Using the installation tool available in each box of studs.

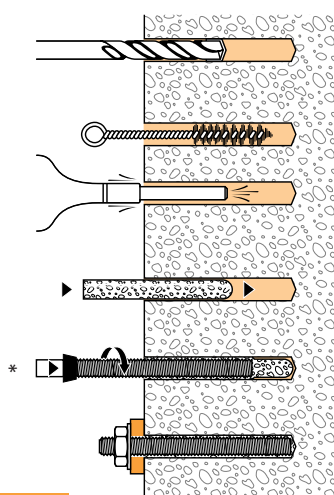
APPLICATION

- Fixing steel framed structures
- Fixing machinery
- Fixing of storage silos, refinery pipework supports
- Fixing motorway signs
- Fixing safety barriers

MATERIAL

- Threaded rod M8-M24: A4-70 acc. ISO 3506-1
- Threaded rod M30: A4-50 acc. Iso 3506-1
- Nut: Stainless steel A4-80, NF EN 10088-3
- Washer: Stainless steel A4, NF EN 20898-2

INSTALLATION



SPIT MAXIMA

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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.

Ultimate ($N_{Ru,m}$, $V_{Ru,m}$) / 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	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
$N_{Ru,m}$	25,9	44,1	67,2	93,2	105,4	237,6	297,7
N_{Rk}	18,3	25,7	37,7	57,1	80,8	119,7	151,9

SHEAR

Anchor size	M8	M10	M12	M16	M20	M24	M30
$V_{Ru,m}$	13,2	20,8	30,3	56,5	70,8	102	163,1
V_{Rk}	11,0	17,4	25,3	47,1	59,0	85,0	135,9

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	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
N_{Rd}	8,5	11,9	17,4	26,4	37,4	55,4	70,3

$\gamma_{Mc} = 2,16$

SHEAR

Anchor size	M8	M10	M12	M16	M20	M24	M30
V_{Rd}	7,0	11,2	16,3	30,4	38,1	54,8	57,1

$\gamma_{Ms} = 1,55$ for M8 to M24 and $\gamma_{Ms} = 2,38$ for M30

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	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
N_{Rec}	6,0	8,5	12,5	18,9	26,7	39,6	50,2

$\gamma_F = 1,4$; $\gamma_{Mc} = 2,16$

SHEAR

Anchor size	M8	M10	M12	M16	M20	M24	M30
V_{Rec}	5,0	8,0	11,6	21,7	27,2	39,1	40,8

$\gamma_F = 1,4$; $\gamma_{Ms} = 1,55$ for M8 to M24 and $\gamma_{Ms} = 2,38$ for M30

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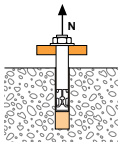
Stainless steel



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SPIT CC- Method (values issued from ETA)

TENSILE in kN

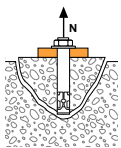


→ Pull out resistance for dry, wet (1) and flooded (2) concrete

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

Anchor size	Design pull-out resistance in dry and wet concrete						
	M8	M10	M12	M16	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
-40°C to +40°C	7,4	11,6	18,5	27,8	34,7	53,2	64,8
-40°C to +80°C	4,2	7,4	11,6	18,5	23,1	34,7	44,0
Design pull-out for flooded concrete							
-40°C to +40°C	-	-	15,8	23,8	29,7	45,6	55,5
-40°C to +80°C	-	-	9,9	15,8	19,8	29,7	37,7

$\gamma_{Mc} = 2,16$ (wet) ; $\gamma_{Mc} = 2,52$ (flooded)

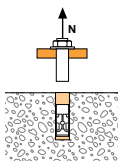


→ Concrete cone resistance for dry, wet (1) and flooded (2) concrete

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

Anchor size	Design pull-out resistance in dry and wet concrete						
	M8	M10	M12	M16	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
-40°C to +40°C	7,4	11,6	18,5	27,8	34,7	53,2	64,8
-40°C to +80°C	4,2	7,4	11,6	18,5	23,1	34,7	44,0
Design pull-out for flooded concrete							
-40°C to +40°C	-	-	15,8	23,8	29,7	45,6	55,5
-40°C to +80°C	-	-	9,9	15,8	19,8	29,7	37,7

$\gamma_{Mc} = 2,16$ (wet) ; $\gamma_{Mc} = 2,52$ (flooded)

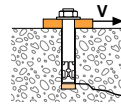


→ Steel resistance

Anchor size	Steel design tensile resistance						
	M8	M10	M12	M16	M20	M24	M30
$N_{Rd,s}$	12,3	19,8	28,9	54,5	85,0	122,5	91,3

$\gamma_{Ms} = 1,87$ for M8 to M24 and $\gamma_{Ms} = 2,86$ for M30

SHEAR in kN

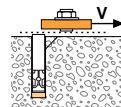


→ Concrete edge resistance

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

Anchor size	Design concrete edge resistance at minimum edge distance (C_{min})						
	M8	M10	M12	M16	M20	M24	M30
h_{ef}	80	90	110	125	170	210	280
C_{min}	40	45	55	65	85	105	140
S_{min}	40	45	55	65	85	105	140
$V_{Rd,c}^0$	2,1	2,7	4,0	5,7	10,1	14,9	26,0

$\gamma_{Mc} = 1,8$



→ Steel resistance

Anchor size	Steel design shear resistance						
	M8	M10	M12	M16	M20	M24	M30
$V_{Rd,s}$	6,2	8,8	11,2	21,9	37,4	51,6	57,1

$\gamma_{Ms} = 1,55$ for M8 to M24 and $\gamma_{Ms} = 2,38$ for M30

(1) The concrete in the area of the anchorage is water saturated.

(2) The concrete is wet, and the hole is full of water. The resin can be injected without remove water.

$$N_{Rd} = \min(N_{Rd,p} ; N_{Rd,c} ; N_{Rd,s})$$

$$\beta_N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c} ; V_{Rd,s})$$

$$\beta_V = V_{Sd} / V_{Rd} \leq 1$$

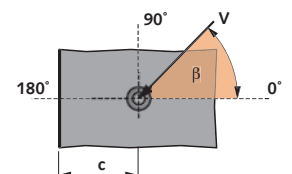
$$\beta_N^{1,5} + \beta_V^{1,5} \leq 1$$

f_b INFLUENCE OF CONCRETE

Anchor size	M8	M10	M12	M16	M20	M24	M30
C20/25	1	1	1	1	1	1	1
C30/37	1	1	1	1	1,18	1,07	1,27
C50/60	1	1	1	1	1,53	1,22	1,79

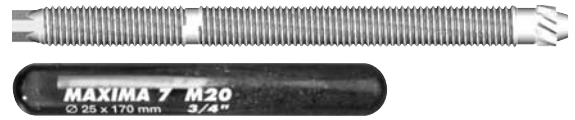
$f_{\beta,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

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



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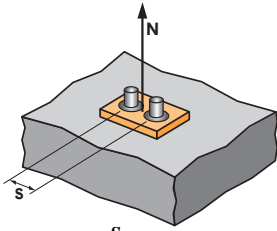
Stainless steel



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SPIT CC- Method (values issued from ETA)

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_s = 0,5 + \frac{s}{4 \cdot h_{ef}}$$

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

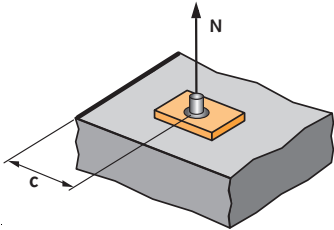
$$s_{cr,N} = 3 \cdot h_{ef}$$

Ψ_s must be used for each spacing influenced the anchors group.

SPACING S	Reduction factor Ψ_s Non-cracked concrete			
	M8	M10	M12	M16
40	0,63			
45	0,64	0,63		
55	0,67	0,65	0,63	0,61
65	0,70	0,68	0,65	0,63
85	0,77	0,74	0,69	0,67
105	0,83	0,79	0,74	0,71
140	0,94	0,89	0,82	0,78
160	1,00	0,94	0,86	0,82
180		1,00	0,91	0,86
220			1,00	0,94
250				1,00

SPACING S	Reduction factor Ψ_s Non-cracked concrete		
	M20	M24	M30
85	0,63		
105	0,65	0,63	
140	0,71	0,67	0,63
160	0,74	0,69	0,64
180	0,76	0,71	0,66
220	0,82	0,76	0,70
250	0,87	0,80	0,72
300	0,94	0,86	0,77
340	1,00	0,90	0,80
370		0,94	0,83
450		1,00	0,90
560			1,00

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



$$\Psi_{c,N} = 0,27 + 0,725 \cdot \frac{c}{h_{ef}}$$

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

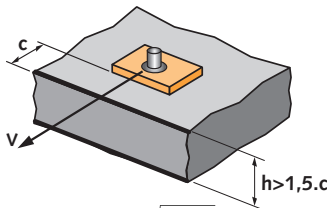
$$c_{cr,N} = 1,5 \cdot h_{ef}$$

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

EDGE C	Reduction factor $\Psi_{c,N}$ Non-cracked concrete			
	M8	M10	M12	M16
40	0,63			
45	0,68	0,63		
55	0,77	0,71	0,63	
65	0,86	0,79	0,70	0,66
85	1,00	0,95	0,83	0,76
90		1,00	0,86	0,79
110			1,00	0,91
125				1,00

EDGE C	Reduction factor $\Psi_{c,N}$ Non-cracked concrete		
	M20	M24	M30
85	0,63		
105	0,72	0,63	
120	0,78	0,68	
140	0,87	0,75	0,63
170	1,00	0,86	0,71
210		1,00	0,81
250			0,92
280			1,00

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



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

For single anchor fastening

Factor $\Psi_{s-c,V}$
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
$\Psi_{s-c,V}$	1,00	1,31	1,66	2,02	2,41	2,83	3,26	3,72	4,19	4,69	5,20	5,72

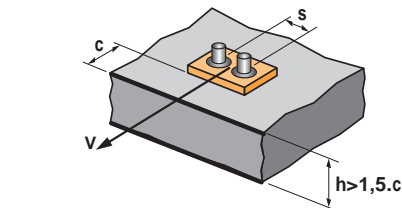
For 2 anchors fastening

Factor $\Psi_{s-c,V}$
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
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 other case of fastenings

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



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

