weber
SAINT-GOBAIN

weberanc 405 BFX

Pure epoxy anchoring resin in cartridge

Technical and repair mortars

Leb	Jordan	Egypt	UAE	Qatar	Kuwait	KSA	Oman
400ml	400ml	400ml	400ml	400ml	400ml	400ml	400ml

PRODUCT

weberanc 405 BFX is a two-component high strength pure epoxy chemical anchoring resin system. It is especially recommended in heavy loads applications, for anchoring of rebar and studs in solid concrete.

BENEFITS

- High bond strength with High load resistance
- Use with all grades of threaded rod and rebar
- Solvent free odorless resin, no shrinkage
- High durability
- For deep embedment installations
- Longer working times for large holes
- Used in dry and wet concrete and also in wood
- Used in flooded holes
- Used in corrosive environments
- Suitable for diamond drilled holes
- Used for elevated temperatures - temperature ranges I, II and III
- Used for rebar installations
- Low shrinkage enables large diameter installations
- Close edge distance and small spacing
- Manual cleaning up to 20mm diameter and embedment depths of 240mm
- Use with potable water
- F120 fire resistant
- ETA for post-installed rebar diameter 8 to 40 mm
- Applicable under seismic loading C1 and C2 and for post-installed rebar under static and seismic loading :
  - C1 for M8 to M30
  - C2 for M12 to M24

SCOPE OF USE

- Rebar anchoring (Doweling) in concrete
- Threaded rod and stud anchoring in concrete
- Horizontal, vertical and overhead applications

CHARACTERISTICS		TEST METHOD
Compressive strength at 7 days	> 80 MPa	ASTM D695
Bond strength at 14 days	10 MPa	
Water Absorption at 24 hours	0.1%	ASTM C882
Linear coefficient of shrinkage	< 0.005	ASTM C881

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VOC Content	A+ Rating	ASTM D570
ETA-19/0464 for rebar connections		

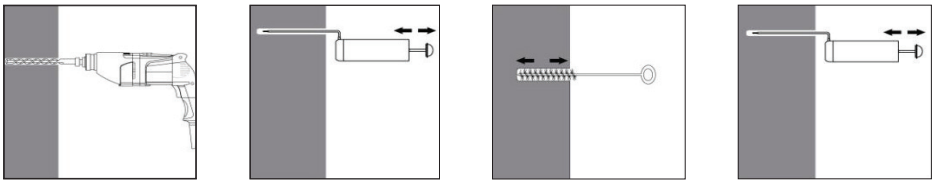
WORKING TIME AND MINIMUM CURING TIME

Concrete Temperature	Gel – Working Time	Minimum curing time in dry concrete	Minimum curing time in wet concrete
5°C	70 mins	48 hours	x2
10°C	32 mins	40 hours	x2
15°C	28 mins	30 hours	x2
20°C	25 mins	18 hours	x2
25°C	22 mins	17 hours	x2
30°C	20 mins	16 hours	x2
40°C	18 mins	12 hours	x2

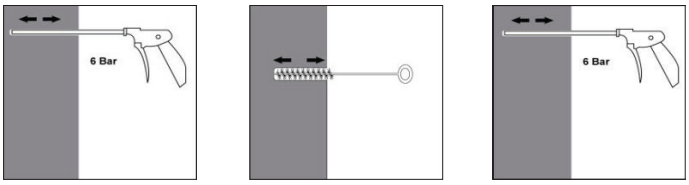
Full cure 24 hours. All specifications based on supplied mixer

PRODUCT APPLICATION

DRILLING HOLE AND CLEANING

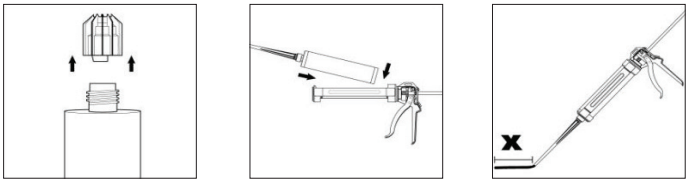


Drill hole in the substrate to the required embedment depth using the appropriately sized carbide drill bit. Bore hole cleaning just before setting an anchor, the bore hole must be free of dust and debris. The manual pump shall be used for blowing out bore holes up to diameters do ≤24mm and embedment depths up to hef ≤10d. Blow out at least 4 times from the back of the bore hole, using an extension if needed. Brush 4 times with the specified brush by inserting the steel brush to the back of the hole (if needed with an extension) in a twisting motion and removing it. Blow out again with manual pump at least 4 times.



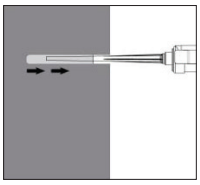
Compressed air cleaning (CAC) for all bore hole diameters do and all bore hole depths.
Blow 2 times from the back of the hole(if needed with a nozzle extension) over the whole length with oil-free compressed air (min.6 bar at 6 m3 /h).
Brush 2 times with the specified brush size by inserting the steel brush to the back of the hole (if needed with an extension) in a twisting motion and removing it.
x2 Blow out again with compressed air at least 2 times.

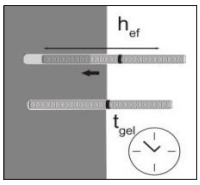
INSTALLATION



Remove the threaded cap from the cartridge.Tightly attach the mixing nozzle.Do not modify the mixer in any way. Made sure the mixing element is inside the mixer.Use only the supplied mixer. Insert the cartridge into the dispenser gun. Discard the initial trigger

pulls of adhesive. Discard the first 10ml of resin.





Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full, to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment depth. Before use, verify that the threaded rod is dry and free of contaminants.
Install the threaded rod to the required embedment depth during the open gel time tgel has elapsed. The working time tgel is given in table 2. The anchor can be loaded after the required curing time to cure (see page 2).

STORAGE

This product should be stored between +5°C & +25°C. Avoid Direct Sunlight The Shelf life of the product is 24 months from the manufacture date.

CONSUMPTION

Rebar Diameter	Hole Diameter	Adhesive volume per cm of embedment
mm	mm	ml
8	10	0.423
10	12	0.509
12	15	0.926
14	16	0.664
16	20	1.530
18	22	1.697
20	25	2.333
22	27	2.472
25	30	2.770
28	35	4.468
32	40	5.727
36	44	6.299
40	50	8.765

Example:

25mm diameter rebar with an embedment of 10 cm
2.77 cm³/cm. x 10 cm = 27.7 ml/anchoring
400 ml/cartridge ÷ 27.7 ml/anchoring = 14 anchoring / cartridge

Section 1: Design tensile resistance used with various stud strengths, material and rebar
Section 2: Bond Strength Factors
Section 3: Tension Edge and Spacing reduction factors

TYPICAL CHARACTERISTIC AND DESIGN RESISTANCE PERFORMANCE

Anchor Diameter	Hole Diameter	Design Tension Resitance(kN)	Recommended Tension Load (kN)	Characteristic Edge in Tension(mm)	Characteristic Spacing(mm)	Standard Embdement Depth (mm)
8	10	12.7	9.07	80	160	80
10	12	20.1	14.36	100	200	90
12	14	29.2	20.86	120	240	110
16	18	54.4	38.86	160	320	125
20	24	84.90	60.64	200	400	170
24	28	122.40	87.43	240	480	210

27	32	159.10	109.52	270	540	240
30	35	194.50	138.93	300	600	280
33	37	240.60	171.86	300	660	300
36	40	283.20	202.20	360	720	340

All data is based on correct installation - see instructions
No influence of edge and spacing
Minimum base material thickness hef +30mm >100mm for M8 to M12 and for M16 to M30 hef +2 d
hef range minimum or 4d whichever is greatest to 20d
Concrete strength C20/25 - fc cube = 25N/mm² (25 Mpa)
5.8 grade stud
Temperature range i maximum long term / short term temperature +24/40°C3

SECTION 1 - DESIGN TENSILE RESISTANCE USED WITH VARIOUS STUD STRENGTHS, MATERIAL AND REBAR.

All mentioned data in below tables is for rebars and threaded rods that work as anchors and not for post-installed rebar

Table 1: 5.8 Grade Steel Studding

Stud Diameter	Hole Diameter	Tensile Design Resistance								H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN								mm	kN
8	10	8.9	11.2	12.7						57	12.7
10	12	11.2	14.0	16.8	20.1					72	20.1
12	14		15.7	18.9	25.1	29.2				93	29.2
16	18				33.5	41.9	50.3	54.4		130	54.4
Depth (mm)		40	50	60	80	100	120	130	140		

Stud Diame-ter	Hole Diame-ter	Tensile Design Resistance												H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN												mm	kN
20	24	39.1	48.9	58.7	78.2	84.9								174	84.9
24	28		58.7	70.4	93.8	117.3	122.4							209	122.4
27	32			73.5	98	122.5	147	159.1						260	159.1
30	35			75.4	100.5	125.7	150.8	176	195					309	194.5
33	38				110.6	138.2	165.91	193.5	221.2	240.6				348	240.6
36	40				120.7	150.8	181	211.1	241.3	283.2				376	283.2
Depth (mm)		80	100	120	160	200	240	280	320	400	480	540	600		

= steel failure
Recommended Load is obtained by multiplying Design resistance by 0.714
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

Table 2: 8.8 Grade Steel Studding

Stud Diameter	Hole Diameter	Tensile Design Resistance									H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN									mm	kN
8	10	8.9	11.2	13.4	17.9	19.5					87	19.5
10	12	11.2	14.0	16.8	22.3	25.1	30.9				111	30.9
12	14		15.7	18.9	25.1	28.3	37.7	45.0			143	45.0
16	18				33.5	37.7	50.3	67.0	83.7		200	83.7
Depth (mm)		40	50	60	80	90	120	160	200	240		

Stud Diameter	Hole Diameter	Tensile Design Resistance													H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN													mm	kN
20	24	48.9	58.7	78.2	97.8	117.3	130.7								267	130.7
24	28	58.7	70.4	93.8	117.3	140.8	164.2	187.7	188.3						321	188.3
27	32		73.5	98	122.5	147	171.6	196.1	244.8						400	244.8
30	35		75.4	100.5	125.7	150.8	176.0	201.1	254.4	299.2					476	299.2
33	38			110.6	138.2	165.9	193.5	221.2	276.5	331.8	370.1				535	370.1
36	40			120.7	150.8	187.0	211.1	241.3	301.6	362.0	407.2	435.7			578	435.7
Depth (mm)		100	120	160	200	240	280	320	400	480	540	600	660	720		

= steel failure
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.
Recommended Load is obtained by multiplying Design resistance by 0.714.

Table 3: 10.9 Grade Steel Studding

Stud Diameter	Hole Diameter	Tensile Design Resistance											H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN											mm	kN
8	10	8.9	11.2	13.4	17.9	26.8	27.2						101	27.2
10	12	11.2	14.0	16.8	22.3	27.9	30.7	43.1					154	43.1
12	14		15.7	18.9	25.1	31.4	34.6	50.3	62.6				199	62.6
16	18				33.5	41.9	46.1	67.0	83.8	100.5	116.6		278	116.6
Depth (mm)		40	50	60	80	100	110	160	200	240	280	320		

Stud Diameter	Hole Diameter	TENSILE DESIGN RESISTANCE														H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN														mm	kN
20	24	39.1	48.9	58.7	78.2	97.8	117.3	136.9	156.4	182.0						372	182.0
24	28		58.7	70.4	93.8	117.3	140.8	164.2	187.7	234.6	262.2					447	262.2
27	32			73.5	98	122.5	147.0	171.6	196.1	245.1	294.1	330.9				557	341.0
30	35			75.4	100.5	125.7	150.8	176	201.1	251.4	301.6	339.3	377			663	416.7
33	38				110.6	138.2	165.9	193.5	221.2	276.5	331.8	373.3	414.7	456.2		746	515.5
36	40				120.7	150.8	181.0	211.1	241.3	301.6	362.0	407.2	452.4	497.7	542.9	805	606.9
Depth (mm)		80	100	120	160	200	240	280	320	400	480	540	600	660	720		

= steel failure
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.
Recommended Load is obtained by multiplying Design resistance by 0.714.

Table 4: A4-70 Stainless Steel Studding

Stud Diameter	Hole Diameter	Tensile Design Resistance									H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN									mm	kN
8	10	8.9	11.2	13.7							51	13.7
10	12	11.2	14.0	16.8	21.7						78	21.7
12	14		15.7	18.9	25.1	31.6					100	31.6
16	18				33.5	41.9	50.3	58.8			140	58.8
Depth (mm)		40	50	60	80	100	120	140	160	200		

Stud Diameter	Hole Diameter	Tensile Design Resistance										H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN										mm	kN
20	24	39.1	48.9	58.7	68.4	78.2	91.7					188	91.7
24	28		58.7	70.4	82.1	93.8	117.3	132.1				225	132.1
27	32			73.5	80.2						*1	131	80.2
30	35			75.4	88	98.1					*1	156	98.1
33	38				96.8	110.3	121.3				*1	176	121.3
36	40				105.6	120.7	142.8				*1	189	142.8
Depth (mm)		80	100	120	140	160	200	240	280	320			

**1 = Tensile strength 500N/mm²*

= steel failure

Recommended Load is obtained by multiplying Design resistance by 0.714

Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

Table 5: A4-80 Stainless Steel Studding

Stud Diameter	Hole Diameter	Tensile Design Resistance										H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN										mm	kN
8	10	8.9	11.2	15.7								58	15.7
10	12	11.2	14	16.8	22.3	24.8						89	24.8
12	14		15.7	18.9	25.1	28.3	31.4	36.1				115	36.1
16	18				33.5	37.7	41.9	50.3	58.7	67.2		160	67.2
Depth (mm)		40	50	60	80	90	100	120	140	160	200		
20	24	39.1	48.9	58.7	68.4	78.2	97.8	104.8				214	104.8
24	28		58.7	70.4	82.1	93.8	117.3	132.1			*2	225	132.1
27	32			73.5	80.2						*1	131	80.2
30	35			75.4	88.0	98.1					*1	156	98.1
33	38				96.8	110.6	121.3				*1	176	121.3
36	40				105.6	120.7	142.8				*1	189	142.8
Depth (mm)		80	100	120	140	160	200	240	320	400			

**1 = Tensile strength 500N/mm²*

**2 = Tensile strength 700N/mm²*

= steel failure

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Recommended Load is obtained by multiplying Design resistance by 0.714
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

Table 6: High bond reinforcing bars F yk=500N/mm²

Stud Diameter	Hole Diameter	Tensile Design Resistance														H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN														mm	kN
8	10	7.3	10.9	14.5	18.2	21.9										120	21.9
10	12	9.8	14.7	19.6	24.4	29.3	34.1									140	34.1
12	15		17.6	23.5	29.3	35.2	41.1	46.9	49.2							168	49.2
16	20			29	36.3	43.6	50.8	58.1	72.6	87.1	87.4					241	87.4
Depth (mm)		40	60	80	100	120	140	160	200	240	280	320	400	500	640		
20	25	36.3	45.4	54.5	63.5	90.8	108.9	127.1	136.6							301	136.6
25	30		52.4	62.8	73.3	104.7	125.7	146.6	167.6	209.5	213.5					408	213.5
28	35			64.5	75.3	107.5	129	150.5	172	215.1	267.8					498	267.8
32	40				78.2	111.7	134.1	156.4	178.7	223.4	279.3	312.8	349.7			626	349.7
36	44				88	125.7	150.8	176	201.1	251.4	314.2	351.9	402.2	443.5		706	443.5
40	50					139.6	167.6	195.5	223.4	279.3	349.1	391	446.9	502.7	546.3	782	546.3
Depth (mm)		80	100	120	140	200	240	280	320	400	500	560	640	720	800		

= steel failure
Recommended Load is obtained by multiplying Design resistance by 0.714
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

Table 7: High bond reinforcing bars fyk= 420N/mm2

Stud Diameter	Hole Diameter	Tensile Design Resistance																				H_{ef} failure	$F_{d,s}$ Design Load
mm	mm	kN																				mm	kN
8	10	10.9	12.7	14.5	16.3	18.2	18.4															101	18.4
10	12	14.7	17.1	19.6	22	24.4	26.9	28.7														117	28.7
12	15	17.6	20.5	23.5	26.4	29.3	32.3	35.2	38.1	41.1	41.3											141	41.3
16	20		25.4	29	32.7	36.3	39.9	46.3	47.2	50.8	58.1	72.6	73.4									202	73.4
20	25			36.3	40.8	45.4	49.9	54.5	59	63.5	72.6	90.8	108.9	114.8								253	114.8
25	30					52.4	57.6	62.8	68.1	73.3	83.8	104.7	125.7	146.6	167.6	179.3						342	179.3
28	35						59.1	64.5	69.9	75.3	86	107.5	129	150.5	172	215.1	225					418	225.0
32	40								72.6	78.2	89.4	111.7	134.1	156.4	178.7	223.4	279.3	293.7				526	293.7
36	44									88	100.5	125.7	150.8	176	201.1	251.4	314.2	351.9	372.5			593	372.5
40	50										111.7	139.6	167.6	195.5	223.4	279.3	349.1	391.0	446.9	458.9		657	458.9
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

= steel failure
Recommended Load is obtained by multiplying Design resistance by 0.714
Data shown below the minimum embedment depth is for reference only. Please refer to manufacturer for advice.

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	Non Cracked Concrete						Cracked Concrete						
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Nominal Embedment
Rebar Ø	Tension Nrk	Shear Vrk	Tension Nrk	Shear Vrk	Tension Nrk	Shear Vrk	Tension Nrk	Shear Vrk	Tension Nrk	Shear Vrk	Tension Nrk	Shear Vrk	(mm)
8	15.08	13.95	8.38	9.30	5.98	6.64	Not Applicable		Not Applicable		Not Applicable		60
	20.11		11.17		7.98								80
	40.21		22.34		15.96								160
10	18.85	21.45	10.47	14.30	7.48	10.21							60
	28.27		15.71		11.22								90
	62.83		34.91		24.93								200
12	23.75	31.05	13.19	20.70	9.42	14.79	13.19	31.05	7.33	20.70	5.24	14.79	70
	37.32		20.73		14.81		20.73		11.52		8.23		110
	81.43		45.24		32.31		45.24		25.13		17.95		240
14	30.78	42.45	17.10	28.30	12.21	20.21	16.71	42.45	9.29	28.10	6.63	20.07	80
	44.25		24.58		17.56		22.56		12.54		8.96		115
	107.73		59.85		42.75		58.50		32.50		23.21		280
16	34.18	55.50	18.99	37.00	13.56	26.43	18.10	55.50	10.05	37.00	7.18	26.43	80
	53.41		29.67		21.19		25.10		13.94		9.96		125
	136.72		75.96		54.25		72.38		40.21		28.72		320
18	37.32	69.66	20.73	46.44	14.81	33.17	19.23	69.66	10.68	46.44	7.63	33.17	80
	69.98		38.88		27.77		31.50		17.50		12.50		150
	167.95		93.31		66.65		86.52		48.07		34.33		360
20	45.24	86.55	21.54	57.70	15.39	41.21	22.62	86.55	10.77	57.70	7.69	41.21	90
	85.45		40.69		29.07		37.60		17.90		12.79		170
	201.06		95.74		68.39		100.53		47.87		34.19		400
22	55.29	104.01	26.33	69.34	18.81	49.53	25.92	104.00	12.34	69.34	8.82	49.53	100
	105.06		20.03		35.73		45.18		21.51		15.37		190
	243.29		115.85		82.75		114.04		54.30		38.79		440
25	62.83	135.00	29.92	90.00	21.37	64.29	27.49	135.00	13.09	90.00	9.35	64.29	100
	131.95		62.83		44.88		56.73		27.02		19.30		210
	314.16		149.60		106.86		137.45		65.45		46.75		500
28	73.89	168.75	35.19	112.50	25.13	80.36	34.48	168.75	16.42	112.50	11.73	80.36	112
	184.73		87.96		62.83		77.60		36.95		26.39		280
	369.45		175.93		125.66		172.41		82.10		58.64		560
32	96.51	220.95	45.96	147.30	32.83	105.21	45.04	220.95	21.45	147.30	15.32	105.21	128
	241.27		114.89		82.07		98.92		47.10		33.65		320
	482.55		229.79		164.13		225.19		107.23		76.60		640

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Section 1-Notes

Formulas used for design tensile resistance calculation:
N rd(KN)= $\tau d * \varpi * d * hef$ where:
N rd : Design tensile Resistance
τd: Design Bond strength derived from test results from the Characteristic Bond Strength (N/mm^2)
τd= 8.5 N/mm2 for rebar 8mm - 16mm (non-cracked C20/25 temp I dry and wet concrete, anchor spacing 20d, anchor edge 10d)
τd =8.3 N/mm2 for rebar 20mm - 30mm (non-cracked C20/25 temp I dry and wet concrete, anchor spacing 20d, anchor edge 10d)
d= nominal diameter of anchor (mm)
hef = nominal embedment depth of anchor (mm)

N rds(KN) = A X fy,s/γMs where:
N rds :Design Steel tensile load (kN)
A: Cross sectional area of anchor
Fy,s :Yield Strength of Anchor
γMs: Safety Factor of 1.15
Safety factor is 1.4 for BSt 500 rebar
Safety factor is 1.56 for stainless steel, up to M24, M30 and M36 is 2.0
Safety factor is 1.5 for all carbon steel

hef,s= N rds/($\tau d * \varpi * d$) where:
hef,s: Depth of steel failure
τd: Design Bond strength derived from test results from the Characteristic Bond Strength (N/mm^2)
d= nominal diameter of anchor (mm).

SECTION 2- BOND STRENGTH FACTORS

2.1 Stud and threaded rod

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm^2 (MPa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
fc=	0.98	1.00	1.02	1.04	1.06	1.08	1.09	1.10

Influence of environmental conditions in non-cracked concrete

		Ø 8	Ø 10	Ø 12	Ø 16	Ø 18	Ø 20	Ø 22	Ø 25	Ø 28	Ø 32
Temp I 40°C/24°C	Dry and Wet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Flooded	1.00	0.94	0.87	0.79	0.71	0.65	0.57	0.50	0.43	0.36
Temp II 60°C/43°C	Dry and Wet	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Flooded	0.65	0.63	0.61	0.59	0.57	0.54	0.52	0.50	0.48	0.46
Temp III 72°C/43°C	Dry and Wet	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.48	0.47	0.46
	Flooded	0.57	0.54	0.52	0.51	0.50	0.49	0.47	0.45	0.44	0.42

Influence of environmental conditions in cracked concrete

		Ø 8	Ø 10	Ø 12	Ø 16	Ø 20	Ø 24	Ø 27	Ø 30	Ø 33	Ø 32
Temp I 40°C/24°C	Dry and Wet	n/a	n/a	0.50	0.48	0.46	0.45	0.43	0.41	0.40	0.38
	Flooded	n/a	n/a	0.50	0.42	0.38	0.38	0.32	0.28	0.24	0.20
Temp II 60°C/43°C	Dry and Wet	n/a	n/a	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25
	Flooded	n/a	n/a	0.32	0.29	0.28	0.27	0.25	0.23	0.22	0.20
Temp III 72°C/43°C	Dry and Wet	n/a	n/a	0.27	0.27	0.26	0.25	0.25	0.24	0.23	0.20
	Flooded	n/a	n/a	0.27	0.27	0.26	0.25	0.25	0.24	0.23	0.22

Influence of environmental conditions in cracked concrete

Temperature Range	Concrete Service Temperature	Maximum Long Term Concrete Temp	Maximum Short Term Concrete Temp
Range I	-40°C to +40°C	+24°C	+40°C
Range II	-40°C to +60°C	+43°C	+60°C

Service temperature range: Range of ambient temperatures after installation and during the lifetime of the anchor.
Short term temperature: Temperatures within the service temperature range which vary over short intervals,e.g. day/night cycles and freeze/thaw cycles.
Long term temperature: Temperature, within the service temperature range, which will be approximately constant over significant periods of time. Long term temperatures will include constant or near constant temperatures, such as those experienced in cold stores or next to heating installations.

2.2- Rebar

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm² (MPa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60	C55/67	C60/75	C70/85	C80/96	C90/105
fc=	0.98	1.00	1.02	1.04	1.06	1.08	1.09	1.10	1.10	1.12	1.13	1.14	1.15

Influence of environmental conditions in non-cracked concrete

		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20	Ø 22	Ø 25	Ø 28	Ø 32
Temp I 40°C/24°C	Dry and Wet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Flooded	1.00	0.94	0.90	0.87	0.85	0.82	0.80	0.76	0.71	0.65	0.63
Temp II 60°C/43°C	Dry and Wet	0.67	0.65	0.63	0.63	0.62	0.62	0.61	0.61	0.60	0.60	0.59
	Flooded	0.65	0.64	0.61	0.60	0.59	0.59	0.58	0.57	0.56	0.55	0.47
Temp III 72°C/43°C	Dry and Wet	0.60	0.58	0.57	0.57	0.56	0.56	0.56	0.55	0.55	0.54	0.53
	Flooded	0.58	0.56	0.53	0.52	0.50	0.47	0.47	0.46	0.45	0.43	0.41

Influence of environmental conditions in cracked concrete

		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20	Ø 22	Ø 25	Ø 28	Ø 32
Temp I 40°C/24°C	Dry and Wet	n/a	n/a	0.55	0.51	0.47	0.45	0.44	0.43	0.43	0.42	0.41
	Flooded	n/a	n/a	0.55	0.48	0.42	0.41	0.40	0.39	0.38	0.36	0.35
Temp II 60°C/43°C	Dry and Wet	n/a	n/a	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.23
	Flooded	n/a	n/a	0.30	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.22
Temp III 72°C/43°C	Dry and Wet	n/a	n/a	0.30	0.28	0.26	0.25	0.25	0.24	0.24	0.23	0.22
	Flooded	n/a	n/a	0.30	0.28	0.26	0.25	0.24	0.24	0.23	0.23	0.22

Influence of environmental conditions in cracked concrete

Temperature Range	Concrete Service Temperature	Maximum Long Term Concrete Temp	Maximum Short Term Concrete Temp
Range I	-40°C to +40°C	+24°C	+40°C
Range II	-40°C to +60°C	+43°C	+60°C
Range III	-40°C to +72°C	+43°C	+72°C

Service temperature range: Range of ambient temperatures after installation and during the lifetime of the anchor.
Short term temperature: Temperatures within the service temperature range which vary over short intervals, e.g. day/night cycles and

freeze/thaw cycles.
Long term temperature: Temperature, within the service temperature range, which will be approximately constant over significant periods of time.
Long term temperatures will include constant or near constant temperatures, such as those experienced in cold stores or next to heating installations.

SECTION 3- TENSION EDGE AND SPACING REDUCTION FACTORS

3.1 Effect of Anchor Spacing - Tension

Anchor Spacing	Stud / Rebar Diameter										
mm	8	10	12	16	20	24	27	30	33	36	40
40	0.64										
50	0.67	0.63									
60	0.70	0.65	0.63								
70	0.73	0.67	0.64								
80	0.76	0.69	0.66	0.63							
90	0.79	0.72	0.68	0.64							
100	0.82	0.74	0.70	0.65	0.63						
120	0.87	0.79	0.74	0.68	0.65	0.63	0.63				
150	0.96	0.86	0.80	0.73	0.68	0.65	0.64	0.63			
160	1.00	0.88	0.82	0.74	0.70	0.66	0.65	0.63	0.63	0.63	0.63
175		0.92	0.85	0.76	0.71	0.67	0.66	0.64	0.63	0.63	0.63
200		1.00	0.90	0.80	0.74	0.69	0.69	0.66	0.65	0.65	0.65
225			0.95	0.84	0.77	0.72	0.71	0.68	0.67	0.67	0.66
240			1.00	0.86	0.79	0.73	0.72	0.69	0.68	0.68	0.67
250				0.87	0.80	0.74	0.73	0.70	0.69	0.68	0.68
275				0.91	0.83	0.76	0.75	0.72	0.71	0.70	0.69
280				0.92	0.84	0.77	0.76	0.73	0.71	0.70	0.69
300				0.95	0.86	0.79	0.78	0.74	0.73	0.72	0.71
320				1.00	0.88	0.81	0.80	0.76	0.74	0.73	0.72
350					0.92	0.83	0.82	0.78	0.77	0.75	0.73
400					1.00	0.88	0.87	0.82	0.80	0.78	0.76
440						0.92	0.91	0.85	0.83	0.81	0.79
480						1.00	0.94	0.88	0.86	0.84	0.81
540							1.00	0.93	0.91	0.88	0.84
600								1.00	0.96	0.92	0.88
660									1.00	0.96	0.91
720										1.00	0.95
800											1.00

3.1 Effect of Anchor Spacing - Tension

Edge Distance	Stud / Rebar Diameter										
mm	8	10	12	16	20	24	27	30	33	36	40
40	0.64										
50	0.73	0.63									
60	0.82	0.70	0.63								
70	0.90	0.77	0.68								
80	1.00	0.84	0.74	0.63							
90		0.91	0.80	0.67							
100		1.00	0.86	0.71	0.63						
110			0.92	0.76	0.66						
120			1.00	0.80	0.70	0.64					
140				0.89	0.77	0.67	0.63	0.63			
160				1.00	0.84	0.72	0.70	0.65	0.63	0.67	
180					0.91	0.78	0.75	0.70	0.66	0.71	0.68
200					1.00	0.84	0.81	0.76	0.71	0.74	0.71
220						0.89	0.86	0.81	0.75	0.78	0.75
240						1.00	0.92	0.86	0.80	0.82	0.78
270							1.00	1.00	0.87	0.87	0.83
300								1.00	0.94	0.93	0.88
330									1.00	0.98	0.93
360										1.00	0.98
400											1.00