

Monday, November 14, 2016

To Whom it may concern  
ADIT Ltd  
Moshav Bne Reem  
79840 Israel

To Whom it may concern.

**Ref:- Chemfix Products Ltd (UK) as the manufacturer of ADIT Chemical Anchors**

This letter confirms the relationship between Chemfix Products Ltd, as a manufacturer of own label chemical anchoring products in cartridges, wholly produced in the Dewsbury factory and exported worldwide.

ADIT Ltd, 79840 Israel is the customer of Chemfix and is supplied with labelled product under the ADIT "Chemical Pro" branding. Each ADIT product pertains to the Chemfix range as follows:

"Adit AC500Pro" is the same resin and cartridge as "Chemfix Pure Epoxy"

"Adit Chemfix500Pro" is the same resin and cartridge as "Chemfix 500"

"AC100Pro" is the same resin and cartridge as "Chemfix CH+"

"CT50Pro" is the same resin and cartridge as "Chemfix PESF"

Yours sincerely



Urs Joos  
Commercial & Marketing Director  
Chemfix Products Limited

# CHEMFIX CH+

## Vinylester RESIN Styrene Free



A two component chemical anchoring injection system.  
 A formulation derived from vinylester resin with very high bond strength, developed principally to anchor threaded rods and rebar into concrete. Used for high performance structural applications where loading is critical.

### • CHARACTERISTICS

- Suitable for high loads within standard annulus and embedments.
- Fast working times for early loading in time sensitive applications.
- No styrene allows for use indoors and in enclosed spaces.
- Use in wet or flooded environments and fixing holes.
- High durability, resistance to chemicals.
- Used for studs and rebar.
- 10:1 resin available in a variety of cartridge types.
- Fixings in concrete, wood, or other high strength materials.

### • APPROVALS / CERTIFICATIONS / TESTING

- 12/0024 - ETA Option 1 Cracked Concrete / TR029. Includes flooded holes, and wet and dry concrete conditions.
- C2 Seismic Approval - PENDING
- 14/0057 - ETA TR023 Post Installed Rebar Installations.
- CE Certified 1404-CPR-2583 - ZAG, Solvenia.
- R240 Fire Test Report SIGGMA
- Complies with Highways Agency Interim Advice Note 104/15.
- WRAS Approved for use with Potable drinking water\* approval no. 1501531.
- LEED tested 2009 EQ c4.1 SCAQMD rule 1168 (2005.)
- VOC A+ Rating (Volatile Organic Content)

### • PHYSICAL PROPERTIES

- Mixed Colour - Grey
- Density - 1.61 kg/m<sup>3</sup>
- Compressive Strength - 73 N/mm<sup>2</sup> (EN ISO 604)

### • TYPICAL TENSILE PERFORMANCE - STANDARD EMBEDMENT DEPTH

Concrete, C20/25, 5.8 Grade Studding						
Size	Recommended Load		Spacing (S <sub>cr,N</sub> ) (mm)	Drill Hole Ø (mm)	Fixing Hole Ø (mm)	Setting Depth (mm)
	Tension (N <sub>rec</sub> )	Shear (V <sub>rec</sub> )				
M8	9.07	5.14	160	10	9	80
M10	14.36	8.57	200	12	12	90
M12	20.86	12.00	240	14	14	110
M16	32.31	22.29	320	18	18	125
M20	49.85	34.86	400	24	22	170
M24	63.33	50.29	460	28	26	210
M30	86.71	81.43	560	35	32	280

### • CARTRIDGE SIZES

165ml | 300ml | 410ml  
 345ml | 825ml



# CHEMFIX CH+

## Vinylester RESIN Styrene Free

### • WORKING AND HARDENING TIMES

Base Material Temperature	-10°C**	-5°C**	5°C	15°C	25°C	35°C
Gel Working Time	50'	40'	20'	9'	5'	3'
Curing Time Dry Concrete	240'	180'	90'	60'	30'	20'
Curing Time Wet Concrete	x 2	x 2	x 2	x 2	x 2	x 2

\*\*Resin Temperature must be at least 20°C

### • APPROVALS

CE 1404  
Chemfix Products Ltd  
2015

DOP: www.chemfix.co.uk/dop/CH

Chemfix CH+  
ETA-12/0024  
ETAG 001-05 Option 7  
M8-M24 / Rebar Ø 8 to 25mm  
Uncracked Concrete  
ETAG 001-05 Option 1  
M12-M16  
Cracked Concrete  
1404-CPR-2583

CE 1404  
Chemfix Products Ltd  
2015

DOP: www.chemfix.co.uk/dop/CH

Chemfix CH+ Rebar  
ETA-14/0057  
TR023  
Post Installed Rebar Ø 8 to 16mm  
1404-CPR-2584

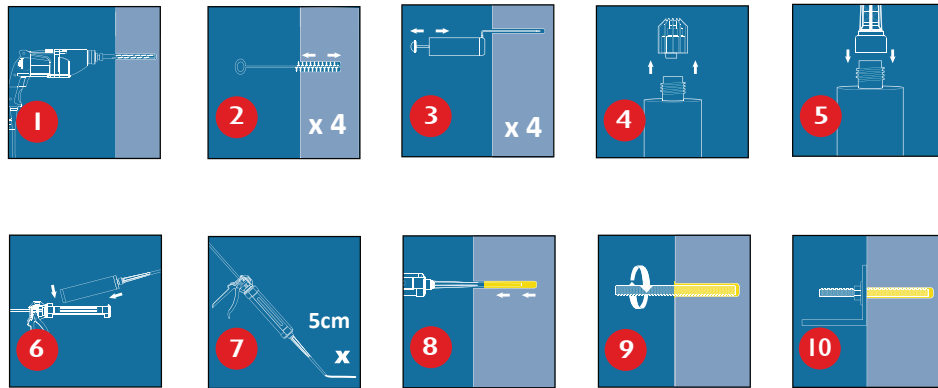
FIRE RATED

WRAS  
APPROVED MATERIAL

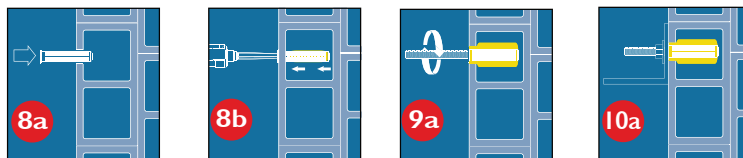
**C2 SEISMIC APPROVAL PENDING**

### • INSTALLATION

Solid substrates



Hollow wall



For further information, see the Technical Data Sheet

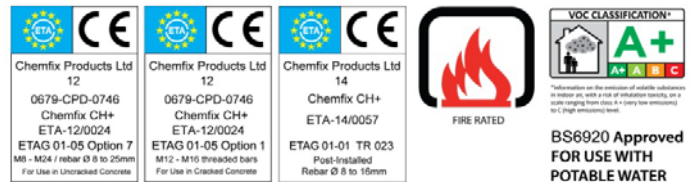
### • STORAGE / SHELF

This product should be stored between +5°C & +25°C.  
Avoid Direct Sunlight  
The Shelf life of the product is 18 months from the manufacture date.

## Features and Benefits

Version 05/07/2014

- High bond strength with High load resistance
- Used with all grades of threaded rod and rebar in accordance with TR029
- Used in non-cracked and cracked concrete
- Fast gelling and curing
- Used in dry and wet concrete
- Used in critical or overhead applications
- Used in corrosive environments
- ETA tested based on life of anchor 50 years
- Used for elevated temperatures - temperature ranges I, II and III
- Used for post installed rebar installations under TR029 and TR023
- Low shrinkage enables large diameter installations
- Close edge distance and small spacing
- Manual cleaning up to 20mm diameter and embedment depths of 240mm
- Independently tested and approved



## Contents

- PAGE 1 - Features and Benefits
- PAGE 2 - Loads, Edge and Spacings based on Characteristic bond strengths Showing steel failure
- PAGE 3 - Design Resistance of resin used with various stud strengths, material and rebar.
- PAGE 4 - Characteristic and Design load resistances based on characteristic bond strengths for hef 4d (minimum embedment) to 20d
- PAGE 5 - Bond Strength Factors
- PAGE 6 - Characteristic and Design load resistances for REBAR based on characteristic bond strengths for hef 4d (minimum embedment) to 20d
- PAGE 7 - Bond Strength Factors for REBAR
- PAGE 8 - Material properties for threaded rods and rebar
- PAGE 9 - Tension Edge and Spacing reduction factors
- PAGE 10 - Curing Time / Temperature Range
- PAGE 11 - Installation parameters: drilling hole cleaning and installation

## Shelf Life and Storage

This product should be stored between +5°C & +25°C.  
The Shelf life of the product is 12 months from the manufacture date.

**IMPORTANT** The information and data given is based on our own experience, research and testing and is believed to be reliable and accurate. However, as we cannot know the varied uses to which its products may be applied, or the methods of application used, no warranty as to the fitness or suitability of its products is given or implied. It is the users responsibility to determine suitability of use. For further information please contact Our Technical Department.

## Product Description

Chemfix CH+ is a 2 component high strength 10:1 ratio chemical anchoring resin system. It is designed as a fast curing high strength resin fixing anchor for very high loads and critical and overhead fixings especially in corrosive environments, or damp conditions.

Available in sizes : 150/165/170/280/300ml Foil Bag 10:1, 330/345/350/825ml Side By Side and 380/400/410ml Coaxial Cartridges

## Specific Benefits

- European Approved
- High loads possible
- High chemical resistance
- Use with potable water
- Studs and rebar
- Cracked or Non-Cracked
- A+ Rating VOC content
- Styrene Free Low odour
- Fire approved R180
- Suitable underwater

## Approvals

- ETA Option 7 ETAG 001 for uncracked concrete with studs and rebar TR029
- ETA Option 1 ETAG 001 for cracked concrete with studs
- ETA for post installed Rebar TR023
- Tested to BS6920 for use with potable water
- Tested according to LEED 2009 EQ c4.1, SCAQMD rule 1168 (2005).

## Loads, Edge and Spacings based on Characteristic bond strengths - Showing steel failure

Size (mm)	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic distances (mm)			Min Edge and Spacing (mm)	Nominal Embedment (mm)	Hole Diameter concrete (mm)	Hole Diameter fixture (mm)	Max Torque (Nm)
	Tension	Shear	Tension	Shear	Tension	Shear	Edge	Spacing	Edge					
	$N_{rk}$	$V_{rk}$	$N_{rd}$	$V_{rd}$	$N_{rec}$	$V_{rec}$	$C_{cr,N}$	$S_{cr,N}$	$C_{cr,V}$	$C_{min}, S_{min}$				
8	19.00		12.70		9.07						60	10	9	10
	19.00	9.00	12.70	7.20	9.07	5.14	80	160	80	40	80			
	19.00		12.70		9.07						160			
10	22.62		15.08		10.77						60	12	12	20
	30.20	15.00	20.10	12.00	14.36	8.57	100	200	90	50	90			
	30.20		20.10		14.36						200			
12	29.82		19.88		14.20						70	14	14	40
	43.80	21.00	29.20	16.80	20.86	12.00	120	240	110	60	110			
	43.80		29.20		20.86						240			
16	43.43		28.95		20.68						80	18	18	80
	67.86	39.00	45.24	31.20	32.31	22.29	160	320	125	80	125			
	81.60		54.40		38.86						320			
20	55.42		36.95		26.39						90	24	22	120
	104.68	61.00	69.79	48.80	49.85	34.86	200	400	180	100	170			
	127.40		84.90		60.64						400			
24	63.33		42.22		30.16						100	28	26	160
	133.00	88.00	88.67	70.40	63.33	50.29	230	460	220	120	210			
	183.60		122.40		87.43						480			
27	70.91		47.27		33.77						110	32	30	180
	154.72	115.00	103.15	92.00	73.68	65.71	270	540	240	135	240			
	238.00		159.10		113.64						540			
30	78.04		52.02		37.16						120	35	32	200
	182.09	142.50	121.39	114.00	86.71	81.43	280	560	280	150	280			
	292.00		194.50		138.93						600			
33	88.95		59.30		42.36						130	37	36	250
	205.27	173.50	136.85	138.80	97.75	121.43	310	620	310	165	300			
	360.00		240.60		171.86						660			
36	108.57		72.38		51.70						150	40	38	300
	246.10	212.50	164.07	170.00	117.19	121.43	330	660	330	180	340			
	425.00		283.33		202.38						720			

= steel failure

**Table notes** : see back page

Design Resistance used with various stud strengths, material and rebar.

**5.8 Grade Steel Studding**

Stud Diameter (mm)	Hole Diameter (mm)	Embedment Depth $h_{ef}$ (mm)																			$h_{ef}$ failure (mm)	$F_{d,s}$ design load (kN)
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660		
8	10	12.7	steel failure																		59	12.7
10	12	15.1	17.6	20.1	steel failure																80	20.1
12	14	19.9	22.7	25.6	28.4	29.2	steel failure														103	29.2
16	18	29.0	32.6	36.2	39.8	43.4	47.1	50.7	54.4	steel failure										150	54.4	
20	24	32.8	36.9	41.1	45.2	49.3	53.4	57.5	65.7	82.1	84.9	steel failure								207	84.9	
24	28	42.2	46.5	50.7	54.9	59.1	67.6	84.5	101.3	118.2	122.4	steel failure						290	122.4			
27	32	47.3	51.6	55.9	60.2	68.8	86.0	103.2	120.3	137.5	159.1	steel failure					370	159.1				
30	35	52.0	56.4	60.7	69.4	86.7	104.1	121.4	138.8	173.4	194.5	steel failure				449	194.5					
33	38	59.3	63.9	73.0	91.2	109.5	127.7	146.0	182.5	219.0	240.6	steel failure			527	240.6						
36	40	67.6	77.2	96.5	115.8	135.1	154.4	193.0	231.6	260.6	283.2	steel failure		587	283.2							
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720	

**8.8 Grade Steel Studding**

Stud Diameter (mm)	Hole Diameter (mm)	Embedment Depth $h_{ef}$ (mm)																			$h_{ef}$ failure (mm)	$F_{d,s}$ design load (kN)			
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660			720		
8	10	12.9	15.0	17.2	19.3	19.5	steel failure																91	19.5	
10	12	15.1	17.6	20.1	22.6	25.1	27.6	30.2	30.9	steel failure														123	30.9
12	14	19.9	22.7	25.6	28.4	31.2	34.1	36.9	39.8	45.0	steel failure										158	45.0			
16	18	29.0	32.6	36.2	39.8	43.4	47.1	50.7	57.9	72.4	83.7	steel failure								231	83.7				
20	24	32.8	36.9	41.1	45.2	49.3	53.4	57.5	65.7	82.1	98.5	114.9	130.7	steel failure						318	130.7				
24	28	42.2	46.5	50.7	54.9	59.1	67.6	84.5	101.3	118.2	135.1	168.9	188.3	steel failure				446	188.3						
27	32	47.3	51.6	55.9	60.2	68.8	86.0	103.2	120.3	137.5	171.9	206.3	232.1	steel failure			570	244.8							
30	35	52.0	56.4	60.7	69.4	86.7	104.1	121.4	138.8	173.4	208.1	234.1	260.2	steel failure		690	299.2								
33	38	59.3	63.9	73.0	91.2	109.5	127.7	146.0	182.5	219.0	246.4	273.7	301.1	steel failure	811	370.1									
36	40	67.6	77.2	96.5	115.8	135.1	154.4	193.0	231.6	260.6	289.5	318.5	347.4	steel failure	903	435.7									
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720				

Design Resistance used with various stud strengths, material and rebar.

### 10.9 Grade Steel Studding

Stud Diameter (mm)	Hole Diameter (mm)	Embedment Depth $h_{ef}$																				$h_{ef}$ failure (mm)	$F_{d,s}$ design load (kN)
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720		
8	10	12.9	15.0	17.2	19.3	21.4	23.6	25.7	27.2													127	27.2
10	12	15.1	17.6	20.1	22.6	25.1	27.6	30.2	32.7	35.2	40.2	43.1										171	43.1
12	14		19.9	22.7	25.6	28.4	31.2	34.1	36.9	39.8	45.4	56.8	62.6									220	62.6
16	18			29.0	32.6	36.2	39.8	43.4	47.1	50.7	57.9	72.4	86.9	101.3	115.8	116.6						322	116.6
20	24			32.8	36.9	41.1	45.2	49.3	53.4	57.5	65.7	82.1	98.5	114.9	131.4	164.2						443	182.0
24	28				42.2	46.5	50.7	54.9	59.1	67.6	84.5	101.3	118.2	135.1	168.9	202.7						621	262.2
27	32					47.3	51.6	55.9	60.2	68.8	86.0	103.2	120.3	137.5	171.9	206.3	232.1					793	341.0
30	35						52.0	56.4	60.7	69.4	86.7	104.1	121.4	138.8	173.4	208.1	234.1	260.2				961	416.7
33	38							59.3	63.9	73.0	91.2	109.5	127.7	146.0	182.5	219.0	246.4	273.7	301.1			1130	515.5
36	40								67.6	77.2	96.5	115.8	135.1	154.4	193.0	231.6	260.6	289.5	318.5	347.4		1258	606.9
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720		

### A4-70 Stainless Steel Studding

Stud Diameter (mm)	Hole Diameter (mm)	Embedment Depth $h_{ef}$																				$h_{ef}$ failure (mm)	$F_{d,s}$ design load (kN)
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720		
8	10	12.9	13.7																			64	13.7
10	12	15.1	17.6	20.1	21.7																	86	21.7
12	14		19.9	22.7	25.6	28.4	31.2	31.6														111	31.6
16	18			29.0	32.6	36.2	39.8	43.4	47.1	50.7	57.9	58.8										162	58.8
20	24			32.8	36.9	41.1	45.2	49.3	53.4	57.5	65.7	82.1	91.7									223	91.7
24	28				42.2	46.5	50.7	54.9	59.1	67.6	84.5	101.3	118.2	132.1								313	132.1
27	32					47.3	51.6	55.9	60.2	68.8	80.2											187	80.2
30	35						52.0	56.4	60.7	69.4	86.7	98.1										226	98.1
33	38							59.3	63.9	73.0	91.2	109.5	121									266	121.3
36	40								67.6	77.2	96.5	115.8	135.1	143								296	142.8
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720		

\*1 = Tensile strength 500N/mm<sup>2</sup>

Design Resistance used with various stud strengths, material and rebar.

**A4-80 Stainless Steel Studding**

Stud Diameter (mm)	Hole Diameter (mm)	Embedment Depth hef																			hef failure (mm)	F <sub>d,s</sub> design load (kN)	
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660			720
8	10	12.9	15.0	15.7																	73	15.7	
10	12		17.6	20.1	22.6	24.8															99	24.8	
12	14		19.9	22.7	25.6	28.4	31.2	34.1	36.1												127	36.1	
16	18			29.0	32.6	36.2	39.8	43.4	47.1	50.7	57.9	67.2									186	67.2	
20	24			32.8	36.9	41.1	45.2	49.3	53.4	57.5	65.7	82.1	98.5	104.8							255	104.8	
24	28					42.2	46.5	50.7	54.9	59.1	67.6	84.5	101.3	118.2	132.1						313	132.1	
27	32						47.3	51.6	55.9	60.2	68.8	80.2									187	80.2	
30	35							52.0	56.4	60.7	69.4	86.7	98.1								226	98.1	
33	38								59.3	63.9	73.0	91.2	109.5	121.3							266	121.3	
36	40									67.6	77.2	96.5	115.8	135.1	142.8						296	142.8	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	480	540	600	660	720		

**High bond reinforcing bars F<sub>yk</sub>=500N/mm<sup>2</sup>**

Rebar Diameter (mm)	Hole Diameter (mm)	Embedment Depth hef																			hef failure (mm)	F <sub>d,s</sub> yield load (kN)	
		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	720			800
8	10	8.7	10.2	11.7	13.1	14.6	16.0	17.5	19.0	20.4	21.9										150	21.9	
10	12	10.4	12.1	13.8	15.6	17.3	19.0	20.7	22.5	24.2	27.6	34.1									198	34.1	
12	15		13.7	15.7	17.6	19.6	21.6	23.5	25.5	27.4	31.4	39.2	47.1	49.2							251	49.2	
16	20			19.3	21.7	24.1	26.5	29.0	31.4	33.8	38.6	48.3	57.9	67.6	77.2						362	87.4	
20	25				21.0	23.6	26.2	28.9	31.5	34.1	36.7	42.0	52.5	63.0	73.5	84.0	105.0				521	136.6	
25	30					28.3	31.1	33.9	36.8	39.6	45.2	56.6	67.9	79.2	90.5	113.1	141.4				695	196.5	
28	35						33.4	36.4	39.5	42.5	48.6	60.7	72.8	85.0	97.1	121.4	151.8	170.0			882	267.8	
32	40							43.1	46.5	53.1	66.4	79.6	92.9	106.2	132.7	165.9	185.8	212.3			1054	349.7	
36	44								52.3	59.7	74.7	89.6	104.5	119.4	149.3	186.6	209.0	238.9	268.8		1188	443.5	
40	50									66.4	82.9	99.5	116.1	132.7	165.9	207.4	232.3	265.4	298.6	331.8	1317	546.3	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		



*Characteristic and Design Load resistances based on characteristic bond strengths for hef 4d (minimum embedment) to 20d*

Size (mm)	Non Cracked Concrete						Cracked Concrete						Nominal Embedment (mm)
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	
	N <sub>rk</sub>	V <sub>rk</sub>	N <sub>rd</sub>	V <sub>rd</sub>	N <sub>rec</sub>	V <sub>rec</sub>	N <sub>rk</sub>	V <sub>rk</sub>	N <sub>rd</sub>	V <sub>rd</sub>	N <sub>rec</sub>	V <sub>rec</sub>	
8	19.30	9.00	12.87	7.20	9.19	5.14	Not Applicable						60
	25.74		17.16		12.26		Not Applicable						80
	51.47		34.31		24.51		Not Applicable						160
10	22.62	15.00	15.08	12.00	10.77	8.57	10.40	15.00	6.94	12.00	4.96	8.57	60
	33.93		22.62		16.16		15.60		10.40		7.43		90
	75.40		50.27		35.90		34.68		23.12		16.52		200
12	29.82	21.00	19.88	16.80	14.20	12.00	13.12	21.00	8.75	16.80	6.24	12.00	70
	46.86		31.24		22.31		20.62		13.75		9.82		110
	102.24		68.16		48.69		44.98		29.98		21.42		240
16	43.43	39.00	28.95	31.20	20.68	22.29	17.37	39.00	11.58	31.20	8.27	22.29	80
	67.86		45.24		32.31		27.14		18.10		12.93		125
	173.72		115.81		82.72		69.50		46.33		33.10		320
20	55.42	61.00	36.95	48.80	26.39	34.86	21.06	61.00	14.04	48.80	10.00	34.86	90
	104.68		69.79		49.85		39.78		26.52		18.94		170
	246.30		164.20		117.29		93.60		62.40		44.59		400
24	63.33	88.00	42.22	70.40	30.16	50.29	Not Applicable						100
	133.00		88.67		63.33		Not Applicable						210
	304.01		202.67		144.76		Not Applicable						480
27	70.91	115.00	47.27	92.00	33.77	65.71	Not Applicable						110
	154.72		103.15		73.68		Not Applicable						240
	348.11		232.08		165.77		Not Applicable						540
30	78.04	142.50	52.02	114.00	37.16	81.43	Not Applicable						120
	182.09		121.39		86.71		Not Applicable						280
	390.19		260.12		185.80		Not Applicable						600
33	88.95	173.50	59.30	138.80	42.36	99.14	Not Applicable						130
	205.27		136.85		97.75		Not Applicable						300
	451.60		301.07		215.05		Not Applicable						660
36	108.57	212.50	72.38	170.00	51.70	121.43	Not Applicable						150
	246.10		164.07		117.19		Not Applicable						340
	521.15		347.44		248.17		Not Applicable						720

Table notes : see back page

## Bond Strength Factors

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

Concrete Strength N/mm <sup>2</sup> (Mpa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
non cracked $f_c$ =	0.94	1.00	1.06	1.12	1.17	1.23	1.26	1.30
cracked $f_c$ =	0.96	1.00	1.03	1.05	1.06	1.07	1.08	1.09

### Influence of environmental conditions in non cracked concrete

		M8	M10	M12	M16	M20	M24	M27	M30	M33	M36
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
Temp II 80°C / 50°C	Dry and Wet	0.90	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80

### Influence of environmental conditions in cracked concrete

		M8	M10	M12	M16	M20	M24	M27	M30
Temp I 40°C / 24°C	Dry and Wet	n/a	0.46	0.44	0.40	0.38	n/a	n/a	n/a
Temp II 80°C / 50°C	Dry and Wet	n/a	0.45	0.43	0.40	0.38	n/a	n/a	n/a

**Table notes** : see back page

*Characteristic and Design Load resistances for **REBAR** based on characteristic bond strengths for hef 4d (min embedment) to 20d*

Rebar Ø	Non Cracked Concrete						Cracked Concrete						Nominal Embedment (mm)												
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)														
	Tension N <sub>rk</sub>	Shear V <sub>rk</sub>	Tension N <sub>rd</sub>	Shear V <sub>rd</sub>	Tension N <sub>rec</sub>	Shear V <sub>rec</sub>	Tension N <sub>rk</sub>	Shear V <sub>rk</sub>	Tension N <sub>rd</sub>	Shear V <sub>rd</sub>	Tension N <sub>rec</sub>	Shear V <sub>rec</sub>													
8	15.68	13.95	8.71	9.30	6.22	6.64	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	60												
	20.91		11.62		8.30								80												
	41.82		23.23		16.60								160												
10	18.66	21.45	10.37	14.30	7.41	10.21							Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	60						
	27.99		15.55		11.11														90						
	62.20		34.56		24.68														200						
12	24.70	31.05	13.72	20.70	9.80	14.79													10.56	31.05	5.86	20.70	4.19	14.79	70
	38.82		21.56		15.40														110						
	84.69		47.05		33.61														240						
14	31.67	42.45	17.59	28.30	12.57	20.21													13.72	42.45	7.62	28.10	5.45	20.07	80
	45.52		25.29		18.06														115						
	110.84		61.58		43.98														280						
16	34.74	55.50	19.30	37.00	13.79	26.43	15.28	55.50	8.49	37.00	6.06	26.43							80						
	54.29		30.16		21.54		125																		
	138.97		77.21		55.15		320																		
18	37.55	69.66	20.86	46.44	14.90	33.17	16.51	69.66	9.17	46.44	6.55	33.17	80												
	70.40		39.11		27.94		150																		
	168.97		93.87		67.05		360																		
20	36.76	86.55	20.42	57.70	14.59	41.21	19.79	86.55	11.00	57.70	7.85	41.21	90												
	69.43		38.57		27.55		170																		
	163.36		90.76		64.83		400																		
22	44.92	104.01	24.96	69.34	17.83	49.53	24.19	104.01	13.44	69.34	9.60	49.53	100												
	85.36		47.42		33.87		190																		
	197.67		109.82		78.44		440																		
25	51.05	135.00	28.36	90.00	20.26	64.29	27.49	135.00	15.27	90.00	10.91	64.29	100												
	107.21		59.56		42.54		210																		
	255.26		141.81		101.29		500																		
28	61.08	168.75	33.93	112.50	24.24	80.36	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	112												
	152.71		84.84		60.60								280												
	305.41		169.67		121.20								560												
32	77.21	220.95	42.89	147.30	30.64	105.21							Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	128						
	193.02		107.23		76.60														320						
	386.04		214.47		153.19														640						

**Table notes** : see back page

## Bond Strength Factors - REBAR

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

Concrete Strength N/mm <sup>2</sup> (MPa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
non cracked $f_c$ =	0.94	1.00	1.06	1.12	1.17	1.23	1.26	1.30
cracked $f_c$ =	0.96	1.00	1.03	1.05	1.06	1.07	1.08	1.09

### 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
Temp II 80°C / 50°C	Dry and Wet	0.90	0.90	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.84	0.84

### 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	0.43	0.43	0.43	0.43	0.53	0.53	0.53	n/a	n/a
Temp II 80°C / 50°C	Dry and Wet	n/a	n/a	0.38	0.38	0.38	0.38	0.46	0.46	0.46	n/a	n/a

**Table notes** : see back page

## Material Properties for grades of other threaded rod and rebar

Stud Diameter (mm)	Stud Grade 8.8		Stud Grade 10.9		Stud Grade A4-70		Stud Grade A4-80	
	$N_{rk,s}$	$N_{rd,s}$	$N_{rk,s}$	$N_{rd,s}$	$N_{rk,s}$	$N_{rd,s}$	$N_{rk,s}$	$N_{rd,s}$
	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
M8	29.2	19.5	38.1	27.2	25.6	13.7	29.2	15.6
M10	46.4	30.9	60.3	43.1	40.6	21.7	46.4	24.8
M12	67.4	44.9	87.7	62.6	59.0	31.6	67.4	36.0
M16	125.6	83.7	163.0	116.4	109.9	58.8	125.7	67.2
M20	196.1	130.7	255.0	182.1	171.5	91.7	196.0	104.8
M24	282.5	188.3	367.0	262.1	247.1	132.1	293.0	132.1
M27	367.0	244.7	477.4	341.0	229.4	80.2	229.4	80.2
M30	448.8	299.2	583.0	416.4	280.6	98.1	280.6	98.1
M36	653.6	435.7	849.7	606.9	408.4	142.8	408.4	142.8

\*1  
\*1  
\*1

\*1 = Tensile strength 500N/mm<sup>2</sup>

Stud Diameter (mm)	Stud Grade 8.8		Stud Grade 10.9		Stud Grade A4-70		Stud Grade A4-80	
	$V_{rk,s}$	$V_{rd,s}$	$V_{rk,s}$	$V_{rd,s}$	$V_{rk,s}$	$V_{rd,s}$	$V_{rk,s}$	$V_{rd,s}$
	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
M8	14.6	11.7	19.0	15.2	12.8	8.2	14.6	9.4
M10	23.2	18.6	30.2	24.1	20.3	13.0	23.2	14.9
M12	33.7	27.0	43.8	35.1	29.5	18.9	33.7	21.6
M16	62.8	50.2	81.6	65.3	55.0	35.2	62.8	40.3
M20	98.0	78.4	127.4	101.9	85.8	55.0	98.0	62.8
M24	141.2	113.0	183.6	146.8	123.6	79.2	141.2	90.5
M27	183.5	146.8	238.7	191.0	114.7	48.4	114.7	48.4
M30	224.4	179.5	291.5	215.9	140.3	59.2	140.3	59.2
M36	326.8	261.4	424.8	283.2	204.2	86.2	204.2	86.2

Rebar Diameter (mm)	Rebar BSt 500 to DIN 488		Rebar BSt 500 to DIN 488	
	$N_{rk,s}$	$N_{rd,s}$	$V_{rk,s}$	$V_{rd,s}$
	(kN)	(kN)	(kN)	(kN)
8	28.0	20.0	14.0	9.3
10	43.0	30.7	21.5	14.3
12	62.0	44.3	31.0	20.7
14	84.4	67.0	42.5	28.3
16	111.0	79.3	55.5	37.0
18	139.5	100.0	70.0	46.7
20	173.0	123.6	86.5	57.7
22	208.3	149.3	104.5	69.7
25	270.0	192.9	135.0	90.0
28	339.0	242.1	169.0	112.7
32	442	315.7	221	147.3
36	563.2	443.5	281.6	187.7
40	693.8	546.3	346.9	231.3

More notes : see back page

**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						
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	0.62			0.63
180		0.93	0.86	0.77	0.72	0.68	0.65	0.65	0.64	0.64	0.64	
200		1.00	0.90	0.80	0.74	0.69	0.67	0.66	0.65	0.65	0.65	
225			0.95	0.84	0.77	0.72	0.69	0.68	0.67	0.67	0.66	
240			1.00	0.86	0.79	0.73	0.71	0.69	0.69	0.68	0.67	
250				0.87	0.80	0.74	0.72	0.70	0.70	0.68	0.68	
275				0.91	0.83	0.76	0.74	0.72	0.72	0.70	0.69	
280				0.92	0.84	0.77	0.75	0.73	0.72	0.70	0.69	
300				0.95	0.86	0.79	0.76	0.74	0.74	0.72	0.71	
320				1.00	0.88	0.81	0.78	0.76	0.75	0.73	0.72	
350					0.92	0.83	0.81	0.78	0.78	0.75	0.73	
400					1.00	0.88	0.86	0.82	0.82	0.78	0.76	
440						0.92	0.89	0.85	0.85	0.81	0.79	
460						1.00	0.91	0.87	0.87	0.82	0.80	
500							0.95	0.90	0.90	0.85	0.82	
540								1.00	0.93	0.93	0.88	0.84
560									1.00	0.95	0.89	0.86
620										1.00	0.93	0.89
660											1.00	0.91
720												1.00

**Effect of Edge Distance - 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	0.62			
180					0.91	0.78	0.75	0.66	0.70	0.67	0.68	
200					1.00	0.84	0.81	0.76	0.76	0.78	0.71	
220						0.89	0.86	0.81	0.81	0.82	0.75	
240						1.00	0.92	0.86	0.86	0.87	0.78	
270							1.00	0.94	0.94	0.93	0.83	
280								1.00	0.97	0.96	0.85	
310									1.00	0.98	0.90	
330										1.00	0.93	
360												1.00

**Effect of Edge Distance - Shear**

Edge Distance	Stud / Rebar Diameter											
	(mm)	8	10	12	16	20	24	27	30	33	36	40
40	0.25											
50	0.44	0.30										
60	0.63	0.48	0.30									
70	0.81	0.65	0.44									
80	1.00	0.83	0.58	0.40								
90		1.00	0.72	0.53								
100			0.86	0.67	0.35							
110			1.00	0.80	0.44							
125				1.00	0.58	0.35						
140					0.72	0.46	0.44	0.30				
160					0.91	0.62	0.57	0.35	0.34			
180					1.00	0.77	0.69	0.46	0.41	0.33		
200						0.92	0.82	0.57	0.50	0.42	0.32	
220						1.00	0.94	0.68	0.59	0.51	0.53	
240							1.00	0.78	0.68	0.60	0.59	
280								1.00	0.86	0.78	0.72	
310									1.00	0.91	0.82	
330										1.00	0.89	
360												1.00

## Minimum Curing Time

Concrete Temperature	Gel - Working Time	Minimum curing time in dry concrete	Minimum curing time in wet concrete
- 10°C *	50 min	240 min	x2
-5°C *	40 min	180 min	x2
5°C	20 min	90 min	x2
15°C	9 min	60 min	x2
25°C	5 min	30 min	x2
35°C	3 min	20 min	x2

\* Resin temperature must be at least 20°C

- Full cure 24 hours

- All specifications based on supplied mixer

## Temperature Ranges

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 +80°C	+50°C	+80°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

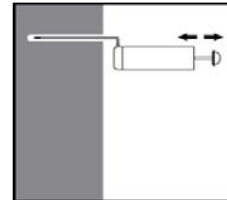
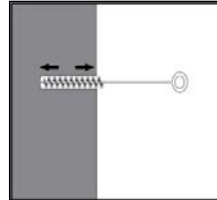
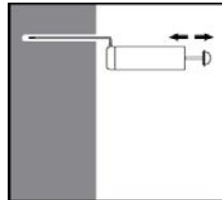
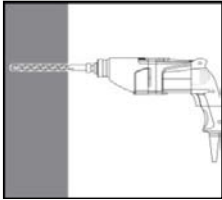
over significant periods of time.

Long term temperatures will include constant or near constant temperatures, such as those experienced in cold stores or next to heating installations.

## Physical Properties

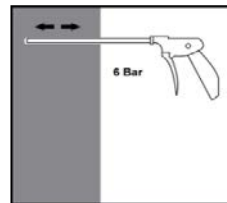
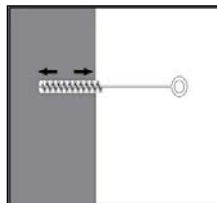
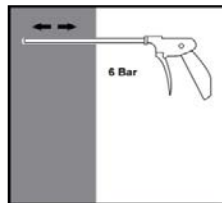
	N/mm <sup>2</sup> (MPa)	Test Method
Compressive Strength	73.0	EN ISO 604 / ASTM 695
Flexural Strength	25.0	EN ISO 178 / ASTM 790
Flexural Modulus	3850.0	EN ISO 178 / ASTM 790
Tensile Strength	14.6	EN ISO 527 / ASTM 638
E Modulus	8029.7	EN ISO 527 / ASTM 638
VOC Content	A+ Rating	-

## Installation parameters: drilling hole cleaning and installation

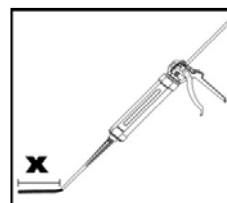
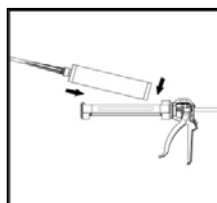
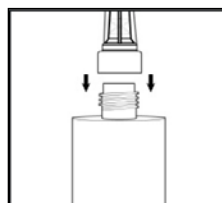
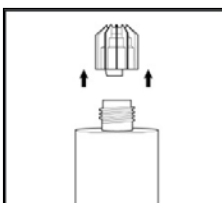


Drill hole in the substrate to the required embedment depth using the appropriately sized carbide drill bit. Bore hole cleaning Just before setting an anchor, the bore hole must be free of dust and debris. The manual pump shall be used for blowing out bore holes up to diameters  $d_o \leq 24\text{mm}$  and embedment depths up to  $h_{ef} \leq 10d$ . 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 size (see Table 6) 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.

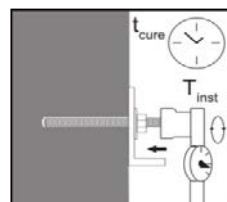
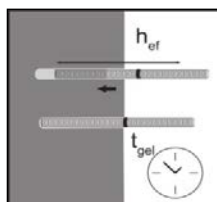
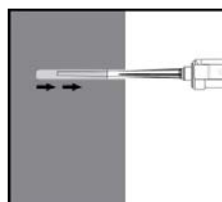
Compressed air cleaning (CAC) for all bore hole diameters  $d_o$  and all bore hole depths



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  $6\text{ m}^3/\text{h}$ ). Brush 2 times with the specified brush size (see Table 6) by inserting the steel brush to the back of the hole (if needed with an extension) in a twisting motion and removing it.  
X 2 Blow out again with compressed air at least 2 times.



Remove the threaded cap from the cartridge. Tightly attach the mixing nozzle. Do not modify the mixer in any way. Make 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  $t_{gel}$  has elapsed. The working time  $t_{gel}$  is given in Table 7. The anchor can be loaded after the required curing time  $t_{cure}$  (see Table 7). The applied torque shall not exceed the values  $T_{max}$  given in Table 1.



## Notes

PAGE 2 :

### ***Typical characteristic and design resistance performance with 5.8 grade studding and associated installation data***

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

he<sub>f</sub> range minimum or 4d whichever is greatest to 20d

Concrete strength C20/25 - f<sub>c</sub> cube = 25N/mm<sup>2</sup> (25MPa)

5.8 grade stud

Temperature range I maximum long term / short term temperature +24/40°C

PAGE 3 :

### ***Design Resistance with various stud strengths, material and rebar.***

Note 1 for stainless steel tensile strength is 500N/mm<sup>2</sup> (500MPa)

Note 2 for stainless steel tensile strength is 700N/mm<sup>2</sup> (500MPa)

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

PAGE 4 and 6 :

### ***Characteristic and Design Load resistances based on characteristic bond strengths for hef 4d (minimum embedment) to 20d***

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

he<sub>f</sub> range minimum or 4d whichever is greatest to 20d

Concrete strength C20/25 - f<sub>c</sub> cube = 25N/mm<sup>2</sup> (25MPa)

Temperature range i maximum long term / short term temperature +24/40°C

PAGE 5 & 7 :

### ***Bond Strength Factors***

Select concrete strength and environmental condition and apply to bond strength table on page 4

PAGE 8 :

### ***Material Properties for grades of other threaded rod and rebar***

All grades shown for information

M30 studding is 8.8 grade instead of 5.8 grade. >M27 for A4-70 tensile strength of 500N/mm<sup>2</sup>, instead of 700N/mm<sup>2</sup>

M30 for A4-70 tensile strength of 500N/mm<sup>2</sup> (500MPa), instead of 700N/mm<sup>2</sup> (700MPa)

Safety factor is 1.5 tension and 1.25 shear for all carbon steel

Safety factor is 1.87 for stainless steel, up to M24, M27 to M36 is 2.86

Safety factor is 1.56 for stainless steel in shear, up to M24, M27 to M36 is 2.37

Safety factor is 1.4 tension and 1.5 shear for BSt 500 rebar

### **Partial Safety Factors for pages 2,3,4,5,6,7 :**

1.5 for all sizes studs

1.8 for all sizes rebar