SET-XP® *High-Strength Anchoring Adhesive for Cracked and Uncracked Concrete*

SIMPSON Strong-Tie®

SET-XP® is a 1:1 two component, high solids epoxy-based anchoring adhesive formulated for optimum performance in both cracked and uncracked concrete. SET-XP exceeds ASTM C881 specification for Type I & IV, Grade 3, Class C epoxy

APPLICATIONS:

- Rebar Doweling
- Tension Zones
- Dry And Wet Concrete
- Threaded Rod Anchoring
- General Purpose Anchoring
- Overhead Anchoring (Tension Zones)
- Structural Steel
- Seismic Loading

APPROVALS: **ETA-11/0360 (OPTION 1) ; ICC-ES ESR-2508**
NSF/ANSI Standard 61 (313 cm²/1000 L)

BASE MATERIAL:
- Normal and Lightweight Concrete
- Hollow Concrete Block
- Grout-filled Concrete Block
- Solid Brick and Hollow Bricks

FEATURES
- Economical and safe
- Non-shrink
- High strength
- Versatile: for use in concrete, brick and concrete block
- Non-sag formulation: ideal for vertical and most overhead applications

INSTALLATION: Refer to page 17 for installation procedures

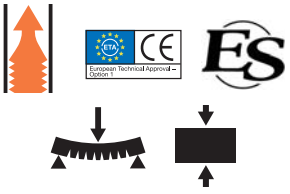
SHELF LIFE: 24 months from date of manufacture in unopened cartridge

STORAGE CONDITIONS: For best results, store between 7–32° C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle

COLOR: Resin – white, hardener – black-green. When properly mixed, SET-XP adhesive will be a uniform teal color

CHEMICAL RESISTANCE: Very good to excellent against distilled water, in-organic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones. For more detailed information, contact Simpson Strong-Tie®

SET-XP® Adhesive (label differs per region) **EMN22i**



EDT22S

Material Properties

PROPERTY	TEST METHOD	RESULTS
Consistency	ASTM C881	Passed, non-sag
Glass Transition Temperature	ASTM E1356	68°C
Bond Strength (moist cure)	ASTM C882	26MPa (2 days)
Water Absorption	ASTM D570	0.10%
Compressive Yield Strength	ASTM D695	102.3MPa
Compressive Modulus	ASTM D695	4442MPa
Gel Time	ASTM C881	49 minutes

Cartridge System

Model #	Contents ml (ounces)	Cartridge Type	Carton Qty	Disp. Tool(s)	Mixing Nozzle
SET-XP22	650 (22)	side-by-side 1:1 Ratio	10	EDT22S, EDT22AP	EMN22i

Refer to website for cartridge usage estimation guide.

Working and Curing Time Schedule

Internal Concrete Temperature	Working Time	Curing Time (Dry Concrete)	Curing Time (Wet Concrete)
$T_{anchorage\ base}$	t_{gel}	$t_{cure,dry}$	$t_{cure,wet}$
$T_{anchorage\ base} \geq +10°C$	60 min	72 h	144 h
$T_{anchorage\ base} \geq +21°C$	45 min	24 h	48 h
$T_{anchorage\ base} \geq +32°C$	25 min	24 h	48 h
$T_{anchorage\ base} \geq +43°C$	12 min	24 h	48 h

* Let anchor fully cure without disturbing.

In-Service Temperature*

Temperature Range I	Maximum Long Term Temperature	+24°C
	Maximum Short Term Temperature	+43°C
Temperature Range II	Maximum Long Term Temperature	+43°C
	Maximum Short Term Temperature	+65°C

* See "Supplemental Topics", section A.4 for more information

Rebar Installation Data

Description	Symbol	Units	Rebar Size (mm)				
			12	14	16	20	25
Drill Hole Diameter	d_o	mm	16	20	20	25	30
Minimum Embedment Depth	$h_{ef,min}$	mm	48	64	64	80	100
Standard Embedment Depth	h_{ef}	mm	120	160	160	200	250
Maximum Embedment Depth	$h_{ef,max}$	mm	240	280	320	400	500

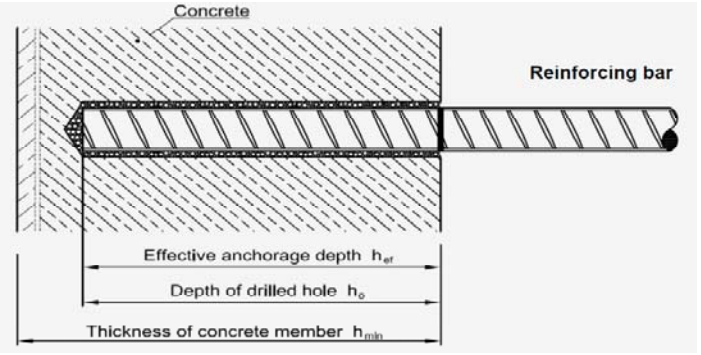
Rebar Strength [5,6]

Description	Symbol	Units	12	14	16	20	25
Nominal Yield Strength	f_{yk}	kN	56.5	77.0	101	157	245
Nominal Tensile Strength	f_{uk}	kN	62.2	84.7	111	173	270

Required Embedment Depth (Characteristic) [1, 2, 3, 4, 7]

Description	Symbol	Units	12	14	16	20	25
Embedment Depth to Exceed f_{yk}	$h_{,fyk}$	mm	200	220	260	360	580
Embedment Depth to Exceed f_{uk}	$h_{,fuk}$	mm	220	250	280	400	640
Minimum Concrete Thickness	h_{min}	mm	$h_{ef} + 2d_o$				

1. Characterisitc bond strengths are used to determine required embedment depth for yield and strength; Designer may apply safety factor to embedment depth at own discretion.
2. Minimum concrete strength is C20/25 ($f_{ck,\ cube}$ = 25 MPa), hole condition is "dry", non-cracked concrete, and exposure is temperature range 1.
3. Tabulated loads are valid at critical spacing and critical edge distance only. Designer should use Simpson Strong-Tie® Anchor Designer™ Software for spacing and edges less than critical.
4. Embedment depths are conservative for any rebar grade with less strength than B500.
5. Nominal yield strength (f_{yk}) for Gr 500B Rebar is determined by the equation: f_{yk} = 500 MPa x A_{nom}
6. Nominal tensile strength (f_{uk}) for Gr 500B Rebar is determined by the equation: f_{uk} = 550 MPa x A_{nom}
7. SET-XP characteristic bond strengths taken from relevant ETA. For sizes of rebar not shown, contact Simpson for additional data.



Characteristic Values of Resistance to Shear Loads [5] (Design Method TR 029)

Description	Symbol	Units	Rebar Size (mm)				
			12	14	16	20	25
Steel Failure Without Lever Arm							
Characteristic Resistance [3]	$V_{Rk,s}$	kN	31	42	55	86	135
Partial Safety Factor	γ_{Ms} [1]	-	1.5				
Steel Failure With Lever Arm							
Characteristic Resistance [4]	$V_{Rk,s}$	Nm	112	178	265	518	1012
Partial Safety Factor	γ_{Ms} [1]	-	1.5				
Concrete pry-out failure							
Characteristic Value	k	-	2				
Partial Safety Factor	γ_{Mcp} [1]	-	1.5				
Concrete edge failure							
See section 5.2.3.4 of The Technical Report TR 029 for the Design of Bonded Anchors							
Partial Safety Factor	γ_{Mc} [1]	-	1.5 [2]				

1. In absence of other national regulations.
2. The partial safety factor γ_2 = 1.0 is included.
3. For reinforcing bars that do not comply with DIN 488: The characteristic resistance $V_{Rk,s}$ shall be determined in accordance with TR 029, equation (5.5).
4. For reinforcing bars that do not comply with DIN 488: The characteristic resistance $M^0_{Rk,s}$ shall be determined in accordance with TR 029, equation (5.6b).
5. Rebar shear values based on Great B500 (DIN 488-2)

All-Threaded Rod Installation Data

Description	Symbol	Units	Threaded Rod Size (mm)				
			M12	M16	M20	M24	M27
Nominal Insert Diameter	d	mm	12	16	20	24	27
Drill Hole Diameter	d_o	mm	14	18	24	28	30
Minimum Embedment Depth	$h_{ef,min}$	mm	70	80	90	100	110
Maximum Embedment Depth	$h_{ef,max}$	mm	240	320	400	480	540
Clearance Hole Diameter in Fixture	d_f	mm	14	18	22	26	30
Installation Torque	$T_{inst, max}$	Nm	40	60	80	100	120

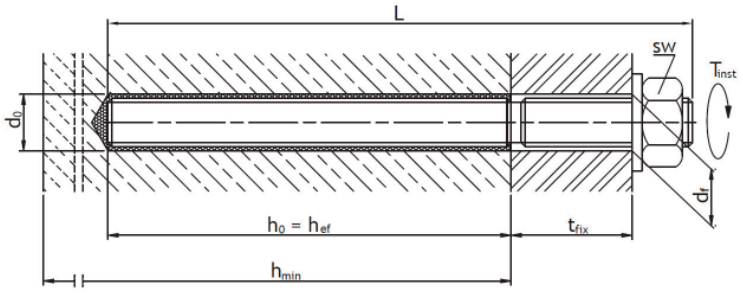
Concrete Thickness, Edge Distance and Spacing [7]

Description	Symbol	Units	M12	M16	M20	M24	M27
Minimum Concrete Thickness	h_{min}	mm	h_{ef} + 30mm	$h_{ef} + 2d_o$			
Minimum Edge Distance	c_{min}	mm	80	100	115	135	155
Minimum Spacing	s_{min}	mm	45	60	70	80	90
Critical Edge Distance	$c_{cr,N}$	mm	$3 \times h_{ef}$				
Critical Spacing	$s_{cr,N}$	mm	$2 \times c_{cr,N}$				

Design Resistance - Single Anchor, No Concrete Edge or Spacing Influence [1, 2, 3, 4, 5, 6, 8]

Description	Symbol	Units	M12	M16	M20	M24	M27
Embedment Depth	h_{ef}	mm	110	140	180	220	240
Minimum Concrete Thickness			140	176	228	276	300
			Non-Cracked Concrete				
TENSION	N_{Rd}	kN	27.7	33.5	53.9	71.1	67.9
SHEAR	V_{Rd}	kN	16.8	31.2	48.8	70.4	92.0
			Cracked Concrete				
TENSION	N_{Rd}	kN	11.9	15.1	16.2	23.7	29.1
SHEAR	V_{Rd}	kN	16.8	31.2	45.2	66.4	81.4

1. N_{Rd} and V_{Rd} values are based on no edge distance, no anchor spacing, and installed in the minimum allowable concrete thickness for the embedment depth (h_{ef}) shown.
2. Concrete strength is C20/25 ($f_{ck, cube}$ = 25 MPa), hole condition is "dry", and exposure is temperature range 1.
3. N_{Rd} value shown is based on the lesser of $N_{Rd,p}$ $N_{Rd,c}$ and $N_{Rd,sp}$. These values are good for any grade of steel used.
4. V_{Rd} is based on Grade 5.8 steel insert. If a different grade of steel is used, then the resistance should be re-evaluated using Simpson Strong-Tie® Anchor Designer™ Software.
5. Concrete is considered un-reinforced, and therefore concrete splitting and spalling is not controlled. If reinforcement is present and can be verified per ETAG TR 029 requirements, then Designer should re-evaluate the design resistances using Simpson Strong-Tie® Anchor Designer™ Software as the design values may increase significantly.
6. All design resistances are derived from the product's characteristic values and safety factors published in the ETA.
7. Critical Spacing ($s_{cr,N}$) and Critical Edge Distance ($c_{cr,N}$) is taken from the relevant ETA for splitting and is conservative. For spacing and edge distance less than critical, use Simpson Strong-Tie® Anchor Designer™ Software for analysis.
8. Reference "Anchor Design Methodology" on page 10 for the descriptions of N_{Rd} and V_{Rd}.



Steel Design Resistance (Tension) [1,2]

Description	Symbol	Units	Threaded Rod Size (mm)				
			M12	M16	M20	M24	M27
Steel Grade 5.8	$N_{Rd,s}$	kN	28.0	52.7	82.0	118.0	153.3
Steel Grade 8.8	$N_{Rd,s}$	kN	44.7	84.0	130.7	188.0	244.7
Stainless Steel A4	$N_{Rd,s}$	kN	39.3	73.3	114.7	164.7	153.3

Steel Design Resistance (Shear) [1,2]

Description	Symbol	Units	M12	M16	M20	M24	M27
Steel Grade 5.8	$V_{Rd,s}$	kN	16.8	31.2	48.8	70.4	92.0
Steel Grade 8.8	$V_{Rd,s}$	kN	27.2	50.4	78.4	112.8	147.2
Stainless Steel A4	$V_{Rd,s}$	kN	24.0	44.0	68.8	99.2	92.0

1. $N_{Rd,s}$ and $V_{Rd,s}$ values are are derived from characteristic values and safety factors published in the ETA.
2. Refer to page 18 for Simpson Strong-Tie threaded-rod anchor products (Grade 5.8 Carbon Steel, and A4 Stainless Steel).