CLEAR FORM

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FLO-ROK® FR5-MAX INJECTION SYSTEM

REQUEST FOR APPROVAL

TO:

NAME: TYPE HERE TITLE: TYPE HERE

COMPANY: TYPE HERE PHONE: TYPE HERE

FAX: TYPE HERE E-MAIL: TYPE HERE

ADDRESS: TYPE HERE

☐ FASTENER SUBSTITUTION ☐ FASTENER RECOMMENDATION ☐ ALTERNATIVE FASTENER

Please review the attached technical data and approve the **FLO-ROK® FR5-MAX INJECTION SYSTEM** (Part No. TYPE HERE) for the following application(S) below:

TYPE HERE

PROJECT:

NAME: TYPE HERE

ADDRESS: TYPE HERE

SPECIFIED FASTENER: TYPE HERE

FASTENING APPLICATION: TYPE HERE

LOCATION: TYPE HERE DWG NO.: TYPE HERE

SPECIFICATION REF: SECTION: TYPE HERE PAGE: TYPE # PARAGRAPH: TYPE HERE

SUBMITTED BY:

NAME: TYPE HERE

COMPANY: TYPE HERE

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DATE:

FOR USE BY THE ENGINEER OR/AND ARCHITECT

☐ APPROVED

☐ APPROVED AS NOTED

☐ ADDITIONAL INFORMATION REQUIRED

☐ REJECTED, REASON FOR REJECTION:

TYPE HERE

BY: TYPE HERE

DATE:

PRINT SAVE

FLO-ROK FR5MAX INJECTION ADHESIVE ANCHOR

DESCRIPTION

UCAN FLO-ROK® FR5 MAX is a styrene free epoxy acrylate adhesive that incorporates the latest technology in chemical anchoring. The unique properties of the two component, high strength adhesive provide stress free fastening and minimal shrinkage. FR5 MAX is an excellent choice for anchoring & dowelling and is ideal for use in a wide range of temperatures from -20°C to over 30°C. A matching static mixing nozzle, as well as FLO-ROK® 's low mix ratio sensitivity, ensures thorough, 10:1 mixing of the resin and the hardener. FR5 MAX is available in 4 sizes - 5 oz., 10 oz., 12 oz. and a jumbo 28 oz. cartridge perfect for high volume applications such as rebar dowelling.

FEATURES

- MTO / MTQ Approved
- Broad working temperature range from -20°C to +30°C
- Excellent for both solid and hollow wall applications
- Smooth flowing, non-drip, easy to control
- User friendly – low odour, styrene free & MMA free
- Meets LEED guidelines; low VOC
- Moisture insensitive, non sag formula
- Suitable for damp and water filled holes
- Long shelf life

TYPICAL APPLICATIONS

- Rebar dowelling
- Highway and bridge construction
- Machine, crane and hoist installation
- Hollow wall anchoring applications
- Renovations

MATERIAL SPECIFICATIONS

Anchor Component	Material Standard	Mechanical Properties F_u	F_y
Standard threaded rod	ISO 898 Grade 5.8	500 MPa (72.5 ksi)	400 MPa (58 ksi)
High Strength threaded rod	ASTM A193 , Grade B7	862 MPa (125 ksi)	724 MPa (105 ksi)
Stainless steel threaded rod	ASTM F593 (AISI 304/316)	689 MPa (100 ksi)	448 MPa (65 ksi)
Carbon steel nuts	ASTM A563		
Stainless steel nuts	ASTM F 594		
Stainless and carbon steel washers	ANSI B18.22.1 Type A Plain		
Two component (10:1 mix ratio) acrylic epoxy adhesive in 28 oz.; 12 oz. twin cartridge; 10 oz. and 5 oz. coaxial cartridge			
Corrosion protection (carbon steel anchors)	ASTM B633 - 98e1	0.0002" (5 micron)	electrodeposited

FLO-ROK FR5MAX INJECTION ADHESIVE ANCHOR

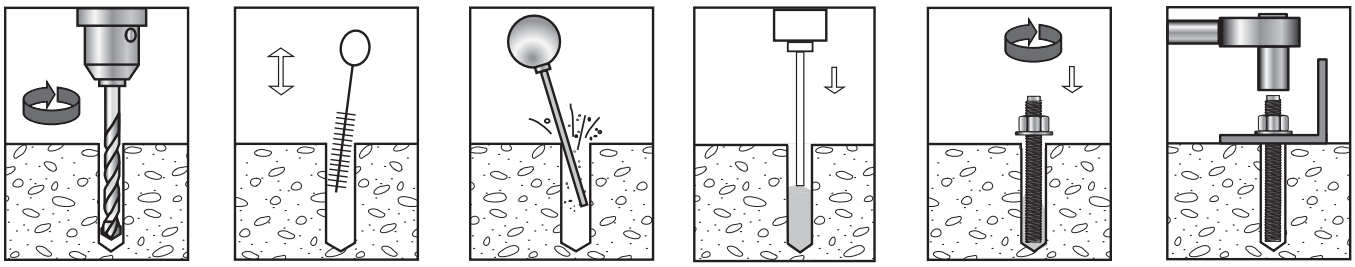
INSTALLATION

Details	Anchor size						
	3/8	1/2	5/8	3/4	7/8	1	1-1/4
Anchor rod dia. d_a (in)	3/8	1/2	5/8	3/4	7/8	1	1-1/4
Drill bit / hole nominal diameter d_o (in)	1/2	9/16	11/16	13/16	1	1-1/8	1-3/8
Effective embedment / hole depth h_{ef} / (in)	3-1/2	4	5	6-1/2	n/a	8-1/4	11-3/4
Critical anchor spacing for 100% performance s_{crN}	10-1/2	12	15	19-1/2	n/a	24-3/4	35-1/4
Required edge distance for 100% performance $c_{cr,N}$	5-1/4	6	7-1/2	9-3/4	n/a	12-3/8	17-5/8
Minimum base material thickness h_{min}	1.0 x embedment + 2 inches						
Max. installation torque T_{inst} (ft x lbf)	15	30	59	111	n/a	148	204

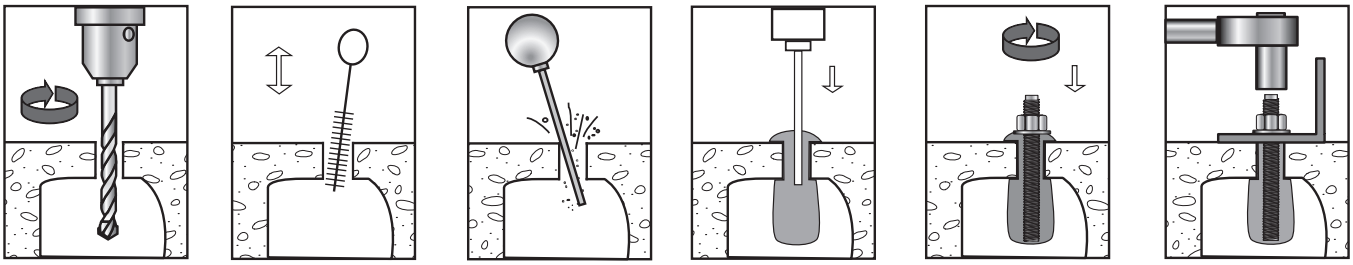
Note: Carbide tipped drill bits shall conform to ANSI B 212.15

- All dimensions are in inches

SOLID CONCRETE/MASONRY APPLICATIONS



HOLLOW CONCRETE BLOCK/MASONRY APPLICATIONS



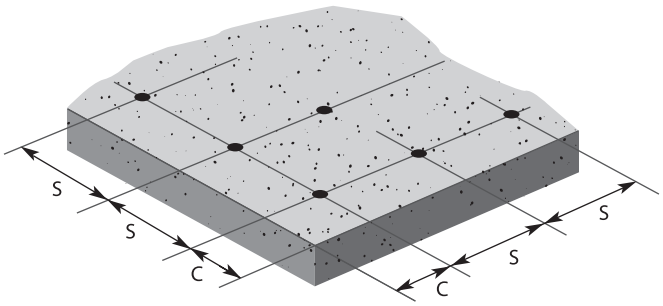
NOTE:

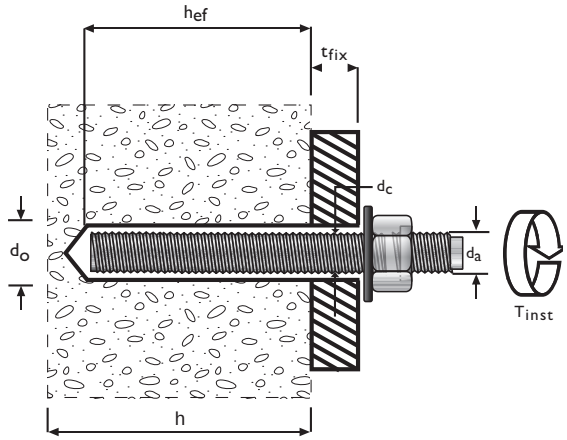
- Clean hole thoroughly by using nylon brush and blow-out bulb or compressed air (65 - 80 psi)
- Always dispense about 1 oz. FLO - ROK to the side, prior to injecting it into the clean hole, to assure uniform mixing indicated by a consistent dark grey colour.
- At a minimum, half fill the hole starting from the bottom up by slowly withdrawing the nozzle. (solid installation)
  Fill the screen fully starting from the bottom by slowly withdrawing the nozzle. (hollow installation)
- Mark embedment depth on the threaded rod (rebar) prior to insertion, and insert the rod (rebar) turning it slowly until it reaches the bottom of the hole (depth mark is flush with the surface).
- Observe curing time. The installed anchor must not be disturbed or loaded before the specified curing time has elapsed.

CURING TIMES

Temperature	Gel Time	Full Cure
30° C (86°F)	4 min	35 minutes
20°C (68°F)	6min	50 minutes
5°C (41°F)	18min	145 minutes
-20°C (-4°F)	20 min*	24 hours

Do not disturb stud during the curing time
*Cartridge temperature +5°C (41°F)





DESIGN DATA

Allowable and Ultimate Bond Strength in min. 20 MPa (3000 psi) Concrete

Rod Diameter	Hole Diameter	Embedment	Tension Bond Capacities in 3000 psi Concrete	
			Allowable Load	Ultimate Load
inch	inch	inch	lbs (kN)	lbs (kN)
3/8	1/2	3	1,822 (8.1)	7,289 (32.4)
		4-1/2	2,733 (12.2)	10,934 (48.7)
1/2	9/16	4	3,010 (13.4)	12,038 (53.6)
		6	4,514 (20.1)	18,057 (80.3)
5/8	11/16	5	4,215 (18.8)	16,859 (75.0)
		7-1/2	6,322 (28.1)	25,289 (115.5)
3/4	13/16	6	6,700 (29.8)	26,799 (119.2)
		9	10,050 (44.7)	40,199 (178.8)
1	1-1/8	8	9,276 (41.3)	37,102 (165.1)
		12	13,913 (61.9)	55,653 (247.6)
1-1/4	1-3/8	10	11,467 (51.0)	45,869 (204.0)
		15	17,201 (76.5)	68,804 (306.0)

Notes: • Use the lesser value of bond and steel capacity
- All above data are calculated using independent laboratory test data on metric size anchor rods installed into local concrete
- Not recommended for overhead anchoring applications
- For flooded hole application suitalility please contact Ucan Fastening Products

FLO-ROK FR5MAX INJECTION ADHESIVE ANCHOR

Ultimate Bond and Steel Strength for Metric Rebar Dowelling in Normal Weight Stone Aggregate Concrete

Metric Rebar Size	Hole Dia. inch	Embedment inch	Bond/Concrete Strength 30 MPa concrete lbf	Bond/Concrete Strength 30 MPa concrete kN	Rebar Strength Properties (Grade 400) Yield Strength lbf	Yield Strength kN	Tensile Strength lbf	Tensile Strength kN
10M	9/16	1-1/4	3,343	14.87	8,992	40	12,140	54
		3-1/2	9,595	42.68				
		7	19,191	85.36				
15M	3/4	2-1/2	9,130	40.61	17,985	80	24,279	108
		5-1/2	20,087	89.35				
		10	36,521	162.45				
20M	61/64	3-1/2	15,507	68.98	26,977	120	36,419	162
		6-1/2	30,164	134.18				
		14	64,968	288.99				
25M	1-1/4	4	18,747	83.39	44,962	200	60,698	270
		8-1/2	51,738	230.14				
		16	97,389	433.21				
30M	1-1/2	5	25,813	114.82	62,947	280	84,978	378
		10	73,042	324.91				
		20	146,084	649.81				
35M	1-3/4	5	25,813	114.82	89,924	400	121,397	540
		10	85,216	379.06				
		20	170,431	758.12				
45M	2-1/4	5	25,813	114.82	134,885	600	182,095	810
		10	3,009	324.76				
		20	211,475	940.69				

Notes:
1./ Ultimate bond values are developed using data for threaded rods of comparable sizes.
2./ Rebar strength properties are based on nominal cross section of the rebar and minimum steel strength.
3./ Use the lesser value of bond and rebar strength.

Allowable Steel Strength for Carbon and Stainless Steel Threaded Rods

Size	ISO 898 Grade 5.8		B7 (125 ksi)		303/304 (100 / 85 ksi)		316 (100 / 85 ksi)	
	Tensile	Shear	Tensile	Shear	Tensile	Shear	Tensile	Shear
1/4	1,175	605	2,025	1,043	1,620	834	1,620	834
3/8	2,643	1,362	4,556	2,347	3,645	1,878	3,645	1,878
1/2	4,699	2,421	8,099	4,172	6,480	3,338	6,480	3,338
5/8	7,342	3,782	12,655	6,519	10,124	5,216	10,124	5,216
3/4	10,752	5,446	18,224	9,388	12,392	6,384	12,392	6,384
7/8	14,390	7,413	24,804	12,778	16,867	8,689	16,867	8,689
1	18,795	9,682	32,398	16,690	22,030	11,349	22,030	11,349
1-1/4	29,367	15,128	50,621	26,078	34,423	17,733	34,423	17,733

Allowable Tension and Shear load data shown are based on AISC Manual of Steel Construction (ASD) 9th Edition

Ultimate Steel Strength for Carbon and Stainless Steel Threaded Rods

Size	ISO 898 Grade 5.8		B7 (125 ksi)		303/304 (100 / 85 ksi)		316 (100 / 85 ksi)	
	Tensile	Shear	Tensile	Shear	Tensile	Shear	Tensile	Shear
1/4	2,670	1,602	4,602	2,454	3,682	1,963	3,682	1,963
3/8	6,007	3,604	11,354	5,522	8,283	4,418	8,283	4,418
1/2	10,679	6,407	18,408	9,817	14,726	7,854	14,726	7,854
5/8	16,686	10,011	28,762	15,340	23,010	12,272	23,010	12,272
3/4	24,027	14,416	41,417	22,089	28,164	15,021	28,164	15,021
7/8	32,704	19,622	56,374	30,066	38,334	20,445	38,334	20,445
1	42,715	25,629	73,631	39,270	50,069	26,704	50,069	26,704
1-1/4	66,743	40,046	115,049	61,359	78,233	41,724	78,233	41,724

Ultimate Tension and Shear load data shown are based on AISC Manual of Steel Construction (LRFD) 3rd Edition

FLO-ROK FR5MAX INJECTION ADHESIVE ANCHOR

Allowable and Ultimate Load Data in Hollow Concrete Block

Rod Dia.	Hole Dia.	Screen Length	Installation Torque	Allowable Loads				Ultimate Loads			
				Tension		Shear		Tension		Shear	
inch	inch	inch	ft. lbs	lbf	kN	lbf	kN	lbf	kN	lbf	kN
3/8	1/2	3	10	360	1.60	803	3.56	1,800	8.00	3,200	14.23
		6									
1/2	5/8	3	15	490	2.18	1,005	4.47	2,450	10.90	4,020	17.88
		6									
5/8	3/4	6	20	490	2.18	1,238	5.50	2,450	10.90	4,950	22.04
		10									

Load Adjustment Factors Spacing and Edge Distance

Embedment	Reduction Factors - TENSION -			
	2 x emdebment		0.5 x embedment (min)	
	spacing	edge distance	spacing	edge distance
8 d_a - 12 d_a	1.00	1.00	0.63	0.67

Concrete Factors

Concrete Strength (MPa)	Factor
30	1.04
40	1.07
50	1.09

EPOXY USAGE ESTIMATING TABLES

Holes per FR5MAX–5

Rod dia.	Hole dia.	Embedment (inch)											
		1	2	3	4	5	6	7	8	9	10	15	20
1/4	5/16	151.0	75.5	50.3	37.8	30.2	25.2	21.6	18.9	16.8	15.1	10.1	7.6
	3/8	89.4	44.7	29.8	22.3	17.9	14.9	12.8	11.2	9.9	8.9	6.0	4.5
3/8	7/16	91.1	45.6	30.4	22.8	18.2	15.2	13.0	11.4	10.1	9.1	6.1	4.6
	1/2	58.5	29.3	19.5	14.6	11.7	9.8	8.4	7.3	6.5	5.9	3.9	2.9
1/2	9/16	65.8	32.9	21.9	16.4	13.2	11.0	9.4	8.2	7.3	6.6	4.4	3.3
	5/8	42.3	21.2	14.1	10.6	8.5	7.1	6.0	5.3	4.7	4.2	2.8	2.1
5/8	11/16	48.1	24.0	16.0	12.0	9.6	8.0	6.9	6.0	5.3	4.8	3.2	2.4
	3/4	32.9	16.5	11.0	8.2	6.6	5.5	4.7	4.1	3.7	3.3	2.2	1.6

Holes per FR5MAX–10

Rod dia.	Hole dia.	Embedment (inch)											
		1	2	3	4	5	6	7	8	9	10	15	20
1/4	5/16	302.1	151.1	100.7	75.5	60.4	50.4	43.2	37.8	33.6	30.2	20.1	15.1
	3/8	178.8	89.4	59.6	44.7	35.8	29.8	25.5	22.4	19.9	17.9	11.9	8.9
3/8	7/16	182.4	91.2	60.8	45.6	36.5	30.4	26.1	22.8	20.3	18.2	12.2	9.1
	1/2	117.1	58.5	39.0	29.3	23.4	19.5	16.7	14.6	13.0	11.7	7.8	5.9
1/2	9/16	131.6	65.8	43.9	32.9	26.3	21.9	18.8	16.5	14.6	13.2	8.8	6.6
	5/8	84.7	42.4	28.2	21.2	16.9	14.1	12.1	10.6	9.4	8.5	5.6	4.2
5/8	11/16	96.2	48.1	32.1	24.1	19.2	16.0	13.7	12.0	10.7	9.6	6.4	4.8
	3/4	65.9	33.0	22.0	16.5	13.2	11.0	9.4	8.2	7.3	6.6	4.4	3.3
3/4	13/16	77.2	38.6	25.7	19.3	15.4	12.9	11.0	9.7	8.6	7.7	5.1	3.9
	7/8	54.5	27.3	18.2	13.6	10.9	9.1	7.8	6.8	6.1	5.5	3.6	2.7
7/8	61/64	67.1	33.5	22.4	16.8	13.4	11.2	9.6	8.4	7.5	6.7	4.5	3.4
	1	44.5	22.3	14.8	11.1	8.9	7.4	6.4	5.6	4.9	4.5	3.0	2.2

Holes per FR5MAX–12

Rod dia.	Hole dia.	Embedment (inch)											
		1	2	3	4	5	6	7	8	9	10	15	20
1/4	5/16	377.5	188.8	125.8	94.4	75.5	62.9	53.9	47.2	41.9	37.8	25.2	18.9
	3/8	223.5	111.7	74.5	55.9	44.7	37.2	31.9	27.9	24.8	22.3	14.9	11.2
3/8	7/16	227.9	113.9	76.0	57.0	45.6	38.0	32.6	28.5	25.3	22.8	15.2	11.4
	1/2	146.3	73.2	48.8	36.6	29.3	24.4	20.9	18.3	16.3	14.6	9.8	7.3
1/2	9/16	164.5	82.2	54.8	41.1	32.9	27.4	23.5	20.6	18.3	16.4	11.0	8.2
	5/8	105.9	52.9	35.3	26.5	21.2	17.6	15.1	13.2	11.8	10.6	7.1	5.3
5/8	11/16	120.2	60.1	40.1	30.1	24.0	20.0	17.2	15.0	13.4	12.0	8.0	6.0
	3/4	82.4	41.2	27.5	20.6	16.5	13.7	11.8	10.3	9.2	8.2	5.5	4.1
3/4	13/16	96.5	48.3	32.2	24.1	19.3	16.1	13.8	12.1	10.7	9.7	6.4	4.8
	7/8	68.1	34.1	22.7	17.0	13.6	11.4	9.7	8.5	7.6	6.8	4.5	3.4
7/8	61/64	83.8	41.9	27.9	21.0	16.8	14.0	12.0	10.5	9.3	8.4	5.6	4.2
	1	55.7	27.8	18.6	13.9	11.1	9.3	8.0	7.0	6.2	5.6	3.7	2.8

FLO-ROK FR5MAX INJECTION ADHESIVE ANCHOR

EPOXY USAGE ESTIMATING TABLES

Holes per FR5MAX–28

Rod dia.	Hole dia.	Embedment (inch)											
		1	2	3	4	5	6	7	8	9	10	15	20
1/4	5/16	891.9	446.0	297.3	223.0	178.4	148.7	127.4	111.5	99.1	89.2	59.5	44.6
	3/8	27.9	264.0	176.0	132.0	105.6	88.0	75.4	66.0	58.7	52.8	35.2	26.4
3/8	7/16	538.3	269.2	179.4	134.6	107.7	89.7	76.9	67.3	59.8	53.8	35.9	26.9
	1/2	345.6	172.8	115.2	86.4	69.1	57.6	49.4	43.2	38.4	34.6	23.0	17.3
1/2	9/16	388.5	194.3	129.5	97.1	77.7	64.8	55.5	48.6	43.2	38.9	25.9	19.4
	5/8	250.1	125.0	83.4	62.5	50.0	41.7	35.7	31.3	27.8	25.0	16.7	12.5
5/8	11/16	284.0	142.0	94.7	71.0	56.8	47.3	40.6	35.5	31.6	28.4	18.9	14.2
	3/4	194.6	97.3	64.9	48.7	38.9	32.4	27.8	24.3	21.6	19.5	13.0	9.7
3/4	13/16	228.0	114.0	76.0	57.0	45.6	38.0	32.6	28.5	25.3	22.8	15.2	11.4
	7/8	161.0	80.5	53.7	40.2	32.2	26.8	23.0	20.1	17.9	16.1	10.7	8.0
7/8	61/64	198.0	99.0	66.0	49.5	39.6	33.0	28.3	24.7	22.0	19.8	13.2	9.9
	1	131.5	65.7	43.8	32.9	26.3	21.9	18.8	16.4	14.6	13.1	8.8	6.6
1	1 1/16	143.9	72.0	48.0	36.0	28.8	24.0	20.6	18.0	16.0	14.4	9.6	7.2
	1 1/8	108.1	54.1	36.0	27.0	21.6	18.0	15.4	13.5	12.0	10.8	7.2	5.4
1 1/4	1 3/8	83.7	41.9	27.9	20.9	16.7	14.0	12.0	10.5	9.3	8.4	5.6	4.2
	1 1/2	55.0	27.5	18.3	13.8	11.0	9.2	7.9	6.9	6.1	5.5	3.7	2.8
Rebar size													
10M	9/16	391.6	195.8	130.5	97.9	78.3	65.3	55.9	49.0	43.5	39.2	26.1	19.6
15M	3/4	268.4	134.2	89.5	67.1	53.7	44.7	38.3	33.6	29.8	26.8	17.9	13.4
20M	61/64	173.8	86.9	57.9	43.4	34.8	29.0	24.8	21.7	19.3	17.4	11.6	8.7
25M	1 1/4	84.7	42.3	28.2	21.2	16.9	14.1	12.1	10.6	9.4	8.5	5.6	4.2
30M	1 1/2	58.8	29.4	19.6	14.7	11.8	9.8	8.4	7.3	6.5	5.9	3.9	2.9
35M	1 3/4	48.3	24.2	16.1	12.1	9.7	8.1	6.9	6.0	5.4	4.8	3.2	2.4

For correct epoxy usage, add 20% waste (multiply the tabulated number by 0.80)