



FIVE STAR® RS ANCHOR GEL

Rapid Setting Epoxy Gel Adhesive

PRODUCT DESCRIPTION

Five Star RS Anchor Gel is a rapid setting, two component, 100% solids structural epoxy for anchoring rods, bars and bolts in concrete, as well as filling cracks and setting ports for epoxy injection. Five Star RS Anchor Gel is a nonsag, moisture insensitive epoxy adhesive that can be used for both vertical and horizontal installations. This system offers chemical resistance, excellent adhesion and rapid strength gain. Five Star RS Anchor Gel meets the requirements of ASTM C 881 Types I and IV, Class B and C, Grade 3.

ADVANTAGES

- Moisture insensitive, can be used in wet environments
- High modulus structural gel adhesive
- Excellent adhesion to masonry, concrete, wood, steel and most structural materials
- Gel consistency ideal for vertical, overhead and non-mating surfaces
- Fast strength gain
- Convenient 1:1 mixing ratio
- Convenient cartridge and bulk packaging
- Low odor

USES

- Sealing cracks and setting ports for pressure injection
- Re-anchoring of veneer masonry
- Surface repair of non-moving cracks on new or existing structures
- Anchor grouting of bolts, dowels, pins and special fasteners
- A pick-proof sealant around windows, doors, lock-ups and inside correctional facilities
- General purpose, fast-setting adhesive

TECHNICAL SUPPORT

Five Star Products maintains the industry's foremost Engineering and Technical Support Group:

- Over 30 years of experience in concrete restoration
- Technical Center staffed with experienced engineers available for consultation
- Design-A-Spec™ for engineering specification assistance
- Experienced representatives for field service
- Corporate research laboratory available to customize products for unique applications

PACKAGING AND YIELD

Five Star RS Anchor Gel is packaged in 22 fl. oz. (600 ml) dual component cartridges and two gallon (7.56 liter) units.

SHELF LIFE

One year in original unopened packaging.

TYPICAL PHYSICAL PROPERTIES

Color	Gray
Viscosity	Gel
Gel Time, ASTM C 881	7 minutes
Water Absorption, ASTM D 570	0.84%
Bond Strength, ASTM C 882	
2 Day Cure	2900 psi (20.0 MPa)
14 Day Cure	3000 psi (20.7 MPa)
Shrinkage, ASTM D 2566	0.0009 in/in (mm/mm)
Heat Deflection Temperature, ASTM D 648	126°F (52°C)
Compressive Properties, ASTM D 695	
Compressive Strength	10800 psi (74.5 MPa)
Compressive Modulus	5.3 x 10 ⁵ psi (3655 MPa)
Elongation at Break, ASTM D 638	1.0%

The data shown above reflect typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result. Test methods are modified where applicable.



TABLE NO. 1
FIVE STAR RS ANCHOR GEL TENSILE LOAD (lb)
THREADED ROD INSTALLED IN NORMAL WEIGHT CONCRETE^{1,2,3,4,5,6}

Anchor Diameter (inches)	Bit Diameter (inches)	Embedment (inches)	Ultimate Bond Strength (lb)				Allowable Steel Load (lb)		
			Concrete Strength, f 'c				A36		300 Series
			2000 psi	2500 psi	4000 psi	5500 psi	A307	A193 B7	Stainless
3/8	7/16	3-3/8	6530	7300	8250	9200	2110	4550	3100
3/8	9/16	3-3/8	8550	9560			2110	4550	3100
3/8	7/16	5-5/8	9820	10980	11360	11740	2110	4550	3100
1/2	9/16	4-1/2	9430	10540	11730	12920	3750	8100	5680
1/2	11/16	4-1/2	13090	14640			3750	8100	5680
1/2	9/16	7-1/2	13110	14660	17010	19360	3750	8100	5680
5/8	3/4	5-5/8	13240	14800	18870	22940	5880	12660	9040
5/8	7/8	5-5/8	20880	23340			5880	12660	9040
5/8	3/4	9-3/8	19280	21560	26260	30960	5880	12660	9040
3/4	7/8	6-3/4	20020	22380	25870	29360	8460	18220	11290
3/4	1	6-3/4	26700	29850			8460	18220	11290
3/4	7/8	11-1/4	27120	30320	34340	38360	8460	18220	11290
7/8	1	7-7/8	20420	22830	29235	35640	11500	24800	15580
7/8	1-1/8	7-7/8	32520	36360			11500	24800	15580
7/8	1	13-1/8	26670	29820			11500	24800	15580
1	1-1/8	9	20840	23300	28780	34260	15020	32400	20440
1	1-1/4	9	36440	40740			15020	32400	20440
1	1-1/8	15	34650	38340			15020	32400	20440
1-1/4	1-3/8	11-1/4	33240	37160	46760	56360	23480	50610	32700
1-1/4	1-3/8	18	44880	50180			23480	50610	32700

TABLE NO. 2
FIVE STAR RS ANCHOR GEL SHEAR AND TENSILE LOADS (lb) FOR
REINFORCING STEEL INSTALLED IN NORMAL WEIGHT CONCRETE^{1,2,3,4,5,6}

Anchor Diameter (inches)	Bit Diameter (inches)	Embedment (inches)	Ultimate Bond Strength (lb)				Allowable Steel Load Tensile or Shear (lb)	
			Concrete Strength, f 'c				Grade 40	Grade 60
			2000 psi	2500 psi	4000 psi	5500 psi		
#3	1/2	3-3/8	6330	7080	9050	11020	2200	2640
#4	5/8	4-1/2	11000	12300	14730	17160	4000	4800
#5	3/4	5-5/8	14310	16000	18810	21620	6200	7440
#6	1	6-3/4	16490	18440	25510	32580	8800	10560
#7	1-1/8	7-7/8	22020	24620	27640	30660	12000	14400
#8	1-1/4	9	24270	27140	30010	32880	15600	18960

¹ The tabulated shear and tensile loads are for anchors installed in normal weight concrete having reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

² Spacing and edge distance shall be in accordance with Table No. 4.

³ For other steel grades compare allowable tensile load with ultimate bond strength and use the lesser. Allowable stainless steel loads are based on ASTM F 593, cold worked condition strength.

⁴ Allowable loads may be increased by 33-1/3% for short term loading due to earthquakes or wind.

⁵ 2000 psi ultimate load were determined in accordance with Section 7.5 of ICBO-ES AC-58, by multiplying 2500 psi test results by a reduction factor of $(2000 \div 2500)^{1.5} = 0.894$.

⁶ Five Star RS Anchor Gel is recommended for installation in damp holes, for use in locations subject to severe exterior weathering conditions and for resisting tensile and shear loads due to earthquake and wind.

TABLE NO. 3
FIVE STAR RS ANCHOR GEL ALLOWABLE SHEAR LOAD FOR
THREADED ROD INSTALLED IN MINIMUM 2000 PSI CONCRETE^{1,2,3,4,5}

Anchor Diameter (inches)	Bit Diameter (inches)	Embedment (inches)	Allowable Steel Load (lb)		
			A 36 A 307	A193 B7	300 Series Stainless
3/8	7/16	3-3/8	1080	2350	1565
1/2	9/16	4-1/2	1930	4170	2900
5/8	3/4	5-5/8	3030	6520	4660
3/4	7/8	6-3/4	4360	9390	5880
7/8	1	7-7/8	5930	12780	8170
1	1-1/8	9	7740	16690	10730
1-1/4	1-3/8	11-1/4	12100	26070	17340

- ¹ The shear and tensile loads are for anchors installed in normal weight concrete having reached a minimum ultimate compressive strength f 'c of 2000 psi at the time of installation.
- ² Spacing and edge distance shall be in accordance with Table No. 4.
- ³ Allowable stainless steel loads are based on ASTM F 593, cold worked condition strength.
- ⁴ Allowable loads may be increased by 33-1/3% for short term loading due to earthquakes or wind. A 36 & A 307 values must be used instead of listed loads for higher strength steels for these conditions.
- ⁵ Five Star RS Anchor Gel is recommended for installation in damp holes, for use in locations subject to severe exterior weathering conditions and for resisting tensile and shear loads due to earthquake and wind.

TABLE NO. 4
FIVE STAR RS ANCHOR GEL ALLOWABLE SPACING AND EDGE DISTANCE
(D = Anchor Diameter)

	DISTANCE FOR FULL ANCHOR CAPACITY (critical distance) ¹	DISTANCE FOR REDUCED ANCHOR CAPACITY	REDUCTION FACTOR ²
Edge Distance - Tensile Load	12D	4D	0.70
Spacing Between Anchors	24D	8D	0.90
Edge Distance - Shear Load	12D	4D	0.26

- ¹ The minimum distances required to obtain the load values in Table Nos. 1, 2 & 3.
- ² Load values in the tables are multiplied by the reduction factor when anchors are installed at the reduced distances. Use linear interpolation for spacing and edge distances between listed values.

Example (2500 psi concrete 7/8" diameter hole, A193 B-7 threaded rod):

Anchor Diameter	Embedment Depth	Edge Distance	Ultimate Load
5/8"	5-5/8"	12D (7-1/2")	23,340 lb (from Table No. 1)
5/8"	5-5/8"	4D (2-1/2")	1. 16,340 lb (23,340 from Table No. 1 x 0.70 reduction factor from Table No. 4) 2. 16,340 ÷ 4 (safety factor) = 4085 lb

Divide calculated ultimate load by safety factor (typically 4). Compare this number to the allowable steel load and use the lower number.

PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials. Concrete may be sandblasted or prepared by other approved mechanical means. Steel should be sandblasted to a SSPC-SP6 commercial finish. For anchoring dowels, pins and bolts, drill hole into sound concrete leaving a clean, rough finish on sides of hole. Hole diameter and embedment length are determined by diameter and strength of the anchor. Ensure that hole is clean of all loose material and dust by use of a stiff bristle brush. Any contamination must be completely removed by appropriate means, including sandblasting, other mechanical abrasion, or oxygenated solvent leaving no residue.
2. **BULK MIXING:** Material should be preconditioned to between 70°F and 80°F (21°C and 26°C) before using. Proportion equal parts by volume of Component A and Component B. Mix thoroughly until a uniform color is obtained. Avoid entrapping air. Do not mix more material than can be placed in 5 minutes at 73°F (23°C).
3. **METHODS OF PLACEMENT:**

Structural adhesive - Apply Five Star RS Anchor Gel to the mating or non-mating prepared substrates. Work into the substrates for positive adhesion. Secure the bonded unit firmly into place until the adhesion has cured. Glue line should not exceed 1/4 inch (6 mm).

To seal cracks for injection grouting - Place the mixed material over the cracks to be pressure injected and around each injection port, approximately 1 inch (25 mm) wide by 1/8 - 1/16 inch (2 - 4 mm) thick. Allow sufficient time to set before pressure injecting. Be sure not to clog ports with adhesive.

Pick-proof sealant: Use proper equipment or cartridge to dispense an appropriate size bead around area to be sealed. Tool material into joint to create seal.

Dual cartridge system: Precondition cartridge to 70°F to 80°F (21°C and 26°C) and place cartridge in gun. Remove cap and plugs. Cut tip of static mixer at second level and install onto cartridge. Dispense and waste gel until a uniform gray color is discharged. Insert tip of mixer to back of hole and partially fill with gel to prevent air pockets. For best results, coat anchor with adhesive, insert and rotate slowly into hole. In freezing temperatures (below 32°F or 0°C), carefully heat hole with torch prior to filling with gel. To obtain full strengths, the installation should be kept at a minimum of 50°F (10°C) until fully cured.
4. **CLEAN UP:** Use an appropriate solvent to clean uncured material. Cured material can only be removed mechanically.

LIMITATIONS

- Minimum surface temperature 35°F (2°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Do not thin with solvents.
- Do not use for sealing moving or leaking cracks.
- Material is a vapor barrier after cure.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application.
- Maximum glue line 1/4 inch (6 mm).
- Cold temperatures lengthen working time, hot temperatures decrease working time.

CAUTION

Irritant, toxic, strong sensitizer. Contains epoxy resin and amine. This product may cause skin irritation. Do not inhale vapors. Provide adequate ventilation. Protect against contact with skin and eyes. Wear rubber gloves, long sleeve shirt, goggles with side shields. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.

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