

CI-GV

Structural Injection Epoxy Gel

SIMPSON

Strong-Tie

®

CSI Specification: 03 01 00 Maintenance of Concrete

DESCRIPTION

CI-GV Structural Injection Epoxy Gel is a two-component, high-solids, moisture-tolerant, thixotropic epoxy designed for pressure injection of concrete cracks. CI-GV is suitable for vertical and horizontal crack sealing, for increasing the bond between freshly placed repair mortars or concrete mixes and existing concrete, and for general concrete repair applications. It is available in side-by-side cartridges and bulk packaging.

SPECIFICATION COMPLIANCE

- Meets the requirements of: ASTM C881 & AASHTO M235, Type I/II, Grade 3, Class B
ASTM C881 & AASHTO M235, Type I/IV and II/V, Grade 3, Class C

ASSESSMENT

WHERE TO USE

- As a gel-viscosity epoxy for repair of medium cracks $\frac{3}{32}$ " – $\frac{1}{4}$ " (2.4–6 mm) in width
- For structural repairs
- For vertical and horizontal crack sealing
- As a pick-proof sealant
- For underwater pressure-injection applications
- To bond new concrete or repair mortars to existing concrete
- For use as a repair mortar

FEATURES

- Chemically bonds with the concrete to provide a structural repair. CI-GV seals the crack from moisture, protecting rebar in the concrete from corrosion.
- Gel-viscosity moisture-tolerant, can be used on dry and damp surfaces
- Formulated for maximum penetration under pressure
- Decreases in viscosity under pressure for increased flowability
- Non-shrink
- Can be used with metered pressure-injection equipment
- Freeze-thaw resistant

PRODUCT DATA

Generic Description

Epoxy resin

Packaging

32 fl. oz. (946 mL) dual cartridge (CIGV32), 5/carton;

3 US gallon (11.4 L) bulk kit (CIGV3KT) contains:

- (2) 1 US gallon (3.8 L) cans of Component "A" (CIGV1A)
- 1 US gallon (3.8 L) can of Component "B" (CIGV1B)

Cured Color

Concrete Gray

Shelf Life

2 years in unopened packaging

Storage

Store dry between 45°–90°F (7°–32°C)

VOC – ASTM D2369

10 g/L (mixed)

APPLICATION DATA

Mixing Ratio (By Volume)	2:1
Yield	231 in. ³ /US gal. (0.001 m ³ /L)
Consistency at 90°F (32°C), ASTM C881 Consistency at 72°F (22°C), ASTM C881 Consistency at 50°F (10°C), ASTM C881	Non-Sag
Pot Life, 1 Quart (0.95 L)	8 minutes at 90°F (32°C) 19 minutes at 72°F (22°C) 55 minutes at 50°F (10°C)
Thin Film (5 mil) Cure Time at 72°F (22°C), ASTM D5895	Set to Touch: 3:00 hours Dry Through: 6:00 hours

APPLICATION DATA — MORTAR

Maximum Mixing Ratio (By Volume)	1 part CI-GV: 1 Part FX-702
Pot Life, 1 Quart (0.95 L)	32 minutes at 72°F (22°C)
Yield, 1 gallon (3.8 L) CI-GV with 1 gallon (3.8 L) of dry, loose sand	1.5 gallons (5.7 L) of mortar



TECHNICAL INFORMATION

Compressive Strength

	40°F (4°C) psi (MPa)	60°F (16°C) psi (MPa)	72°F (22°C) psi (MPa)	90°F (32°C) psi (MPa)	Test Standard
4-hour cure	—	—	—	9,150 (63.1)	ASTM D695
8-hour cure	—	—	5,150 (35.5)	9,800 (67.6)	
16-hour cure	—	3,100 (21.4)	9,300 (64.1)	10,200 (70.3)	
24-hour cure	—	6,800 (46.9)	10,250 (70.7)	10,250 (70.7)	
3-day cure	5,100 (35.2)	10,500 (72.4)	11,250 (77.6)	10,250 (70.7)	
7-day cure	7,600 (52.4)	11,700 (80.7)	11,600 (80.0)	10,400 (71.7)	
14-day cure	8,300 (57.2)	12,150 (83.8)	11,600 (80.0)	10,600 (73.1)	
28-day cure	10,600 (73.1)	12,400 (85.5)	11,700 (80.7)	10,800 (74.5)	

Temperature Range	Class B 40°–60°F (4°C–16°C)	Class C >60°F (16°C)	Test Standard
Epoxy Classification	Types I, II Grade 3	Types I, II, IV, V Grade 3	ASTM C881
Gel Time , 60 gram mass ¹	200 minutes	30 minutes	ASTM C881
Bond Strength , Slant Shear:			
Hardened to Hardened Concrete, 2-day cure ²	1,250 psi (8.6 MPa)	3,050 psi (21.0 MPa)	ASTM C882
Hardened to Hardened Concrete, 14-day cure ²	3,650 psi (25.2 MPa)	3,850 psi (26.5 MPa)	
Fresh to Hardened Concrete, 14-day cure ³	3,130 psi (21.6 MPa)	3,130 psi (21.6 MPa)	
Flexural Strength , 7-day cure ²	4,400 psi (30.3 MPa)	10,150 psi (70.0 MPa)	ASTM D790
Modulus of Elasticity in Compression , 7-day cure ²	389,000 psi (2,680 MPa)	454,000 psi (3,130 MPa)	ASTM D695
Heat Deflection Temperature , 7-day cure ³		124°F (51°C)	ASTM D648
Glass Transition Temperature , 7-day cure ³		136°F (58°C)	ASTM E1356
Water Absorption , 14-day cure ⁴		0.31%	ASTM D570
Linear Coefficient of Shrinkage ³		0.001 in./in.	ASTM D2566
Coefficient of Thermal Expansion ³		2.32 x 10 ⁻⁵ in./in.°F 4.18 x 10 ⁻² cm/(cm°C)	ASTM C531
Shore D Hardness , 24-hour cure ³		74	ASTM D2240
Shore D Hardness , 7-day cure ³		80	ASTM D2240
Adhesion to Concrete , 24-hour cure ³		1,100 psi (7.6 MPa)	ASTM D7234

1. Class B tested at 50°F (10°C), Class C tested at 72°F (22°C) 3. Cured at 72°F (22°C)
 2. Class B cured at 40°F (4°C), Class C cured at 60°F (16°C) 4. Cured at 72°F (22°C), immersed in water 24 hours

TECHNICAL INFORMATION

TECHNICAL INFORMATION — WHEN USED AS A MORTAR

Tests performed at 1 part by volume of mixed CI-GV to 1 part by volume of FX-702

Compressive Strength

	40°F (4°C) psi (MPa)	60°F (16°C) psi (MPa)	72°F (22°C) psi (MPa)	Test Standard
1-day cure	—	8,000 (55.2)	9,200 (63.4)	ASTM C579
7-day cure	8,600 (59.3)	9,500 (65.5)	10,200 (70.3)	
28-day cure	9,450 (65.2)	9,600i (66.2)	10,450 (72.0)	

	72°F (22°C) psi (MPa)	Test Standard
Flexural Strength, 7-day cure	4,050 (27.9)	ASTM C580
Tensile Strength, 7-day cure	2,000 (13.8)	ASTM C307
Bond Strength, Slant Shear Hardened to Fresh Mortar, 7-day cure	1,800 (12.4)	ASTM C882

LIMITATIONS

- For optimal product performance, do not apply to surfaces below 40°F (4°C) or above 90°F (32°C)
- For use in non-moving cracks only
- Not for use in actively leaking or seeping cracks
- Remove active hydrostatic pressure before attempting injection
- For cracks wider than ¼ in. (6 mm), consult a qualified engineer

SURFACE PREPARATION

General Concrete Repair: Concrete surface must be sound, clean and free of all contaminants that could impair product adhesion, bond or performance. Concrete should be at least 28 days old or substantially cured to the specified compressive strength prior to CI-GV installation. Prepare the surface by abrasive blasting or other mechanical means to achieve an open pore structure and profile per ICRI Guideline 310.2 CSP5-9, taking care to avoid microcracking. Remove all loose or deteriorated concrete by chipping hammer, water jetting or other mechanical means to achieve an open pore structure and sound concrete surface. Remove all cleaning media and debris by vacuum or blowing with high-pressure, oil-free air.

Pressure Injection: Prepare surface area around crack by abrasive blasting or other mechanical means, taking care not to impact any debris into the crack. Blow out the crack with minimum 80 psi (550 kPa) oil-free, compressed air to remove any visible debris. For surface mounted ports, use a suitable paste-over material such as CIP-LO, CIP-F, ETR16, or FX-764 (Underwater Applications) to adhere the ports to concrete surface. For drill-in ports, drill the appropriate sized hole and set. Paste over and seal the entire crack, and port bases using a putty knife. Apply the paste-over material at a minimum thickness of ¾ in. (5 mm) and 1 in. (25 mm) wide. Cover port bases with a minimum thickness of ¼ in. (6 mm) and extend the paste-over at least 1 in. (25 mm) beyond the base of the port. If possible, seal the backside of the crack. Allow paste-over material to fully cure before injecting.

Bonding Agent: Concrete surface must be sound, clean and free of all contaminants that could impair product adhesion, bond or performance. Concrete should be a minimum of 28 days old or substantially cured to the equivalent design strength prior to CI-GV installation. Prepare concrete in accordance with ICRI Guideline 310.2R CSP 5-9, taking care to avoid micro-cracking. Remove all loose or deteriorated concrete by chipping hammer, water jetting, or other mechanical means to achieve an open pore structure and sound concrete surface. Remove all cleaning media and debris by vacuum or blowing with high-pressure, oil-free air.

Repair Mortar: Prepare the surface by abrasive blasting or other mechanical means to achieve an open pore structure and profile per ICRI Guideline 310.2 CSP3-6. Prepare the repair area in accordance with ICRI Guideline No. 310.1R, taking care to avoid microcracking. Prime exposed reinforcing steel with a zinc-rich primer such as FX-406.

MIXING

For Neat Resin: Proportion components at a 2A:1B ratio by volume in a clean pail or use calibrated mixing equipment. Mix thoroughly with a low-speed (300–600 rpm) drill and mixing paddle for 2–3 minutes, scraping unmixed material from sides and bottom of mixing container as needed to achieve a uniform consistency. Avoid entrapping air into mixture.

Dual Cartridges: Hold cartridge upright, unscrew retaining nut and remove plugs. Attach Simpson Strong-Tie EMNO22 mixing nozzle (included) to the top of cartridge and secure with retaining nut. Insert cartridge into dispensing tool. When using a pneumatic dispensing tool, regulate air pressure to 80–100 psi (550–690 kPa). **IMPORTANT:** Cartridge must be equalized prior to use. Failure to follow these instructions can result in product not properly curing. To ensure proper mixing ratio, squeeze the trigger on the tool until the mixing nozzle is completely full. Once full, dispense 3 full trigger pulls or until the product dispenses as a uniform gray color. Repeat if necessary. Dispose of unmixed adhesive in accordance with local regulations. When properly mixed, CI-GV will be a uniform gray color. Modification or improper use of mixing nozzle may impair adhesive performance. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle. Adhesive will start to gel in the nozzle if allowed to stand beyond the listed pot life. Adhesive will gel faster at higher temperatures. Material under pressure can blow out the back of the cartridge if the adhesive in the nozzle hardens.

Repair Mortar: Mix neat resin as stated above, then slowly add 1 part by volume of FX-702 oven dried rounded silica filler for every 1 part by volume of mixed CI-GV, to avoid clumping, while continuing to mix for approximately 2–3 minutes or until a uniform consistency is achieved, scraping the pail as needed. For large batches, mix neat resin as stated above, then transfer the mixed liquid to a mortar mixer and add FX-702, and continue mixing for 2–3 minutes or until a uniform consistency is achieved. Do not thin CI-GV.

APPLICATION

General Concrete Repair/Adhesive: Remove all standing water by vacuum or blowing with oil-free, compressed air prior to installation. CI-GV can be installed on damp or dry surfaces. Do not install through standing water. Avoid installing at high temperatures or windy conditions to maximize open time. Apply properly mixed CI-GV to the prepared substrates with a trowel. Do not disturb until fully cured.

For Pressure Injection: With all ports open, begin injecting CI-GV at the lowest port and work your way up. For horizontal applications, choose one end of the affected site and work your way to the other end. Begin pumping CI-GV into the first port to establish flow. If the next port shows material, close that port and continue pumping until the first port refuses material. If the first port refuses material prior to showing at the next port, close the first port and re-establish flow at the second port. Repeat until all ports refuse material. When injection is complete, and following initial set time, remove installation ports. If desired, remove cured paste-over epoxy by mechanical means.

As a Bonding Agent: Remove all standing water by vacuum or blowing with oil-free, compressed air prior to installation. CI-GV can be installed on damp or dry surfaces. Do not install through standing water. Avoid applying in direct sunlight. Apply CI-GV by brush, roller, spray, or squeegee at a rate of 60–100 ft.²/US gal. (1.5–2.5 m²/L), depending on surface profile and porosity. Care should be taken to prevent pooling of the bonding agent. Immediately install repair materials or concrete mix into wet CI-GV. Do not allow CI-GV to dry or become tack-free before concrete or mortar installation. If CI-GV does dry or becomes tack-free, abrade surface and recoat. Do not apply more bonding agent than can be effectively covered with repair mortars or concrete mixes while remaining tacky.

For Repair Mortar: Prior to applying repair mortar, apply neat resin as a bonding agent as stated above. Pour mixed repair mortar material into repair area. Screed and vibrate if necessary. Finish with wood float or steel trowel. Allow CI-GV to fully cure to its design strength prior to placing into service. CI-GV repair mortar can be applied to dry or damp surfaces. Do not apply to wet surfaces or through standing water.

WARNING

Resin: WARNING! Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction.

Hardener: DANGER! Harmful if swallowed. Harmful in contact with skin. Causes severe skin burns and eye damage. May cause an allergic skin reaction.

Protective Measures: The use of chemical splash goggles or safety glasses with side shields and chemical-resistant gloves is recommended. Use appropriate clothing to minimize skin contact. The use of a NIOSH-approved respirator is required to protect respiratory tract when ventilation is not adequate to limit exposure below the Permissible Exposure Limit (PEL). Refer to Safety Data Sheets (SDS) available at strongtie.com/sds for detailed information.

FIRST AID

Eye Contact: Hold open eyes under running water for 15 minutes. Seek medical advice.

Skin Contact: Wash skin with soap and water. Seek medical advice if irritation develops.

Inhalation: Remove victim to fresh air. If necessary, use artificial respiration. Seek medical advice.

Ingestion: If product is swallowed, call physician or poison control center. Do not induce vomiting, or give diluents to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice.

CLEAN-UP

Spills: Construct a dike to prevent spreading. Soak up with absorbent material such as clay, sand, or other non-reactive material. Place in leak-proof containers. Keep out of sewers, storm drains, surface waters, and soils.

Surface Area: Wipe up uncured material with cotton cloths. If desired, scrub area with abrasive, water-based cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), or adhesive remover can be used. Cured material can only be removed by mechanical means.

Tools and Equipment: Wipe up uncured material with cotton cloths. If desired, scrub area with abrasive, water-based cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), or adhesive remover can be used. Cured material can only be removed by mechanical means.

Skin: Use a non-toxic pumice-based soap, citrus-based hand cleaner or waterless hand-cleaner towel. Never use solvents to remove product from skin.

Disposal: Dispose of container and unused contents in accordance with federal, state, and local requirements. Containers may be recycled; consult local regulations for exceptions.

LIMITED WARRANTY

This product is covered by the Simpson Strong-Tie RPS Product One-Year Limited Warranty, which is available at strongtie.com/limited-warranties or by calling Simpson Strong-Tie at (800) 999-5099.

IMPORTANT INFORMATION

It is the responsibility of each purchaser and user of each product to determine the suitability of the product for its intended use. Prior to using any product, consult a qualified design professional for advice regarding the suitability and use of the product, including whether the capacity of any structural building element may be impacted by a repair. As jobsite conditions vary greatly, a small-scale test patch is required to verify product suitability prior to full-scale application. The installer must read, understand, and follow all written instructions and warnings contained on the Limited Warranty, product label(s), Product Data Sheet(s), Safety Data Sheet(s), and the strongtie.com website prior to use. For industrial use only by qualified applicators. KEEP OUT OF REACH OF CHILDREN!

 **WARNING!** Cancer and reproductive harm — www.P65Warnings.ca.gov.