STRONGWALL INDUSTRIES, INC.

DATA SHEET

STRONGPATCH HVO

Technical Data Sheet

Fast Setting HVO Sculpting Repair Mortar

STRONGPATCH HVO is an extremely versatile, polymer modified structural repair mortar. It is designed for hand placement to restore horizontal, vertical and overhead substrates. STRONGPATCH is an excellent rapid return-to-service single source repair product. HVO is placed in multiple lifts in rapid succession. Its properties are fast set, low shrink and high early strength gain. These features also make HVO an excellent sculpting mortar that is able to be placed and finished in a single lift. HVO is available to be custom matched to any existing masonry, concrete, stone or building envelope element.

WHERE TO USE:

- Expertly custom matched repairs of concrete, stone or any building ornament.
- Rapid repairs of up to 2" in multiple lifts.
- Stand alone or coated repairs.
- Horizontal, vertical and overhead concrete repairs.
- Non-formed overhead repairs.
- Interior and exterior service conditions.
- Building envelope restoration projects included within residential complexes, educational institutions, health care facilities, public buildings and houses of worship.
- Commercial, industrial, institutional and transportation facilities including: structures precast panels, walls, curbs, concrete pipes, pilings, platforms and bridges.

FEATURES AND BENEFITS:

- Custom substrate matches of any existing stone or masonry substrate
- Custom color matches
- Placed and sculpted repairs in a single lift
- High polymer to cement ratio
- Tenacious bond formation
- Fast turnaround
- 10-20 minute initial set
- Very low dry shrinkage values
- Self-curing
- Free of chloride, gypsum and heavy metals
- Sulfate resistant
- Contains migratory corrosion inhibitor

PACKAGING:

50 pound bag

YIELD:

Many factors contribute to unit yield such as but not limited to: substrate texture, porosity, disparities in applied thickness, and methods of application, individual installation technique and typical allowance for waste.

Average yield neat: 0.48 ft^3

TYPICAL PHYSICAL PROPERTIES AT 75˚F (24˚C):

Typical physical properties and test results may differ based upon statistical variations of independent testing labs with respect to test methods, mixing methods and equipment used. Project application methods as well as temperature, actual site and environmental conditions will all affect the cure rates, working life, recoat time and open to traffic project conditions throughout the installation.

Compressive Strength	ASTM C-109	1 day: 2600 psi 7 days: 6800 psi 28 days: 7000 psi
Flexural Strength	ASTM C-348	1 day: 570 psi 7 days: 1250 psi 28 days: 1650 psi
Tensile Strength	ASTM C-190	1 day: 265 psi 7 days: 460 psi 28 days: 510 psi
Slant Shear Bond Strength	ASTM C-882	7 days: 1140 psi 28 days: 1800 psi
Shrinkage	ASTM C-157	28 days: -0.045%
Freeze Thaw Resistance	ASTM C-666	50 cycles: excellent
Gardner Impact		28 days: greater than 158 inch lbs.
Entrained Air Content	ASTM C-231	Wet: 5.3%
Water Penetration	ASTM E-514	3 day soak: 1/2 inch
pH		Wet: 12
Dry Packaged Rapid Hardening Cementitious Materials	ASTM C-928	Meets requirements for concrete repairs
Initial Set Time		5 - 10 minutes
Finishing Time		30 - 60 minutes
Time Between Lifts		5 - 10 minutes
Color		Light gray or custom match*
CSI Division		03920

*Custom matches available upon request of existing masonry, stone, façade elements or any color.

JOB SITE SURVEY:

- Evaluate the existing substrate for signs of efflorescence.
- For on or below grade, exterior and non-controlled environments perform multiple adhesion tests.
- Testing may be required for hydrostatic pressure, MVER, chlorides content, depth of carbonation, ASR, AAR and to determine if there are any deleterious aggregate or unacceptably high levels of potassium, sulfate, alkali or other aggressive agents within the concrete substrate.

ENVIRONMENTAL CONDITIONS:

All materials are mixed, applied and cured at the job site. These environmental conditions are required to facilitate proper curing and performance of the products. Do not proceed if outside of these environmental conditions.

Ambient	**Minimum**	**Maximum**
Temperature	45°F and rising	90°F
Wind	N/A	30 mph
Substrate: Not frost laden		
Temperature	50°F and rising	85°F
Measure and record these temperatures daily. Do not apply materials if rain or freezing conditions are anticipated. Substrate temperature must be at least 5°F above measured dew point.		

SUBSTRATE PREPARATION GUIDELINES:

- Determine the best method or combination of methods of concrete removal and mechanical surface preparation: sandblast, scarify, shot blast or scabble to obtain an exposed aggregate profile and open the concrete pore structure. Variations in surface conditions seen in walls and ceilings versus those in horizontal substrates should be considered when choosing surface preparation methods and techniques.
- Any acid based cleaning solutions must be neutralized.
- Carefully sound out the structure. Minimize damage to existing concrete and its bond to embedded reinforcing steel.

- It is practice to have 2” of bar free of any rust stained concrete or contamination and a ¾” clearance surrounding the reinforcement. Perform according to the ACI and ICRI technical guidelines or specifications.
- All reinforcing steel must be mechanically white metal cleaned, coated or primed and fully dry.
- Restore all non-durable, unsound, damaged, deteriorated, delaminated, cracked, weak, loose, spalled and rust stained concrete.
- Concrete surface repair dimensions including overall length, width, depth and shape require careful consideration. Area to be patched is required to be cut at right angles to the existing concrete. Saw cutting is recommended. Install in compliance with ACI standards of practice for placing and curing of concrete and cement based products.
- Remove or replace areas with penetrating and migrating contaminants, silicone coated surfaces, concrete curing compounds and form release agents, sealers, dirt, adhesives, oil, grease, wax, fatty acids, hydraulic fluid, cutting oils, paint, films, existing coating, laitance, glaze, efflorescence and all contaminants that will inhibit or prevent formation of a penetrating bond within the substrate.
- Mechanically profile the substrate to a concrete surface profile as required depending upon the substrate condition, bonding requirements, type of repair and coating or system installation. Refer to the ICRI Technical Guideline #310.2R-2013 for “Selecting and Specifying Concrete Surface Preparation.”
- For assessment of decontamination, surface preparation and profile of the substrate perform a Tensile Adhesion Test per ASTM C-1583. Mechanical preparation methods may require additional testing to verify substrate tensile strength of the existing substrate in accordance with ICRI Guideline No. 210.3R-2013 (Guide for Using In situ Tensile Pull-off Tests to Evaluate Bond of Concrete Surface Materials).

INSTALLATION:

The proper installation of the STRONGPATCH HVO is the sole responsibility of the end-user.
The supervision and quality control of the project is the sole responsibility of the user.
Job site visits by SWI representatives are only for the purpose of making recommendations.

- Conduct a pre-installation conference on site with all parties in attendance to review the surface preparation, concrete removal, structural repair specifications and procedures prior to commencing work.
- For best results, install a field mock-up of the repairs using the same equipment as in the construction procedures, for owner, architect and engineer approval of the following: surface preparation, adhesion, installation procedures and technique.
- Power wash substrate at recommended psi to remove all contaminants.
- When power washing is not possible, thoroughly brush the substrate. Clean with wet and dry vacuum or compressed air.
- Make all repairs to within acceptable tolerances.
- Mechanically profile all repairs.
- Work according to the approved field mock-up.
- Provide sufficient ventilation to achieve optimal performance and a full and continuous cure.
- Follow all environmental conditions.

SLURRY COAT

Mix only what is required.
Substrate is SSD.
Achieve a dull concrete finish.
Maintain this status during placement of the slurry coat.
No ponding conditions or standing water in holes and voids.

- Gradually add powder to the water.
- Mix for 1 minutes until free of pockets of dry powder.
- Scrape sides of the container.
- Mix for 1 minute.
- Scrub in to fill pores and prime all voids and steel surfaces.
- Re-apply if the substrate is rapidly absorbing the mixture or it dries.
- Leave no puddles.

REPAIR MORTAR MIX:

Mix ratio: 5 quarts water maximum : 50 lbs. powder
For large scope repairs use a paddle type mortar mixer.
Mix only what can be placed in 10 minutes.
Do not over water.

- Pour 4 ½ quarts water into the mixing vessel.
- Use a 400 rpm drill with a mounted Jiffy mixer.
- Place the paddle at ¾ depth of the pail.
- Do not create a vortex or aerate the material.
- Gradually add powder to the water.
- Never reverse this step.
- Scrape sides of the container.
- Mix for 2 minutes.
- Add an additional ½ quart of water.
- Mix until there are not dry pockets of powder.

EXTENSION WITH AGGREGATE - Single lift repairs > ¾":

Ratio: 20 lbs. of ⅜" aggregate per 50 lbs. bag. Never use limestone.
Variances in aggregate quality may result in different strengths and performances.
As per ACI Guidelines, the aggregate size and thickness should not exceed ⅓ of the depth of the repair.
The coarse ⅜" pea gravel, sharp sand or any combination must be non-reactive, clean and washed, well-graded, high density, low water retention and saturated surface dry prior to being incorporated into the mortar mix as per the ACI, ICRI and ASTM Standards of Aggregate Selection repair guidelines and specifications.

- Prepare mortar mix as above.
- Pre-saturate aggregate.
- Slowly add the measured aggregate.
- Mix for 30 seconds.

PLACEMENT:

Place in accordance with repair procedures, specifications, and recommendations of ACI for placing and curing of concrete and cement based products.
Ensure good, intimate contact with the slurry coat while it is still tacky.
If the material falls off the trowel, it is too dry; if it sags, it is too wet.
Do not let mix settle, remix during use.
Do not let aggregate settle.
Do not re-temper once mix begins to set up.

- Immediately place the repair material.
- **Sculpting**: overfill patch and shave to shape for up to 1 hour after initial set.
- **Vertical and overhead:** install in 1 ½" lifts to the required depth.
- **Single application horizontal repairs**: install at up to 2" per lift. Up to ¾" install neat; greater than ¾" extend with aggregate.
- Trowel the mix against the perimeter of the repair.
- Work the material towards the center.
- Thoroughly compact the mortar around the exposed reinforcement
- Consolidate into a tight compact repair.
- Finish with a damp sponge, brush or steel trowel.
- Clean all tools and equipment with water while still wet immediately after use. If cured, mechanical means will be necessary.

MULTIPLE LIFTS:

- Score top surface on each lift to roughen patch.
- Allow previous layer to initially set (5-10 minutes) prior to layering.
- Dampen the patch.
- Scrub in next lift.

CURING:

As per ACI recommendations for Portland cement concrete, curing is required in order to meet published physical properties.
Moist curing with burlap, polyethylene or burlene as per the ACI standards is the preferred method.
Breathable coatings can be installed within a 24 hour cure.
Resinous coatings and primers require a 24 hour cure per ½ inch in depth.

- Protect from direct sun, rain and frost after finishing.
- Moist curing should commence immediately.
- It is recommended to wet cure for 3 days.
- Allow repairs to fully cure prior to profiling.
- Allow to cure for 24 hours before applying weight or stress.

EQUIPMENT AND TOOLS:

Concrete removal
Mechanical surface preparation
Power washer
Air blower
Mister
Volumetric graduated containers
Mixing pails
Paddle type mortar mixer
Variable speed industrial drill
Jiffy mixer Model PS-1
Steel trowel
Masonry brush
Sculpting tools

PRECAUTIONS AND LIMITATIONS:

Refer to corresponding Product Data Sheets, Installation Procedures, and Safety Data Sheets of all products and systems prior to installation. Refer to www.strongwall.com for the most recent information and updates.

- Never over water
- Do not allow the slurry coat to cure prior to the application of the mortar as it will act as a de-bonder.
- Discard any material that starts to set up in the container.
- For extensive repairs, use a mixer large enough to permit continuous placement before any part of the mix has set.
- This material does not contain added gypsum, lime or high aluminum cements.
- Prevent any contact with aluminum, as with all Portland cement based products, to prevent adverse chemical reactions and possible product failure. Follow specifications to insulate potential areas of contact by coating aluminum bars, rails and posts with an appropriate epoxy.
- Extension with coarse aggregate may alter the physical properties of as published.
- Size, shape and depth of repair must be consistent with practices recommended by ACI and ICRI.
- Refer to ACI 305 the “Guide to Hot Weather Concreting” or ACI 306 the “Guide to Cold Weather Concreting” when there is a need to place this product while either hot or cold temperatures prevail. Thinner placements will be more sensitive to the temperature conditions.
- A warm substrate will decrease the pot life and make the materials sticky. A cooler substrate will retard the cure.
- Product is temperature sensitive regarding cure and set time.
- Do not allow repairs to freeze prior to a full cure.

SHELF LIFE:

One year from date of manufacture as long as containers remain unopened and when material is stored in a tempered area at 65°F to 75°F.

SITE, STORAGE AND TRANSPORTATION CONDITIONS:

Materials should be delivered in their original packaging in containers with seals unbroken and bearing the manufacturers’ labels indicating brand name, directions for storage and mixing with other components. Check materials upon receipt to make sure all is accounted for and has arrived in good condition. Store materials indoors, off the ground and in a dry location at temperatures not exceeding 80°F or lower than 65°F.

SPECIFICATION ASSISTANCE:

Consult Strongwall Industries, Inc.

TESTING:

The technical data contained herein is the result of tests made in the manufacturer's laboratories or independent laboratories using small scale equipment, ideal conditions and following generally accepted trade practices. Although this information is believed to be true and accurate, the use of different equipment for testing under dissimilar conditions or the testing of samples produced under dissimilar conditions may develop substantially different results.

FIRST AID, HEALTH AND SAFETY:

Contains Portland Cement CAS # 65997-15-1. Freshly mixed cement products may cause skin injury. Avoid contact with skin where possible and wash exposed areas promptly with water.

Contains sand CAS # 14808-60-7. Avoid breathing dust. Prolonged exposure to dust may cause delayed lung injury (silicosis) or cancer IARC Class 2A. Wear NIOSH approved mask for silica dust.

In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately with plenty of water for at least 15 minutes. If ingested, do not induce vomiting and get prompt medical attention. For respiratory problems, remove person to fresh air. Contact a physician.

Users must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300. For further information and advice regarding transportation, handling, storage, and disposal of chemical products, the user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data.

MATERIALS GUARANTEE

Available upon request.

LEGAL DISCLAIMER:

Strongwall Industries, Inc. products and systems are for professional use only and should be applied by professionals with prior experience with SWI products and systems or who have undergone training in the application of SWI products and systems. Published technical data and procedures are subject to change without notice. Call the corporate office at (201)-445-4633 or visit www.strongwall.com for current technical data, guidelines or project specific recommendations.

Prior to each use of any product of Strongwall Industries, Inc., the user must always read and follow the warnings and instructions on the product's most current Product Label, Safety Data Sheet, Product Data Sheet, and Installation Procedures.

In addition, no materials guarantee will be issued with respect to appearance, color, fading, chalking, staining, shrinkage, peeling, normal wear and tear and improper application and/or surface preparation performed by the applicator. Damage caused by abuse, neglect, and lack of proper maintenance, acts of nature and/or physical movement of the substrate or structural defects is also excluded from the materials guarantee. SWI reserves the right to conduct performance tests on any material claimed to be defective prior to any repairs by the owner, general contractor or applicator. Nothing contained in any Strongwall Industries, Inc. literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each Strongwall Industries, Inc., product as outlined in the current Product Label, Product Data Sheet and Installation Procedures prior to use of the Strongwall Industries, Inc. product.

Strongwall Industries, Inc. warrants this product free from manufacturing defects if installed as directed and within the product's shelf life by a state-licensed waterproofing contractor over a clean, sound and properly mechanically prepared substrate. The user determines the suitability of the product for the intended use and assumes all risks associated with the use or application of the product. Users and/or buyers sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. No claim of any kind shall be greater than the purchase price of the product in respect of which damages are claimed. No other warranties express or implied shall apply including any warranty of merchantability or fitness for a particular purpose. Strongwall Industries, Inc. shall not be liable under any legal theory for special or consequential damages. Strongwall shall not be responsible for the use of this product in a manner to infringe on any patent or any other intellectual property rights held by others. In addition, all recommendations, statements and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty or materials guarantee, either expressed or implied. It is the user's responsibility to satisfy himself, by his own information and test, to determine the suitability of the product for his own intended use, application and job situation and the user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazards listed herein are the only ones that may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from the use or inability to use the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and SWI makes no claim that these tests or any other tests accurately represent all environments.

Keep containers tightly closed. Always keep out of reach of children. Never for internal consumption. For industrial use only. For professional use only. Do not allow application by untrained workers.