

Polymer-Based Unidirectional High Strength Steel Tape

DESCRIPTION:

Hardwire 3x2 is one of the steel cord tape reinforcement systems used in the Hardwire structural repair and strengthening systems, a family of structural reinforcement systems consisting of unidirectional ultra high strength steel cords oriented in the 0° direction. Hardwire 3x2 is a tape made of high carbon steel cords with a micro-fine brass or AO-brass (Adhesion Optimized) coating. Each Hardwire 3x2 cord is made by twisting 5 individual wires together - 3 straight filaments wrapped by 2 filaments at a high twist angle. The steel cord reinforcement systems can be adhered to the exterior of concrete, steel, or wood structural elements with Type 2 impregnating resin for strengthening applications. The result is an externally bonded Micro-rebar® system that can be engineered to increase the strength and performance of structural and non-structural elements. Type 2 epoxy is a two-component 100% solids, moisture-tolerant, high strength, high modulus, self-priming structural epoxy adhesives. Type 2 epoxy may also be used as filler putty.

ADVANTAGES:

- High tensile and shear strengths
- High impact resistance
- Lightweight system
- Easy to install
- Increase shear, flexural, and axial capacities
- Improves serviceability
- Anchoring feasibility
- Excellent fatigue properties
- Chemical and mechanical interlock with adhesive
- Flexible system
- Low aesthetic impact

USE TO:

- Increase bending capacity of concrete beams, slabs, and walls
- Restore capacity deficiency due to steel corrosion
- Replace damaged post-tensioning tendons
- Provide reinforcement to concrete repairs
- Control cracking of concrete members
- Correct deficiencies due to design/ construction errors
- Replace missing steel bar
- Increase shear and flexural capacities of masonry walls
- Increase flexural capacity of timber members

Typical Data for Hardwire™ 3x2 Micro-rebar® Reinforcing System

Storage Conditions	Store dry at 40°F – 95°F
Color	Brass
Primary Fiber Direction	0° (unidirectional)
Weight	6.4 lb./yrd ² (3.5 kg/m ²)
Cords	23 cord/in

Hardwire™ 3x2 Tape Properties (Design Value)

Tensile Strength	460,000 psi (3170 N/mm ²)
Modulus of Elasticity	30 x 10 ⁶ psi (206,800 N/mm ²)
Elongation at Break	2.0%
Net Area per Width	0.0173 in. ² /in. (0.44 mm ² /mm)
Strength per Width	7900 lbs./in. (9.3 kN/mm)
Weight	0.71 lbs/ft ² (3.4 kg/ m ²)

Hardwire™ 3x2 Single Cord Properties

Net Area	0.00075 in. ² (0.48 mm ²)
Strength	345 lbs./cord (1.53 kN/cord)
Density	0.0025 lbs./ft (3.7g/m)

Epoxy Material Properties (Type 2 Epoxy Resin)

Tensile Strength	4,300 psi (30 N/mm ²)
Modulus of Elasticity	5.5 x 10 ⁵ psi (3.8 kN/mm ²)
Elongation at Break	1.5%
Pot Life	30 Min.
Color	Light gray
Shelf Life [unopened]	2 years
Mixing	Mix entire unit component A with entire unit component B

* Design and specification values will vary based on individual project requirements and applicable safety factors. Contact VSL Engineers to determine appropriate specification values.

- Increase flexural capacity of steel beams and joists
- Increase the capacity of steel and concrete silos and tanks

INSTALLATION:

Prior to placing the Hardwire 3x2 tape, a coat of Type 2 epoxy is applied to the concrete to prime and seal the surface. Material can be applied by spray or roller. Hardwire 3x2 is applied and pressed onto the wet epoxy to impregnate it. A second coat of Type 2 epoxy is applied to seal the system. Installation of Hardwire strengthening systems should be performed only by VSL trained and approved applicators. Installation is done in strict compliance with the VSL installation procedure and must meet VSL quality control requirements.

SURFACE PREPARATION:

- Surface preparation should be in accordance with ACI 546R and ICRI 03730.
- Steel corrosion-related deterioration should be repaired before applying Hardwire strengthening systems.
- Cracks wider than 0.015 in. (0.3 mm) should be pressure injected in accordance with ACI 224.1R
- A concrete surface profile (CSP) 3 or better as defined by the ICRI is recommended.
- Surface preparation is accomplished by abrasive or water-blasting techniques to achieve an open-pore structure.
- Surface must be dry and free from frost. Remove laitance, dust, dirt, grease, curing compound, existing coatings, foreign particles, disintegrated materials, and any other bond inhibiting matter from the surface.

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- Existing uneven surfaces, bug holes, and surface voids must be filled with appropriate repair mortar or epoxy putty.
- Localized out-of-plane variations, including form lines, should not exceed 1/16 in. (1.5 mm).
- Localized out-of-plane variations can be smoothed out by grinding or smoothed over with epoxy putty.
- Random pull-off testing (ACI 503R) may be performed at the discretion of the engineer. Minimum tensile strength of 200 psi must be achieved.
- VSL Technical Support staff can be consulted to determine surface profiling and preparation requirements.

CUTTING:

Hardwire 3x2 can be cut to appropriate length by using a commercial quality medium to heavy-duty handheld electric shears. Since dull or worn cutting can damage, weaken or fray the cords, their use should be avoided. Consult VSL for proper cutting tools and handling procedures.

LIMITATIONS:

Design calculations must be made and certified by a licensed professional engineer. Lowest application temperature: 40°F and rising at the time of application.

PACKAGING:

Hardwire 3x2 tape is shipped in 12 in. X 50 ft. (50 ft²/roll) [0.3 m X 15.2 m (4.6 m²/roll)] rolls. Type 2 resin is shipped in 1-gallon units.

COVERAGE:

Hardwire 3x2 - Approximately 20 sq. ft. per gallon per ply.

CAUTION:

Hardwire 3x2 tape is non-reactive. Gloves must be worn to protect against injuries. Caution must also be used when cutting Hardwire 3x2 tape to prevent injuries. Use of an appropriate, properly fitted NIOSH/MSHA approved protective equipment is recommended.

Keep Container Tightly Closed
Keep Out of Reach of Children
Not for Internal Consumption
For Industrial Use Only
Consult Material Safety Data Sheet for More Information

Type 2 Resin

Component 'A' - Irritant; Sensitizer:

Contains epoxy resin. Can cause sensitization after prolonged or repeated contact. Skin and eye irritant. High concentrations of vapor may cause respiratory irritation. Avoid skin contact. Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH/MSHA approved respirator. Remove contaminated clothing. Consult MSDS for more detailed information.

Component 'B' - Corrosive; Sensitizer:

Contains amines. Contact with eyes or skin may cause severe burns. Can cause sensitization

after prolonged or repeated contact. Skin and eye irritant. High concentrations of vapor may cause respiratory irritation. Avoid skin contact. Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate NIOSH/MSHA approved respirator. Remove contaminated clothing. Consult MSDS for more detailed information.

FIRST AID

In case of skin contact, wash immediately and thoroughly with soap and water. For eye contact, flush immediately with plenty of water for at least 15 minutes; contact physician immediately. For respiratory problems, remove person to fresh air. Wash clothing before re-use.

CLEAN UP

Ventilate area. Confine spill. Collect with absorbent material. Dispose of in accordance with current, applicable local, state, and federal regulations. Uncured material can be removed with approved solvent. Cured material can only be removed mechanically.

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