

Cementitious-Based Unidirectional High Strength Steel Tape

DESCRIPTION:

Hardwire 3SX-12 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 3SX-12 is a tape made of high carbon steel cords with a micro-fine brass or AO-brass (Adhesion Optimized) coating. Each Hardwire 3SX-12 cord is made by twisting three identical wire filaments together at a longer than usual lay length and then over-wrapping the bundle with a single filament. The result is a cord with lower twist angles and straighter filaments that is the basis for the increased compressive strengths. The steel cord reinforcement systems can be adhered to the exterior of concrete structural elements with Type A cementitious grout for strengthening applications. The result is a cementitious based externally bonded Micro-rebar system that can be engineered to increase the strength and performance of structural and non-structural elements. Type A Grout is a two component, polymer-modified, leveling and pore sealing mortar with the additional benefit of penetrating corrosion inhibitor.

ADVANTAGES:

- Cementitious based system
- Excellent high temperature properties
- High tensile and shear strengths
- High impact resistance
- Lightweight system
- Easy to install
- Increase shear and flexural capacities
- Improves serviceability
- Anchoring feasibility
- Excellent fatigue properties
- Mechanical interlock with adhesive
- Flexible system
- Low aesthetic impact

USE TO:

- Upgrade structures with high operational temperatures
- Increase bending capacity of concrete beams, slabs, and walls
- Increase shear capacity of concrete beams 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

Typical Data for Hardwire™ 3SX-12 Microbar® Reinforcing Tape

Storage Conditions	Store dry at 40°F – 95°F
Color	Brass
Primary Fiber Direction	0° (unidirectional)
Weight	3.9 lb./yrd ² (2.1 kg/m ²)
Cords	12 cord/in

Hardwire™ 3SX-12 Tape Properties (Design Value)

Tensile Strength	345,000 psi (2390 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	0.0104 in. ² /in. (0.26 mm ² /mm)
Strength per Width	3580 lbs./in. (4.2 kN/mm)
Weight	0.43 lbs/ft ² (2.0 kg/ m ²)

Hardwire™ 3SX-12 Single Cord Properties

Net Area	0.00087 in. ² (0.56 mm ²)
Strength	345 lbs./cord (1.53 kN/cord)
Density	0.003 lbs./ft (4.5 g/m)

Type A Grout Properties

Shelf Life	One year in original, unopened packaging.
Storage	Store dry at 40°F - 95°F (4°C - 35°C). Condition material to 65°F - 75°F Protect component 'a' from freezing; discard if frozen.
Color	Concrete gray when mixed.
Mixing ratio	Mix entire unit.
Application Time	Dependent on temperature and relative humidity.

Flexural Strength (ASTM C-293)

28 days	2,000 psi (13.8 MPa)
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Splitting Tensile Strength (ASTM C-496)

28 days	750 psi (5.2 MPa)
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Compressive Strength (ASTM C-109)

1 day	1,250 psi (8.6 MPa)
7 days	5,000 psi (34.5 MPa)
28 days	6,000 psi (41.4 MPa)

Permeability (AASHTO T-277)

28 days	Approximately 500 Coulombs
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* Design and specification values will vary based on individual project requirements and applicable safety factors. Contact VSL Engineers to determine appropriate specification values.

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INSTALLATION:

Prior to placing the Hardwire 3SX-12 tape, a layer of Type A cementitious grout is applied to the concrete surface. Material can be applied by trowel. Hardwire 3SX-12 is applied and pressed onto the wet grout to impregnate it. A second layer of Type A grout is applied to seal the system. Installation of Hardwire 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 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.
- Existing uneven surfaces, bug holes, and surface voids must be filled with an appropriate repair mortar.
- 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 an appropriate repair mortar.
- 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 3SX-12 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 3SX-12 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 A is shipped in two components:

- Component "A": 1-gallon plastic container [4/carton]
- Component "B": 46.5 lb. (21kg) multi-wall bag.

COVERAGE:

Type A Grout - Approximately 40 sq. ft. per unit per ply.

CAUTION:

Hardwire 3SX-12 tape is non-reactive. Gloves must be worn to protect against injuries. Caution must also be used when cutting Hardwire 3SX-12 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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