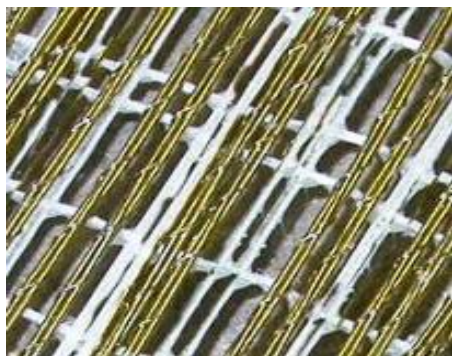


**FIDSTEEL 3X2-4-12-500 HARDWARE™**  
**LOW DENSITY (600 g/m<sup>2</sup>)**  
**UNIDIRECTIONAL ULTRA-HIGH TENSILE STEEL SHEET**  
**FOR STRUCTURAL STRENGTHENING**



TECHNICAL GLOBAL SERVICES

**HARDWARE**  
 STEEL REINFORCED COMPOSITE MATERIALS



**Mechanical and Geometrical Properties\***

**Filament**

Area	0,096	mm <sup>2</sup>
Ultimate Tensile Strength, $\sigma_{\text{filament}}$	3200	MPa
Elastic Modulus, $E_{\text{filament}}$	206	GPa

**Sheet**

Effective area of one cord	0,481	mm <sup>2</sup>
Ultimate load of one cord	1539	N
Sheet Density	1,57	trefoli/cm
Sheet weight	600	g/m <sup>2</sup>
Sheet Equivalent Design Thickness, $t_{\text{sheet}}$	0,075	mm
Sheet Ultimate Tensile Strength, $\sigma_{\text{sheet}}$	3070	MPa
Sheet Elastic Modulus, $E_{\text{sheet}}$	190	GPa
Sheet Ultimate Deformation, $\epsilon_{\text{sheet}}$	1,6	%

\* Updated on 11 March 2009

Design and specification values are the one reported for the sheet, and are independent from the type of matrix (mortar or resin) used and will vary based on individual project requirements and safety factors. The matrix has the role to guarantee necessary protection of the steel cords from the environment and to determine the necessary bond with the substrate.

Contact FIDIA engineers to determine appropriate specification values.

\* The properties of the composite have been determined according to the UNI and ASTM standards as indicated in the CNR-DT 200/2004 guidelines "Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Existing Structures".

**MATERIAL CHARACTERISTICS**

*Description*

FIDSTEEL 3x2 4-12-500 HARDWARE™ is a high carbon steel cord with a micro-fine brass or galvanized coating. The 3X2 cord is made by twisting 5 individual wire filaments together - 3 straight filaments wrapped by 2 filaments at a high twist angle. The result is an easy to handle cord that combines great engineering properties with excellent economics. The low density sheet is particularly ideal for strengthening masonry structures as it can be either impregnated with resin or mortar. The sheet nomenclature stands for:

- 3x2, the type of wire;
- 4, the density (4 wire/2,5cm);
- 12, the width of the sheets (305mm);
- 500, the total length of one roll (152m).

*Ideal for:*

- Retrofit of arches;
- Enhance the shear and compressive strength of masonry walls;
- Retrofit-Increase the flexural strength of masonry walls to prevent overturning;
- Constrain main structural walls through floor level connections;
- Retrofit vaults and cupola subjected to out of plane loads that have cracked their surface;
- Wrapping of prevalently axially loaded columns.

*Advantages:*

- High flexibility for anchoring and ease of installation;
- High tensile strength;
- Very good shear strength of the sheet that allows using mechanical anchorages to develop different type of retrofit solutions (i.e. pretensioning of the sheet).

This material can be impregnated with either epoxy or mortar.

**APPLICATION**

*1. Surface preparation*

Clean the surface from dust, grease and other particles by brushing and sand blasting. Clean the reinforcements from eventual traces of rust and seal possible crevices.

*2. Leveling surface*

Leveling the surface in order to eliminate eventual roughness and incoherent materials.

If you are using epoxy matrix follow points (3), (4), (5), (6), (7).

If you are using mortar matrix follow points (5), (6), (7).

*3. Primer application*

Apply to the surface, with a brush or a roller, a layer of primer and wait until it cured. Level the surface with putty.

*4. Application of the first layer of saturant resin*

Apply a first layer of epoxy to impregnate the sheet.

*5. Sheet installation*

Till the epoxy layer is still "fresh", install the sheet previously cut of the required dimension paying attention to not form any bubble by manually smoothing or by passing with a roller.

*6. Sheet impregnation*

Roll several times the sheet ensuring a good level of impregnation eliminating any excess of resin.

*7. Finishing*

Apply a second layer of epoxy and finish by applying silica sand; proceed with the application of polyuretan paint or polyurea for protecting the reinforcement.

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LOW DENSITY (600 g/m<sup>2</sup>)  
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TECHNICAL GLOBAL SERVICES

**HARDWIRE®**  
STEEL REINFORCED COMPOSITE MATERIALS

#### PACKAGES

The sheet is usually supplied in special spools with dimensions of about 305 mm width, 152m length and weights 36 kg approximately. For special jobs and upon special request the sheet can be cut in length needed by using a special tool.

#### RECOMMENDATIONS

When managing the sheet protective clothing and glasses must be worn and the instructions must be followed regarding the application of the materials.

*Skin contact:* no special measures are needed.

*Contact with eyes:* rinse for at least 15 minutes; in case of use of contact lenses they must be removed and rinsed for at least another 5/10 minutes; if still painful seek medical care.

*Ingestion:* rinse the mouth by drinking water and inducing vomit. Seek medical care.

*Yard storage:* Keep in a dry covered area which is far from substances which may jeopardize the optimal bond of the matrix.

#### APPLICATION EXAMPLES

To learn about structural projects using unidirectional ultra-high tensile steel sheet visit the "Application" area at the following website: [www.fidiaglobalservice.com](http://www.fidiaglobalservice.com). Or visit the website of our partner Hardwire LLC. at [www.hardwirellc.com](http://www.hardwirellc.com), and download examples of applications around the world.

#### QUALITY & CERTIFICATION

Material supply is accompanied by a certificate of origin of the material from the producer and the certificate of characterization of the mechanical properties issued by an Italian laboratory approved by the Ministry of Infrastructure and Transport according to Art. 59 of D. P. R. 380/2001 construction material sector following the law .1086/71, with Decree n.38194 of 14/01/1992 and followings.

#### LEGAL NOTES

*The technical advice that Fidia S. r.l. Technical Global Services provides, orally or in writing, as assistance to the customer or installer on the basis of its experiences, corresponding to current scientific knowledge and practices, are not binding and do not demonstrate any legal or contractual obligation accessory with contract of sale. They do not exempt from liability buyer feel our products as regards their suitability for use. For the rest are valid our commercial conditions. Discrepancies that original content and/or use not involve any responsibility by the company's Fidia S. r.l.. The Client is obliged to check that this report, and the values are valid for the consignment of product of its interest and not be overcome, as replaced by subsequent editions and/or new formulations of the product. In doubt, please contact advance our Technical Office.*

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