ICC-ES Evaluation Report

ESR-4232

Reissued December 2024

Subject to renewal December 2025

DIVISION: 03 00 00—CONCRETE **Section: 03 20 00—Concrete Reinforcing** **Section: 03 21 00—Reinforcement Bars**	**REPORT HOLDER:** **LITE-FORM TECHNOLOGIES LLC**	**EVALUATION SUBJECT:** **LITEBAR® GLASS FIBER REINFORCED POLYMER (GFRP) BARS AS SHRINKAGE AND TEMPERATURE REINFORCEMENT**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021 and 2018 *International Building Code®* (IBC)
- 2021 and 2018 *International Residential Code®* (IRC)

Properties evaluated:

- Crack Control
- Physical

2.0 USES

The LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar is used as an alternative to the shrinkage and temperature reinforcement specified in Section 24.4 of ACI 318-19 (2021 IBC) and ACI 318-14 (2018 IBC) for plain concrete footings and for plain concrete slabs (as defined by ACI 360) supported directly on the ground.

The LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar is also used as an alternative to horizontal temperature and shrinkage reinforcement in structural plain concrete walls covered in Section 1901.2 of the 2021 and 2018 IBC, Section 1906 of the 2018 IBC, IRC Sections R404.1.3 and R608.1, and ACI 332-20 Sections 9.2.1 and 9.2.7 (2021 IRC), or ACI 332-14 Sections 8.2.1 and 8.2.7 (2018 IRC), excluding walls where vertical reinforcement is required.

3.0 DESCRIPTION

The LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar is solid and has a circular cross section composed of glass fibers embedded in a resin matrix. Available bar size and properties are provided in Table 1 of this report.

4.0 DESIGN AND INSTALLATION

The LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar must be installed in accordance with this report, applicable provisions in ACI 440.5-08, and Lite-Form Technologies, LLC Installation Instructions dated December 1, 2021.

5.0 CONDITIONS OF USE:

The LiteBar® Glass Fiber Reinforced Polymer (GFRP) described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Installation of FRP bars or meshes used as temperature and shrinkage reinforcement for plain concrete footings, plain concrete slabs, and as horizontal reinforcement in plain concrete walls where vertical reinforcement is not required, must be in accordance with this evaluation report, and the report holder's Installation Manual. In case of conflict, this report governs.

5.2 LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar designation No. 3, as shown in Table 1 of this report, with a maximum spacing of 12 in. (300 mm) can be used as an alternative to conventional temperature and shrinkage reinforcement with maximum steel bar designation No. 3 and minimum spacing of 12 in. (300 mm). Alternate spacings over 12 in. (300 mm) for GFRP bars have not been evaluated and may be considered by a registered design professional to the satisfaction of the code official for each project.

5.3 Complete construction documents, including plans showing compliance with the evaluation report, must be submitted to the code official for each project at the time of permit application. The construction documents must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed

5.4 LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar must be stored and protected during storage in accordance with the guidelines given in ACI 440.5-08.

5.5 Special inspection as required by Table 1705.3 of the IBC for steel-reinforced concrete construction, is also applicable to FRP bar construction under this report.

5.6 Use of FRP bar does not eliminate the requirement for joints specified in Section 14.3.4 of ACI 318 (IBC and IRC).

5.7 LiteBar® Glass Fiber Reinforced Polymer (GFRP) bar is manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fiber-reinforced Polymer (FRP) Bars and Meshes for Internal Reinforcement of Non-structural Concrete Members (AC521), dated October 2020 (Editorially revised May 2021), including fiber mass content, moisture absorption, shrinkage crack resistance, and quality control documentation.

7.0 IDENTIFICATION

7.1 Product labeling shall include, the name of the report holder or listee, and the ICC-ES mark of conformity. The listing or evaluation report number (ICC-ES ESR-4232) may be used in lieu of the mark of conformity. The LiteBar® Glass Fiber Reinforced Polymer (GFRP) is identified by packaging Corporation (Lite-Form Technologies, LLC) and contact information, product name, bar size, lot number and evaluation report number (ESR-4232).

7.2 The report holder's contact information is the following:

LITE-FORM TECHNOLOGIES LLC
1950 WEST 29th STREET
SOUTH SIOUX CITY, NEBRASKA 68776
(402) 241-4402
www.liteform.com
general@liteform.com

TABLE 1—LITEBAR® DIMENSIONS AND PROPERTIES

BAR DESIGNATION NUMBER	NOMINAL DIAMETER (in)	NOMINAL CROSS SECTIONAL AREA (in^2)	GUARANTEED ULTIMATE TENSILE FORCE (kip)	MEAN TENSILE MODULUS OF ELASTICITY (ksi)	MEAN ULTIMATE TENSILE STRAIN (%)
3 (M10)	$^3/_8$	0.11	14.6	8600	1.9

For **SI**: 1 inch = 25.4 mm, 1 kip = 4.45kN, 1 psi = 6.89 kPa, 1 ksi = 6.89 MPa