

ICC-ES Evaluation Report


ESR-5092

Reissued December 2023

Subject to renewal November 2024

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2024 ICC Evaluation Service, LLC. All rights reserved.

<p>DIVISION: 03 00 00 — CONCRETE</p> <p>Section: 03 20 00 — Concrete Reinforcing</p> <p>Section: 03 21 00 — Reinforcement Bars</p>	<p>REPORT HOLDER: BASANITE INDUSTRIES, LLC.</p>	<p>EVALUATION SUBJECT: BASAFLEX™</p>	
---	--	---	---

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:

- Physical
- Structural
- Durability

2.0 USES

BasaFlex™ are Basanite Industries concrete reinforcement rebars used as tension reinforcements in flexural concrete members such as beams, shallow foundations, and one-way or two-way elevated slabs, and as vertical reinforcement in concrete columns and walls in normal-weight concrete, as permitted by Section 104.11 of the IBC. The Basanite Industries Rebars may also be used where an engineering design is submitted in accordance with IRC Section R301.1.3 and where approved by the building official in accordance with IRC Section R104.11.

3.0 DESCRIPTION

The BasaFlex™ rebars are basalt fiber-reinforced polymer (BFRP) bars that are solid and have circular cross section composed of basalt fibers embedded in a resin matrix. Available bar sizes and properties are provided in [Table 1](#) of this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The BasaFlex™ rebars must be designed in accordance with Basanite Industries, LLC Design Manual, Document Number BASA-DM-22-001, Version 1, issue date October 11, 2022, Chapter 19 of the IBC (ACI 318-19 for 2021 IBC and ACI 318-14 for the 2018 IBC), and ACI 440.11-22, as applicable. The registered design professional must be responsible for determining, through analysis, the strengths and demands of the structural elements, subject to the approval of the building official.

The following limitations also apply:

1. The BasaFlex™ rebars are limited for use as (a) tension reinforcement in flexural concrete members; (b) vertical reinforcement in concrete columns and walls.
2. The BasaFlex™ rebars are limited to concrete members in normal-weight concrete.
3. The bond coefficient, K_b of the BasaFlex™ rebars must be 1.2.
4. Bent shapes, continuous closed stirrups and ties (hoops) are outside the scope of this report.
5. There is no restriction for the shape of flexural concrete member cross-section (e.g., rectangular, T-shape, L-shape).
6. For flexural reinforcement, use of multiple bar layers and bar bundling is permitted. For multiple bar layers, the relevant provisions for steel reinforcing bar in ACI Code 440.11 and ACI Code 318 must apply to FRP bars, because the FRP bars have no plastic region and the stress in each reinforcing layer varies depending on its distance from the neutral axis. Thus, the analysis of the flexural capacity must be based on a strain-compatibility approach. For bundled bars, all relevant provisions of ACI Code 440.11 and ACI Code 318 apply.

4.2 Installation:

The BasaFlex™ rebars must be installed in accordance with the approved drawings and specifications. Reinforcement details, including preparation, tolerances, reinforcement relation, concrete cover and reinforcement supports, must comply with the applicable provisions in Part 3 of ACI SPEC 440.5-22, and Basanite Industries Rebars, LLC installation instructions, Document Number BASA-DM-22-001, Version 1, issue date October 11, 2022.

4.3 Special Inspection:

Special inspection is required in accordance with Table 1705.3 of the IBC. The special inspector must verify, but are not limited to, the following:

1. The BasaFlex™ rebars are of the type and size specified and is labeled in conformance with this report.
2. The BasaFlex™ rebars is placed within tolerances set forth in ACI SPEC 440.5 Section 3.2 and are adequately supported and secured to prevent displacement during concrete placement.
3. The minimum concrete cover is provided in accordance with ACI SPEC 440.5 Section 3.2.
4. The placement, quantity, and size of the BasaFlex™ rebars comply with the approved drawings and specifications.

5.0 CONDITIONS OF USE:

The BasaFlex™ rebars 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 Design and installation must be in accordance with this report, the Basanite Industries LLC Design Manual, Document Number BASA-DM-22-001, Version 1, issue date October 11, 2022, the IBC or the IRC, and ACI 440.11, as applicable. In case of conflict, this report governs.
- 5.2 When requested, copies of the Basanite Industries LLC Design Manual, Document Number BASA-DM-22-001, Version 1, issue date October 11, 2022, must be submitted to the code official for each project using the product.
- 5.3 Complete construction documents, including plans and calculations verifying compliance with this 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 The fire-resistance rating of the BasaFlex™ rebars in a reinforced concrete assembly is outside the scope of the evaluation report, and concrete assemblies with BasaFlex™ rebars are limited to Type VB construction under the IBC or IRC.
- 5.5 BasaFlex™ rebars must be stored above the surface of the ground on platforms, skids or other supports as close as possible to the point of placement. If stored outdoors, the Basanite Industries Rebars must be covered with opaque plastic or other types of cover that will protect the bars from ultraviolet rays.

- 5.6 Use of BasaFlex™ rebars in structural members for structures assigned in Seismic Design Categories C through F is permitted when the following conditions are met: (1) structural members are not considered part of the lateral force-resisting system, (2) structural members are not required to be designed to accommodate drifts and forces that occur as the building responds to a seismic event.
- 5.7 Special inspection must be provided in accordance with Section 4.3 of this report.
- 5.8 BasaFlex™ rebars are 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 for Internal Reinforcement of Concrete Members \(AC454\)](#), dated October 2022, including fiber mass content, moisture absorption and alkaline resistance and quality control documentation.

7.0 IDENTIFICATION

- 7.1 The BasaFlex™ rebars is identified by packaging labeled with the company name (Basanite Industries LLC.) and contact information, product name, bar size, lot number and evaluation report number (ESR-5092).
- 7.2 The report holder’s contact information is the following:

BASANITE INDUSTRIES, LLC.
2041 NORTHWEST 15TH AVENUE
POMPANO BEACH, FLORIDA 33069
(954) 532-4653
www.basaniteindustries.com
sb@basaniteindustries.com

TABLE 1—DIMENSIONS AND PROPERTIES

BAR DESIGNATION NUMBER	NOMINAL DIAMETER (in)	NOMINAL CROSS SECTIONAL AREA (in ²)	MEAN MEASURED CROSS SECTIONAL AREA (in ²)*	GUARANTEED ULTIMATE TENSILE FORCE (kips)	MEAN TENSILE MODULUS OF ELASTICITY (ksi)	MEAN ULTIMATE TENSILE STRAIN (%)	GUARANTEED TRANSVERSE SHEAR STRENGTH (ksi)	GUARANTEED BOND STRENGTH (ksi)
4 (M13)	0.50	0.20	0.229	27.6	9100	1.7	34	2.0
6 (M19)	0.75	0.44	0.525	52.9	8800	1.6	32	1.1
8 (M25)	1.00	0.79	0.879	90.2	7700	1.7	32	1.1

For SI: 1 inch = 25.4 mm, 1 kip = 4.45kN, 1 psi = 6.89 kPa, 1 ksi = 6.89 MPa, 1 in² = 645.2 mm²

* Mean measured cross sectional area includes surface ribs.