ICC-ES Evaluation Report

ESR-4593

Reissued March 2024

This report also contains:

- CBC Supplement

Subject to renewal March 2025

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DIVISION: 03 00 00—CONCRETE Section: 03 20 00—Concrete Reinforcing Section: 03 21 00—Reinforcement Bars	REPORT HOLDER: OWENS CORNING INFRASTRUCTURE SOLUTIONS	EVALUATION SUBJECT: OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR STRUCTURAL FRP REINFORCING BARS	

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

The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural fiber-reinforced polymer (FRP) reinforcing bars are used as tension reinforcement in flexural concrete members such as beams, shallow foundations, and one-way or two-way elevated slabs, in normal-weight concrete. The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are also used as tension reinforcement in walls when subjected to pure flexural loading in normal-weight concrete. The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars may also be used where an engineering design is submitted in accordance with IRC Section R301.1.3 and is approved by the building official in accordance with IRC Section R104.11.

3.0 DESCRIPTION

The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are fiber-reinforced polymer (FRP) bars that are solid and have circular cross-sections composed of glass 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 OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars must be designed in accordance with Chapter 19 of the IBC (ACI 318-19 for 2021 IBC and ACI 318-14 for the 2018 IBC), and ACI CODE 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 OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are limited for use as tension reinforcement in flexural concrete members such as beams, shallow foundations, one-way or two-way elevated slabs. OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are also used as tension reinforcement in walls when subjected to pure flexural loading.
2. The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are limited to concrete members in normal-weight concrete.
3. The bond coefficient, K_b of the OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars 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 multiple bar layers, the relevant provisions for steel reinforcing bars in ACI CODE 440.11-22 and ACI 318 must also 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.

4.2 Installation:

The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars must be installed in accordance with the approved drawings and specifications. Reinforcement details, including tolerances, reinforcement relation, concrete cover, and reinforcement supports, must comply with the applicable provisions in Part 3 of ACI SPEC 440.5-22.

4.3 Special Inspection:

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

1. The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are of the types and sizes specified and are labeled in conformance with this report.
2. The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are placed within tolerances set forth in ACI SPEC 440.5-22 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 440.5-22 Section 3.3.
4. The placement, quantity and size of the OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars comply with the approved drawings and specifications.

5.0 CONDITIONS OF USE:

The OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars 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, ACI CODE 440.11-22, the IBC, or the IRC, as applicable. In case of conflict, this report governs.

5.2 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.

5.3 The fire-resistance rating of the OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars reinforced concrete assembly has not been evaluated and is outside the scope of the evaluation report. Concrete assemblies with OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are limited to Type VB construction under the IBC or IRC.

5.4 OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars 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 OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars must be covered with opaque plastic or other types of cover that will protect the bars from ultraviolet rays.

5.5 Use of OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars in structural members for structures assigned in Seismic Design Categories C through F are 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.

5.6 Special inspection must be provided in accordance with Section 4.3 of this report.

5.7 OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars 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 ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4593) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR structural FRP reinforcing bars are identified by packaging labeled with the company name (Owen Corning Infrastructure Solutions) and contact information, product name, bar size, lot number, and evaluation report number (ESR-4593).

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

OWENS CORNING INFRASTRUCTURE SOLUTIONS
1 OWENS CORNING PARKWAY
TOLEDO, OHIO 43659
(419) 248-8000
www.owenscorning.com

TABLE 1— OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR DIMENSIONS AND PROPERTIES

PRODUCT NAME	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)
OCIS PINKBAR®+ FIBERGLAS™ REBAR	3	0.375	0.11	0.116	13.3	8068	1.4	25.4	1.1
OCIS PINKBAR®+ FIBERGLAS™ REBAR	4	0.500	0.20	0.194	21.8	7713	1.4	27.0	1.1
OCIS MATEENBAR™ FIBERGLAS™ REBAR	5	0.625	0.31	0.343	41.8	8700	1.5	26.1	1.1
OCIS MATEENBAR™ FIBERGLAS™ REBAR	6	0.75	0.44	0.494	58.8	9200	1.3	25.8	1.1
OCIS MATEENBAR™ FIBERGLAS™ REBAR	8	1.00	0.79	0.893	105.5	9600	1.5	22.1	1.1

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

DIVISION: 03 00 00—CONCRETE
Section: 03 20 00—Concrete Reinforcing
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

OWENS CORNING INFRASTRUCTURE SOLUTIONS

EVALUATION SUBJECT:

OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR STRUCTURAL FRP REINFORCING BARS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR structural fiber-reinforced polymer (FRP) reinforcing bars, described in ICC-ES evaluation report ESR-4593, have also been evaluated for compliance with the codes noted below.

Applicable code edition*(s)*:

- 2022 *California Building Code* (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR structural fiber-reinforced polymer (FRP) reinforcing bars, described in Sections 2.0 through 7.0 of the evaluation report ESR-4593, comply with CBC Chapter 19, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 19, as applicable.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The OCIS PINKBAR®+ AND MATEENBAR™ FIBERGLAS™ REBAR structural fiber-reinforced polymer (FRP) reinforcing bars, described in Sections 2.0 through 7.0 of the evaluation report ESR-4593, comply with CRC Chapter 3, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 3, as applicable.

This supplement expires concurrently with the evaluation report, reissued March 2024.