NYC Buildings

[Date]

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Ramon Gilsanz, Applicant
Gilsanz Murray Steficek LLP
129 West 27th Street
New York, NY 10001

Re: OTCR Submittal Code: # 56-24
General acceptance evaluation of MST-BAR Grade III Glass Fiber Reinforced Polymer (GFRP) rebar for approval as an alternative material
Acceptance Letter

Dear Mr. Gilsanz,

Thank you for submitting the OTCR1 application, dated June 13, 2024, for the above referenced project for general acceptance of MST-BAR Grade III glass fiber reinforced polymer (GFRP) Rebar as an alternative material. The application includes the following:

Equipment Description. GFRP rebar is comprised of glass fibers bound together in a polymer base. GFRP rebar uses geometric characteristics such as transverse ribs to develop and maintain a strong bond with concrete. GFRP rebar-reinforced concrete has been used in locations around North America where corrosion in steel rebar is likely through exposure to chlorides and deicing chemicals. Figure 1 shows a photograph of a sample of MST-BAR GFRP rebar.

Figure 1: 15 mm (#5) MST-BAR® GFRP rebar.

Supporting Documents. Please see "Supporting Documents" in the Appendix.

Code Statement. The 2022 NYC Building Code prescribe requirements for concrete with steel reinforcement bars (steel rebar). BC 1903.6 (Steel Reinforcement) requires the "[r]einforcement and welding of reinforcement to be placed in concrete construction shall conform to the requirements of [ACI 318-14], Chapter 20, and this section [BC 1903.6]." While concrete incorporating steel rebar is designed and installed in accordance with ACI 318-14 as per BC 1903.6, the use of GFRP rebar to be used in concrete structures are not prescribed in the Building Code or ACI 318-14. Therefore, the use of GFRP rebar in concrete is considered an alternative to the code.

In accordance with 28-113.2.2, alternative materials are required to comply "with the intent of the provisions of this code" and be "equivalent of that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety".

Accordingly, OTCR has conditionally approved the use of GFRP rebar for concrete through evaluation of GFRP rebar as an alternative material based on the following:

Recognition in ACI 318-14. Steel reinforcement bars are recognized in ACI 318-14. To be considered an acceptable alternative, recognition

of GFRP would be required to be recognized in an equivalent manner to prescribed materials such as steel reinforcing bars. ACI 318-25 recognizes GFRP by referencing ACI 440.11-22 “Building Code Requirements for Structural Concrete Reinforced with GFRP Bars” (see Supporting Documents). ACI recognition of standards includes review and consideration by experienced stakeholders and consensus for adoption. Consequently, ACI has published 440.11-22 as a design standard. Although DOB has not formally accepted ACI 318-25 as a reference standard, OTCR accepts that there is no compatibility issue present when the appropriate edition of the ACI 318 is used for the applicable concrete members and/or components (i.e. ACI 318-25 for concrete component with GFRP rebar and ACI 318-14 elsewhere).

Accordingly, OTCR accepts GFRP rebar in concrete as an alternative material in accordance with the conditions specified by the Department and the approval requirements listed below:

1. **Requirements Prior to Approval.**
    a. **Design**. Use of MST Grade III GFRP rebar is limited to concrete components of a structure (e.g. balcony component) in accordance with requirements of ACI 318-25 and ACI 440.11.
    b. **Manufacture and Marking**. In accordance with ASTM 440.11-22, MST Grade III GFRP rebar must be manufactured and marked in accordance with requirements listed in ASTM D7957 (Standard Specification for Solid Round GFRP Bars for Concrete Reinforcement).
2. **Requirement Prior to Permit**.
    a. **Construction permit**. A DOB permit is required for all applicable work.
3. **Requirement Prior to Signoff**.
    a. **Installation**. Concrete construction incorporating GFRP rebar shall be installed in accordance with Chapter 26 of ACI 440.11.
    b. **Inspections**. Pursuant to section BC 1705.1, the installation of MST Grade III GFRP rebar shall be subject to special inspection requirements of Chapter 17 of the Building Code and Department Rules covering special inspection.
        i. Maintain the same qualification requirements for the “Concrete – Cast-in-place & Precast” category as defined in 1 RCNY section 101-06, Appendix A.
        ii. Have duties and responsibilities in accordance with, but not limited to, 1 RCNY section 101-06, Section BC 1705.3 (when applicable), Chapter 26 of ACI 440.11 and ACI SPEC-440.5-22
        iii. Complete a statement of special inspection within which this bulletin shall be referenced under the Special Inspection Item for “Alternative Materials” in section 3.0 of the TR1 form.

In the event of noncompliance with any of the requirements listed above, all concrete construction with MST Grade III GFRP bars shall be removed at the owner’s expense. An audit may be performed to verify compliance.

This OTCR Acceptance Letter only addresses material/equipment acceptance. Project approval and permit must be obtained from the Department of Buildings through the required application process.

This OTCR Acceptance Letter must be scanned and included in the Departments' BSCAN Virtual Job Folder as part of the project record. Refer to the above referenced OTCR Submittal Code in any future correspondence.

Regards,

Andrew Lum

Andrew Lum, P.E.
Project Manager

Cc: Alan Price, P.E., Director, OTCR, DOB
Rupert Williams, P.E., Construction Site Safety Support Engineer, Technical Affairs, DOB
Joseph Ackroyd, P.E., Assistant Commissioner, Technical Affairs, DOB
Kam Chan, P.E., Director, Technology Management, Bureau of Fire Prevention, FDNY

APPENDIX

1. Supporting Documents.

1. OTCR 1 application.
    a. File name: 56-24, Application.pdf
2. Proposed Material Standard/Certification: ASTM D7913, ASTM D7957, ICC-ES ACA 454
    a. File name: otcr1 astm mst applicaiton 9657.pdf
    b. File name: ICC-ES AC 454.pdf

b. Proposed Design Standard: ACI 440.11-22
    a. File name: ACI 440.11-22: Building Code Requirements for Structural Concrete Reinforced with Glass Fiber Reindorced Polymer (GFRP) Bars – Code and Commentary

3. Proposed Evaluation Report:
    a. File name: esr 4664.pdf
4. Application Description
    a. File name: 56-24 Project Requirements-122024.docx
5. Code Statement: File name: 56-24 Project Requirements-122024.docx
6. Installation, Inspection, and Maintenance Guidelines.
    a. File name: Chapter 26 of ACI 440.11-22: Building Code Requirements for Structural Concrete Reinforced with Glass Fiber Reindorced Polymer (GFRP) Bars – Code and Commentary
    b. File name: Environment _ MST-BAR GFRP.pdf
7. Stress-Strain Curve
    a. Source: Ibrahim, Haitham A. “3D FD Analysis For the Seismic Behavior of Hybrid Steel-FRP Reinforced Concrete Beam-Column Joints”. Published June 2017. Retrieved February 10, 2025. Link: ResearchGate