



**TOPIC: Structural Design - IBC/26/#1**

**CODE: Structural Specialty Code: 2010 Edition**

**APPROVED: April 9, 2012**           *[Paul L. Scarlett]*          , Director

**REFERENCE: Section 2612 – Structural Specialty Code**

**SUBJECT: Use of Fiber Reinforced Plastic Material for Rooftop Screening Applications**

**QUESTION:** Can Fiber Reinforced Plastic (FRP) be used to construct rooftop antenna screens? What are the specific design and construction requirements and limitations that must be considered when designing and building FRP rooftop antenna screens?

**RESPONSE:** Recent technological advancements in the wireless communications field have led providers of wireless communication services to install antennas and other related equipment on the roofs of many building structures. Often these antennas are screened from public view.

Screens constructed of conventional building materials, wood and steel, tend to interfere or block the signals passing from and to the antennas. The use of these screening materials is incompatible with the function of the wireless equipment.

In order to meet the needs of the wireless communication providers, the Bureau of Development Services (BDS) will allow the use of plastic materials (FRP) for the purpose of screening wireless rooftop antennas and other related equipment.

The use of FRP in the design and construction of rooftop antenna screens must follow the requirements and limitations set forth in this guide.

**IBC/26/#1**

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**Page 2 of 4**

**April 9, 2012**

**Requirements and Limitations for the use of Fiber Reinforced Plastics in Rooftop Screening Applications**

**A. GENERAL**

1. All FRP rooftop screening plans shall be submitted for review and approval by the Building Official and Fire Marshal prior to permit issuance.
2. Fiber Reinforced Plastic (FRP) products proposed for use within the jurisdiction of the City of Portland shall have a valid approval report such as an International Code Council Evaluation Service (ICC-ES) report or City of Los Angeles Research Report (LA-RR). This report must be current and must be based on the acceptance criteria for antenna enclosure systems given in ICBO - AC 141. Reports validating the allowable use of an FRP product must be made available to the City of Portland, Bureau of Development Services.
3. The fabrication of the FRP product must be in accordance with manufacturer's quality control manual. A copy of the manual must be on file with the City of Portland, Bureau of Development Services.
4. The engineer of record for the FRP screen design must specify the manufacturer of all FRP products that are to be used in the construction of any FRP screen structure. This information must be shown on the permit documents. All FRP products used must be labeled with the name of the product manufacturer.
5. For cases where the requirements of this guide and a product specific test report are in conflict, the more restrictive requirement must be met.
6. A complete permit application will include plans and structural calculations prepared, stamped and signed by an engineer licensed in the State of Oregon.
7. In addition to all the requirements listed in this guide, the rooftop screening must meet the height, design and other requirements of the Portland Zoning Code.
8. The Building Official and Fire Marshal, at their discretion, may approve plans that vary from the requirements of this guide, as long as the alternate design meets the intent of this guide.

**B. DESIGN AND CONSTRUCTION**

1. The FRP screen systems shall not include any type of roof structure.
2. The design of the FRP screen must meet all of the requirements given in the test report for the FRP product being specified. Engineering design must be based on the properties and safety factors given in the approval documentation (ICC-ES or LA-RR) for the product specified on the design drawings. The design must provide a complete load path for all code prescribed loads on the screen structure.
3. Moment connections are not allowed for resisting lateral or vertical loads.
4. FRP panels may not be used as shear panels to resist lateral loads.
5. All connections must be made with FRP or steel bolts or threaded rods and nuts. Plastic epoxy or adhesive may not be used when designing connections.
6. In applications where extreme temperatures are expected, the design must consider the reduced capacities of FRP at elevated temperatures.
7. The height of the FRP screen shall not exceed 10'-0" above the elevation of the roof at any point where the FRP screen is attached.
8. The total vertical surface area of the screen panels shall not exceed 10% of the area of the roof.
9. The maximum length of any side of a rooftop screen shall not exceed 25% of the length of the building wall parallel to that side of the screen wall.
10. The rooftop screening must be located at least 10'-0" from any interior property line.
11. The rooftop screening must be located no closer than 5'-0" clear from any mechanical equipment. Verify whether any specific equipment requires larger clearances and provide as necessary.
12. The rooftop screening must not obstruct access to the roof by the fire department.
13. The rooftop screening must not block any means of egress or emergency escape and rescue for the occupants of the building.
14. The rooftop screening must not obstruct roof drainage.

15. Access pathways shall be provided as described in this document. Access pathways shall be clear of any smoke and heat vents, other roof vents, drains or other small obstructions. Access pathways shall be a minimum of 5'-0" wide and have a minimum overhead clearance of 7'-0".
16. The rooftop screening must be located such that an access pathway is maintained on three sides of the rooftop screen. The bottom edge of sloped roofs (slope > 2:12) shall not be used as a pathway.
17. Access pathways must be provided at 50'-0" maximum along each length of screen wall.
18. FRP material used in rooftop screening applications shall be classified as CC1 or better and have a maximum flame spread of 50.
19. Screening shall not be illuminated or electrified.
20. FRP structures shall be built in the shop as much as possible. If any field cutting is required, all cut edges and drilled holes must be sealed using a vinyl ester sealing kit supplied by the manufacturer.

#### **C. INSPECTION**

Special inspection must be provided for FRP installations.

1. The special inspector must verify that the FRP material specified on the approved design documents is being installed.
2. The special inspector must verify that all cut edges and drilled holes are properly sealed using a vinyl ester sealing kit supplied by the manufacturer.
3. The special inspector must verify that the structure is built in accordance with the approved design documents.