



Test report of BFRP rebar in marine environment

Abstract

This test is ordered to determine the durability when putting basalt fiber in seawater.

Testing was performed by Composite Materials and Structure Lab of Harbin Institute of Technology.

BFRP rebar was placed in the splash zone of Harbin Institute of Technology's Weihai campus in Shandong Province.

It can be found that **BFRP** rebar appearance has no obvious change after 6 months corrosion. Its tensile strength improved by 20% when its modulus of elasticity lowered by 5.8%. It indicates that the marine environment has no effect on the degradation of **BFRP** basalt performance.

The samples tested specification: An 8mm parallel bundle of continuous basalt fibers coated in epoxy resin with a surface coating of quartz sand. Samples also show regularly spaced surface deformations caused by spiral winding of the uncured matrix. After curing the resulting rod can be termed "rebar" and suitable to function as a light weight and non-rusting tensile reinforcement member in brittle materials such as concrete. **BFRP** rebar tested here is **RAW brand RockRebar™** supplied by **No Rust Rebar Inc.** and produced from 13um continuous basalt fiber manufactured by **Sichuan Aerospace Tuoxin Basalt Industrial Co., LTD.**



Figure 1: Sample: **BFRP** durability test in ocean splash zone.

Note: corrosion has been shown to accelerate in seawater / salt-spray environments with the crashing of waves.

RAW Brand RockRebar™

Testing the performance change of
**Basalt Fiber Reinforced Polymer (BFRP) rebar after
6 months exposure to ocean splash zone**



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Figure: 2 shows appearance after 6 month and still inside the iron test cage (shown drying out at the ebb tide)



Figure: 3 Specimens of 8 mm RockRebar™ test sections appearance after removal from 6 months in iron cage and exposed to ocean splash zone shows only green moss.



Figure: 4 shows the rebar removed from the test cage and clamp fixture after 6 months of ocean splash zone exposure. Surface appearance of the rebar has nearly “no change” only some moss, the quartz sand is good, no fiber is exposed, which stated that resin matrix has no degradation.

Data: 1 shows the tensile strength, the parameter **before** corrosion as follows:

tensile strength 899.1MPa, modulus of elasticity 50.8 GPa.

Data: 2 shows the tensile strength of the (5) BFRP samples **after** corrosion as follows:

tensile strength 1053.1 MPa, modulus of elasticity 47.8GPa.

The comparison shows that the tensile strength and modulus of elasticity have no obvious change, nearly no change (the variation is less than 5%)

Sample number	1	2	3	4	5	Average value
Maximum load (KN)	55.04	53.66	52.02	49.98	53.92	52.924
Tensile strength (MPa)	1095.0	1067.5	1034.9	994.3	1072.7	1053.1
Modulus of	46.2	47.1	49.1	48.0	48.3	47.8