

BBF **testing**

**DEVELOPED IN HOUSE METHOD
SOP 33 BASED ON EN 12467: 2012 + A2:2018
SECTION 7.4.1 CLIMATIC PERFORMANCE -FREEZE - THAW**

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SECTION 1: FORWARD

This testing procedure is based on EN 12467: 2012 + A2: 2018 Section 7.41.

It has been developed in modified form to provide a test for determining the effect of a cycle of freezing and thawing on Glass Fibre Reinforced Concrete (GRC/GFRC) to determine loss of flexural strength at both the elastic/yield (LOP) and ultimate (MOR) levels.

The test method follows the requirements of the EN standard test with the following errors, omissions, modifications, or deviations.

- 1.1 The 3-point bending test described in Section 7.3.2 of the standard is substituted for the 4-point bending test as detailed in EN 1170-5: 1998. This test is deemed more suitable for Glass Reinforced Concrete
- 1.2 Specimen sizes and sampling are in accordance with EN 1170-8:2008

SECTION 2: REFERENCES

The following published standards are required for the application of this test method.

| | | |
|------------|------|--|
| EN 1170-5: | 1998 | Measuring bending strength 'Complete bending test' method |
| EN 1170-8: | 2008 | Test method for glass fibre reinforced cement Part 8 Cyclic weathering type test |
| EN 12467: | 2012 | Fibre cement flat sheets – Product Specification and test methods. |

SECTION 3: APPARATUS

- 3.1 A freezer meeting the requirements detailed in EN 12467: 2012 Section 7.4.1.2.1
- 3.2 A temperature control water bath meeting the requirements of EN 12467:2012 Section 7.4.1.2.2.
- 3.3 A 4 Point Bending Test Machine meeting the requirements of EN 1170-5:1998 Section 4.

SECTION 4; PROCEEDURE

- 4.1 A test board allowing sampling as detailed in Figure 1 of EN 1170-8:2008 is to be manufactured using the same production methodology as that used to manufacture GRC/GFRC products
- 4.2 The board is to be removed from the mould after a minimum of 12 hours but not exceeding 24 hours.
- 4.3 The board is to be stored in the production facility until 6 days old
- 4.4 Specimens are to be cut from the board using a suitable masonry saw. The length, width and thickness of the specimens is to be in accordance with EN 1170-5:1998 but not exceed a thickness

of 12.5mm. Cut specimens are to be packed in airtight plastic bags for transportation to the testing laboratory. The transportation time from the manufacturing location to the testing laboratory is to be disregarded in respect of determining specimen age.

4.5 On receipt of the specimens at the testing laboratory they are to be removed from the sealed bags and placed in a humidity chamber at 20°C (+/- 3°C) 60% (+/-5%) relative humidity for 21 days.

4.6 At 27 days old the 8 “R” specimens are to be immersed in water at a temperature of 20°C (+/- 2°C) for 24 hours

4.7 Carry out the Full Bending Test as detailed in 1170-5 within 30 minutes of removing specimens from water and wiping with a damp cloth to remove surface water.

4.8 At 27 days old the “C” specimens are to be immersed in water at a temperature of 20°C (+/-2°C) for 48 hours

4.9 After removal the 8 “C” specimens are to be subjected to 25 freeze-thaw cycles as detailed in EN 12467: 2012 Section 7.4.1.3.

4.10 On completion of the 25 cycles carry out the Full Bending Test as detailed in 1170-5:1998 within 30 minutes of removing specimens from water and wiping with a damp cloth to remove surface water.

SECTION 5 RESULTS

Pair each of the 8 “R” & “C” specimens and designate as i ($i = 1-8$) and calculate the individual ratios as detailed in EN 12467: 2012 Section 7.4.1.4 noting ratios should be calculated for both Limit of Proportionality and Modulus of Rupture

Calculate R_L of the mean of ratios for LOP and MOR as detailed in EN 12467