



Glass Fibre Reinforced Concrete Grade 18P

PRODUCT DESCRIPTION

GRC is a composite material comprising of, cement, fine aggregates, alkali resistant glass fibres, acrylic polymers and admixtures/additives.

SPECIFICATION

In accordance with the recommendations and guidelines stated within “Specification for the Manufacture, Curing and Testing of Glassfibre Reinforced Concrete (GRC) Products” published by of our trade body, The International Glassfibre Reinforced Concrete Association (GRCA) and British Standards referred to in this document.

APPLICATION

Wide range of applications beyond its most common adopted use for small, medium and large format panel systems providing lightweight, high impact, total façade rainscreen cladding solutions.

PERFORMANCE ATTRIBUTES

Grade 18P direct sprayed GRC achieves the highest technical performance of all the GRC grades, providing the highest level of creativity and enabling large format cladding panel sizes up to 12m². GRC is easily moulded, its high strength capabilities enable the design and off-site manufacture, of thin lightweight cladding elements. Available with a wide range of colours, textures and surface finish options.

CHARACTERISTIC MECHANICAL PROPERTIES GRADE 18P GRC AT 28 DAYS

(MOR ₂₈)	18-30 N/mm ²
(LOP ₂₈)	5-10 N/mm ²
(UTS ₂₈)	8-12 N/mm ²
(BOP ₂₈)	4-6 N/mm ²
Interlaminar Shear	2-4 N/mm ²
In-Plane Shear	7-12 N/mm ²
Punching Shear	25-35 N/mm ²
Charpy Impact Strength	15-25 N/mm ²
Dry Bulk Density	1800-2100 Kg/m ³
Water Absorption	8-13%
Apparent Porosity	16-25%

MOR - Modulus of Rupture (flexural), the ultimate bending stress obtained from the four point bend test.

LOP - Limit of Proportionality (flexural) ie the point at which the stress/strain curve deviates from a straight line.

UTS - Ultimate Tensile Strength - Stress at which GRC fails in pure tension.

BOP - Bend over point (tensile), namely, the stress at which the stress/strain curve deviates from a straight line variation when a sample of GRC is tested in direct tension.

PROPERTIES IN RELATION TO FIRE

Tests indicate GRC Grade 18P is non-combustible (BS 476-4), achieves fire propagation Class 0 (BS 476-6), surface spread of flame, class 1, zero spread (BS 476-7), providing 4 hours integrity and A1 Classification for reaction to fire performance in accordance with BS EN 13501-1:2007+A1:2009.

QUALITY AND APPEARANCE

Created from natural minerals, glass fibre reinforced concrete products have minor colour and texture variations.

COLOUR

Colour variation is carefully monitored due the extensive use of ordinary Portland cement, natural aggregates and oxide pigments in the formulations. Project specific criteria can be established for colour variation.

TEXTURE

GRC products can be of a natural cast smooth or textural finish, acid etched, abrasive grit blasted or coloured with deep penetrating dyes. During these processes variations in texture is unavoidable as described in CEN/TR 15739. However such variations should not be readily visible when viewed in normal daylight conditions at a distance of five metres for areas intended to be seen at close range (e.g. entrance / corridor), and ten metres for areas intended to be seen from any other range.

SHARPNESS OF EDGES AND CORNERS

Abrasive blasting at high pressure exposes the decorative aggregates used in a face mix created for the project, often to replicate a Portland or natural stone simulation of colour and texture. During this process larger aggregate particles at the vertical/horizontal interface may become dislodged. The larger the aggregate the greater the risk, but whilst these will be visible close, they should not be easily evident when inspected in a similar manner as stated above.

BLOW (AIR) HOLES

GRC uses a high water/cement ratio poured and vibrated or sprayed into a mould. The entrapment of air within the matrix is unavoidable, although close consideration is given to its prevention.

The following criteria is that normally acceptable beyond which the blow hole will be invisibly repaired

- No blow hole is to have a surface area more than 3cm² or 2mm in depth.
- The surface area of blowholes shall be less than 2% of total surface area.

EFFLORESCENCE/LIMEBLOOM

Efflorescence/limebloom is a natural occurring phenomenon caused by the migration of salts to the surface of the concrete during the curing process and may be more apparent on darker shades. Measures taken to minimize this risk beyond the use of an acrylic polymer include:

- Curing the GRC for seven days at controlled temperatures above 15C.
- Allowing air to circulate between packed elements.
- Ensuring panels are not stored horizontally allowing water to settle on the surface.

Additional measures such as the application of vapour permeable hydrophobic surface sealants may also be specified. It is important to note also non treated elements of the façade may perform differently if they are acid-etched and grit blasted, when compared to smooth surfaces struck from the mould. In such instances we would recommend a sealer is specified which will enhance also the weathering capabilities of the façade.

Efflorescence/limebloom fades naturally and dissipates with time.

REPAIRS

Repairs to GRC units are unavoidable and normally resulting from handling damage or mould release abnormalities. Factory remedial work is carried out prior to blasting with repairs to blow holes normally post grit blasting. Repairs should never be visible when viewed in normal daylight conditions at a distance of five metres for areas intended to be seen at close range (e.g. entrance / corridor), and ten metres for areas intended to be seen from any other range.

QUALITY MONITORING

As part of our Quality Management System, we have our own in-house testing facility that enables us to continually monitor the performance of our GRC products. The testing regimes vary from daily 'calibration' checks to ensure that the constituent components of the manufacturing process are being correctly batched, to weekly tests to monitor the strength and flexural properties of our GRC. Tests follow the recommendations stated within the GRCA "Methods of Testing of Glassfibre Reinforced Concrete (GRC) Material" document, and British Standards referred to in this document.

APPROVALS AND ACCREDITATIONS

Telling Architectural GRC products are manufactured under licence to Byggimpuls Fibrebeton AS, whose systems have over 25 years proven experience in the harsh climates of Scandinavia. As part of our commitment to deliver class leading GRC solutions to the satisfaction of our clients, Telling Architectural manufacture all grades of GRC as recognized by GRCA International for which we hold Full Membership grade status.

Our Quality management system has been registered and assessed in accordance with ISO 9001:2008 – Certificate Number 12363-QMS-001

We take our commitment to the environment very seriously and are accredited to ISO14001:2004 – Certificate Number 12363-EMS-001

Our Environmental Policy and Safety Data Sheets can be viewed/requested on our website www.telling.co.uk.

The performance criteria for Grade 8P and Grade 10P are also available.

REFERENCES

This document has been compiled with reference to the following:

Specification for the Manufacture, Curing and Testing of Glassfibre Reinforced Concrete (GRC) Products. Published by: The International Glassfibre Reinforced Concrete Association (GRCA)

Methods of Testing of Glassfibre Reinforced Concrete (GRC). Published by: The International Glassfibre Reinforced Concrete Association (GRCA)

BSI Published Document PD CEN/TR 15739 Precast concrete products – Concrete finishes – Identification.

BS EN 1169 Precast concrete products. General rules for factory production control of glass-fibre reinforced cement.

BS EN 1170 Parts 1-8 Precast concrete products. Test methods for glass-fibre reinforced cement.

BS476-4 Fire tests on building materials and structures. Non-combustibility test for materials.

BS 476-6 Fire tests on building materials and structures. Method of test for fire propagation for products.

BS 476-7 Fire tests on building materials and structures. Method for classification of the surface spread of flame of products.

BS EN 13501-1:2007+A1:2009 Fire Classification of construction products and building elements. Classification using test data from reaction to fire tests.

BS EN 15191:2009 Precast concrete products-classification of glassfibre reinforced concrete. performance.

BS EN 15422:2008 Precast concrete products-specification of glassfibres for mortars and concrete.

The above information is based upon years of research, experience and testing, and is provided in good faith and to the best of our knowledge. As part of our commitment to continuously improve and develop our systems, and meet the changes in technical progress, revised standards and legislation, we reserve the right to amend our specification at any time. The latest version of this document can be found on our website www.telling.co.uk.

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Excellence in GRC