G-Clad

Glass Fibre Reinforced ConcreteCladding system

www.bcmgrc.com

BCM
GRC Limited

BCM GRC Ltd are an award winning manufacturer of Glassfibre Reinforced Concrete (GRC) with over 30 years of experience. During this time the dedicated approach to quality and custmer service has enabled BCM to build an enviable reputation as the leading manufacuturer if GRC products in the UK.

Bespoke Column Casings
No 1 Spinningfields
Manchester

As a GRCA international merit award winning manufacturer we are proud to supply our innovative high quality products to many sectors of the construction, rail and water industries worldwide. We are fully committed to achieve the highest levels of excellence in all aspects of the design, manufacture and performance of our products.

Large Section Jamb and Mullion Detail
Bishop Ramsey School
Middlesex

Column and Balcony Fascia Units
Met Quarter Shopping Centre
Liverpool

This technical manual introduces the BCM GRC Cladding system; it is designed to give a brief insight into the exceptional qualities of GRC as a cladding material such as its aesthetic properties, durability, impact resistance, ease of installation, versatility and overall weight savings on the structure. The use of GRC as a cladding & façade material is rapidly increasing as it provides architects with a high quality, aesthetically pleasing appearance, and contractors with a cost effective solution suitable for fast track installation.

Panel System
Plaza Corner
Leeds

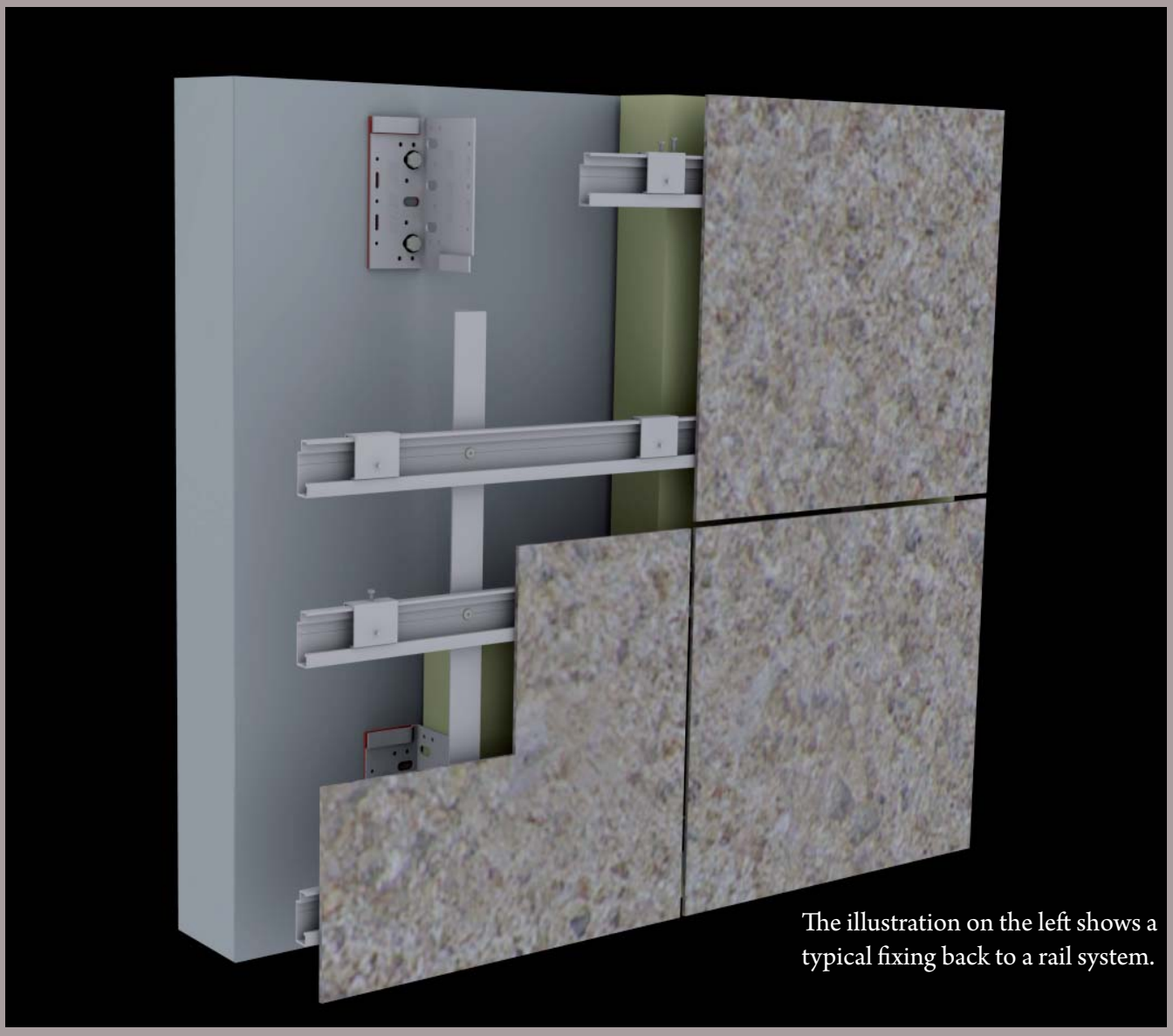
GRC has a number of advantages over natural and alternative cladding materials. In the UK, GRC is finished to replicate the appearance of natural stone products, re-constituted stone and pre-cast concrete panels. GRC's main advantage over these products is weight, as our products can be as much as 80% lighter. Weight reduction of this magnitude offers substantial savings on the structure, installation time, transportation, on-site mechanical handling equipment, and overall depth of the carrier system. Smaller panels can be designed to comply with manual handling recommendations.

For those unfamiliar with GRC, it can be thought of very simply as a thin section concrete that uses Alkali Resistant (AR) glass fibres for reinforcement as opposed to traditional steel reinforcement. The fact that the fibres will not rust like steel means there is no requirement for "cover" thus enabling thin sections of material to be produced which have excellent compressive and flexural strength.

Panel System
Burnley College

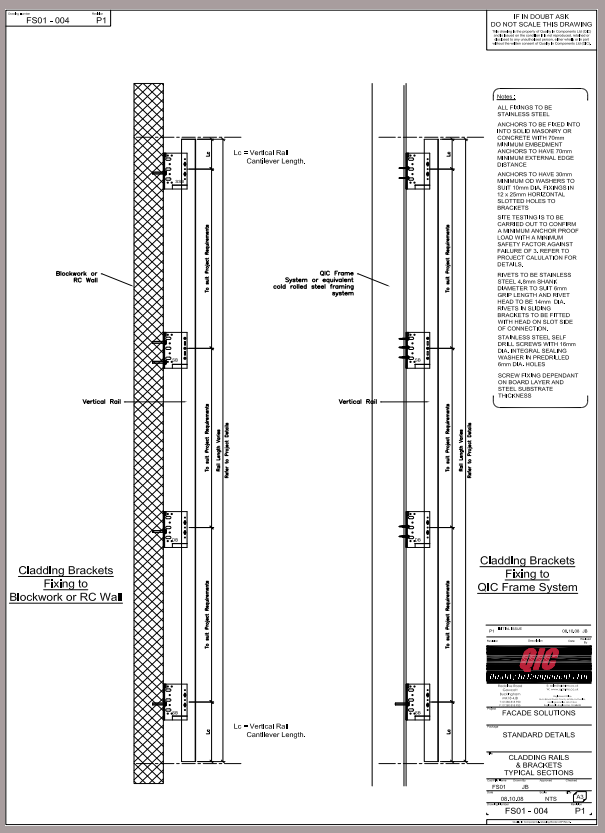
GRC panels can be detailed as custom made units for a specific design or for a more cost effective solution be built up from modular units from our standard range of sizes. The constraints of the product are few but it is essential that the panels are mounted on a backing system that will accommodate the thermal and moisture movement associated with a cementious material For this reason we have designed our cladding system to work with the typical aluminium fixing systems that most installers and specifiers already know.

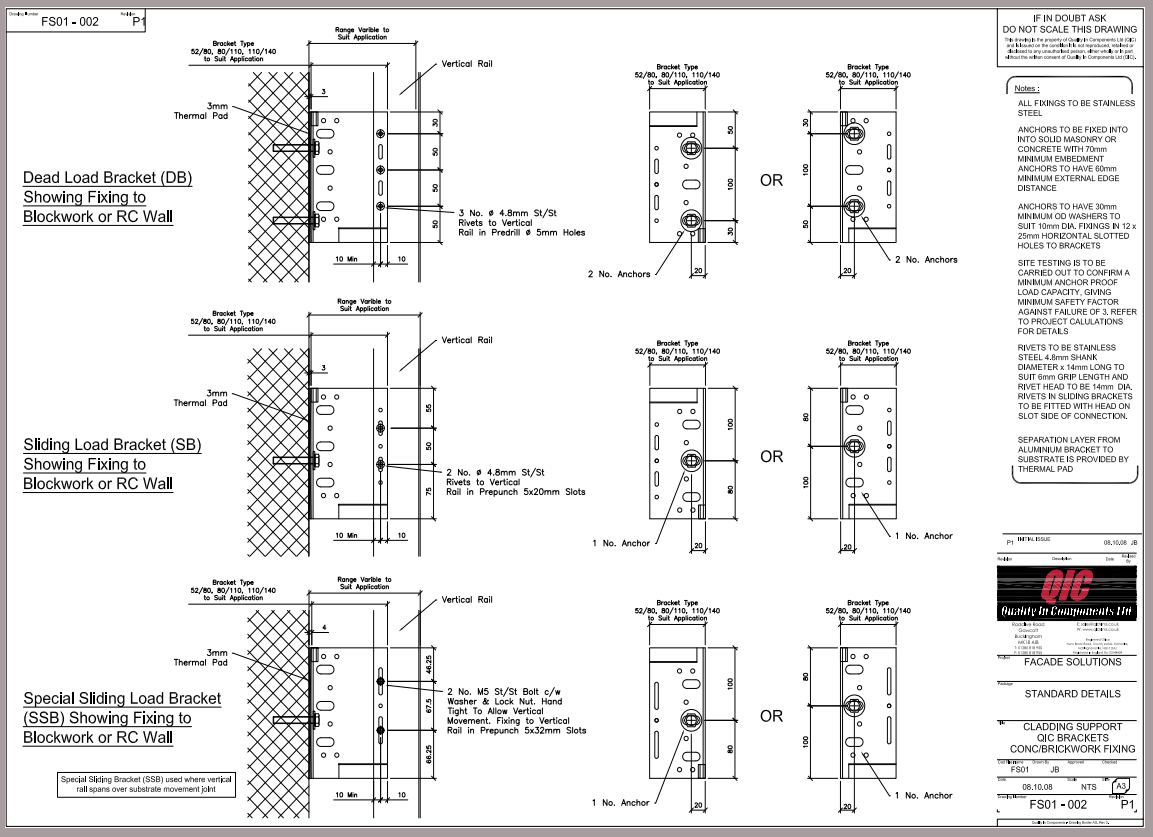
This type of rail system has the advantage that it is “off the shelf” and is familiar to façade contractors who will be able to integrate the erection of our product as part of there package. To enable the panels to be fixed, each GRC element is fitted with cast in sockets which will accept the hanging brackets supplied with the carrier system.

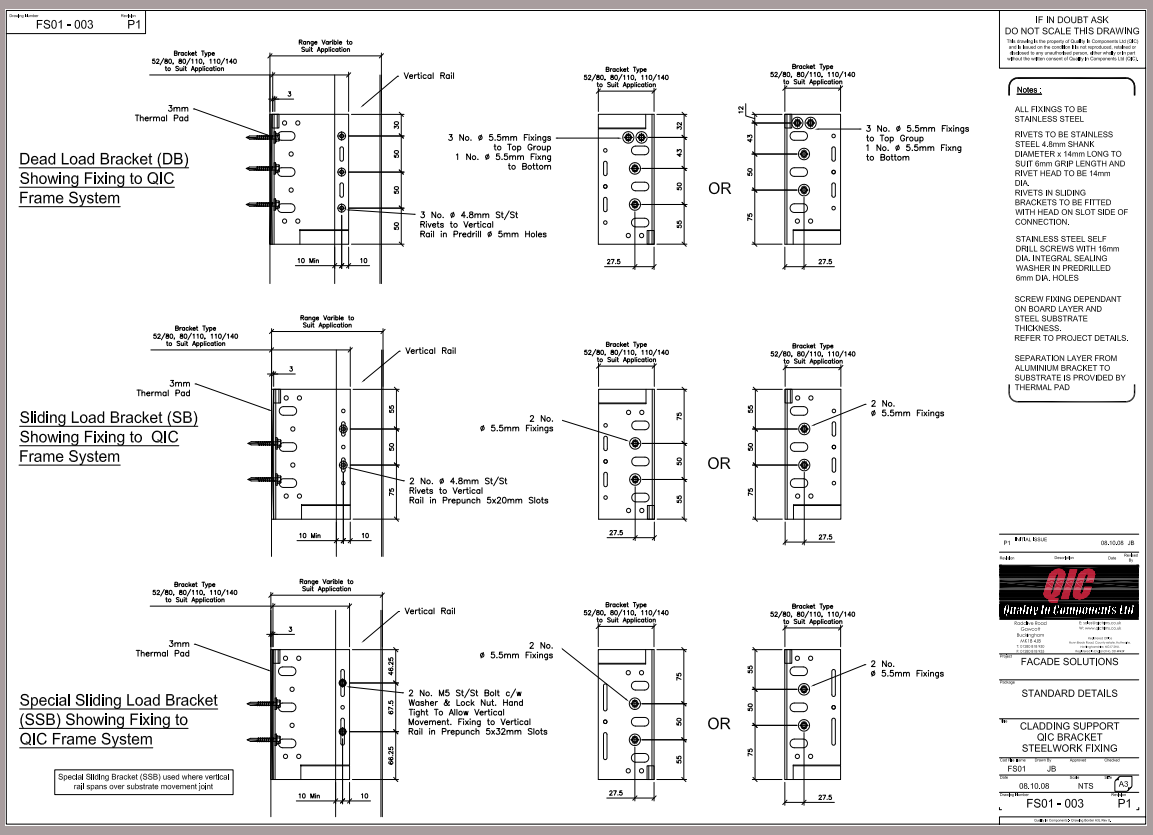


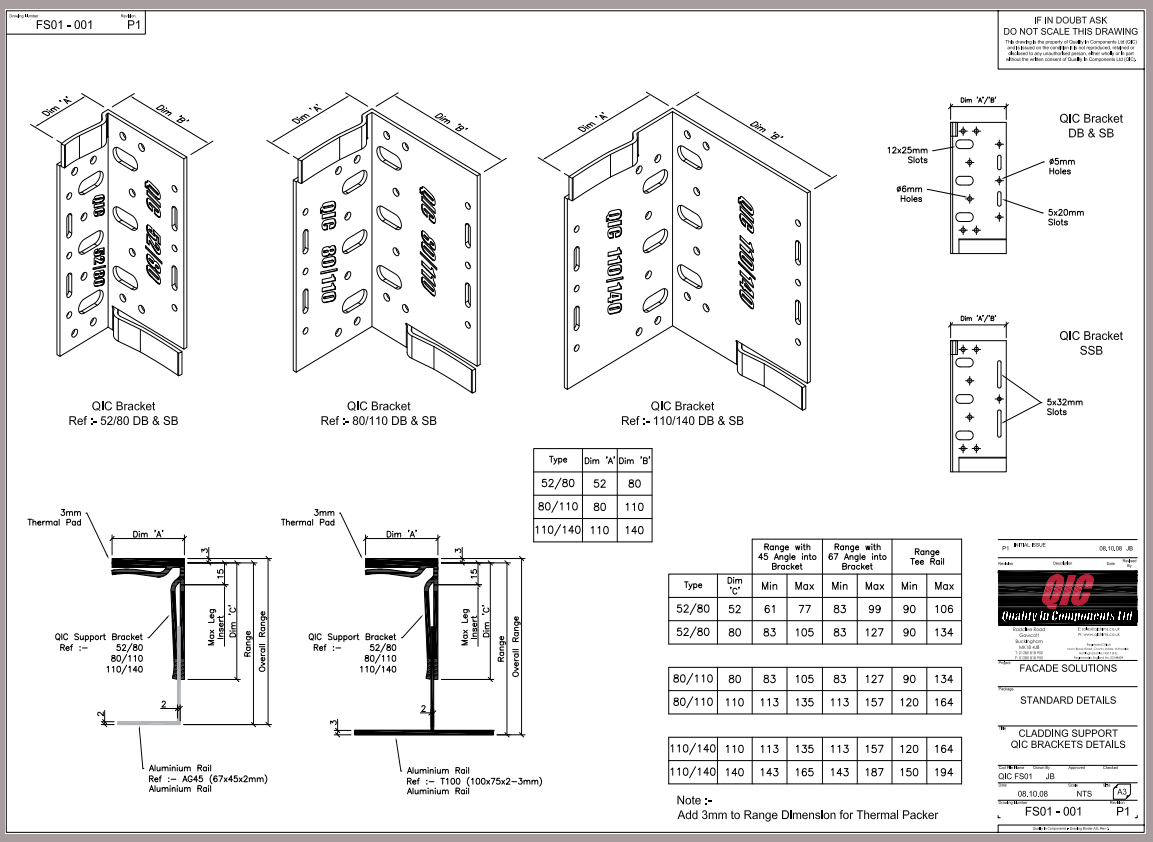
The illustration on the left shows a typical fixing back to a rail system.

The BCM GRC Cladding system is designed to be compatible with the QIC rail system, and is available with a complete range of fittings.









Type	Dim 'A'	Dim 'B'
52/80	52	80
80/110	80	110
110/140	110	140

Type	Dim 'C'	Range with 45 Angle into Bracket Min	Range with 45 Angle into Bracket Max	Range with 67 Angle into Bracket Min	Range with 67 Angle into Bracket Max	Range Tee Rail Min	Range Tee Rail Max
52/80	52	61	77	83	99	90	106
52/80	80	83	105	83	127	90	134
80/110	80	83	105	83	127	90	134
80/110	110	113	135	113	157	120	164
110/140	110	113	135	113	157	120	164
110/140	140	143	165	143	187	150	194

The majority of projects are supplied via a specialist sub contractor who will work with BCM GRC to ensure the whole package complies with all relevant regulations and specifications. If this is not suitable for your project we can supply the panel and backing system as a complete package.

One of the major advantages for the designer of GRC is its ability to form different shapes and patterns, although it is important to understand when detailing bespoke panels or architectural features that each element is produced from a mould, and that the maximum degree of repetition should be introduced to minimise the number of moulds , maximising mould usage thus enabling the solution to be cost effective.
The production cycle for GRC is 24 hours, with the GRC unit being de-moulded 16-18 hours after casting.

Typical panel sizes for use with the rail system will be a maximum of 1500mm x900mm and between 12-20mm thick and can include perimeter and mid-panel stiffening ribs depending on panel size to prevent over-stressing in service. (Panels over this size can be easily achieved but require a different fixing method, please call our technical team for details on larger panels.)

Corners can be formed “in the mould”

The thickness of the panels is built up with a “face mix” which is a slurry mix without glass fibres to form the face of the product (This prevents fibres being seen in the face of the product) and is nominally 3mm thick. The panel is then sprayed in layers containing the glass fibres and compacted with rollers until the designed thickness is achieved.

All our cladding and façade products are manufactured from Grade 18P GRC. “18” refers to the flexural strength achieved at 28 days and is the highest recognised grade of GRC which can only be achieved by spraying the material with the simultaneous addition of glass fibre rovings. “P” refers to the polymer which is added to the GRC cement matrix prior to spraying which provides a variety of material enhancements but is primarily added to allow dry curing of the product. (Architectural products are unsuitable for wet curing due to water marking etc.)

Being cement based with no metal re-inforcement (cast in sockets are stainless steel) it has excellent durability, high compressive and impact strength, will not corrode or spall, and weather at least as well as any natural or pre-cast product and better than semi-dry materials.

Grade 18 GRC (P) Properties and Attributes

Flexural Strength - >18N/mm2 at 28 days

Shrinkage and Creep – 1.0mm to 1.5mm per metre of product

Density – 1.8-2.1 Tonne/m3

Water Absorption – 8-13%

Apparent Porosity – 16-25%

Impact Resistance – GRC has excellent impact resistance and when damage does occur is restricted to a localised area due to the fibres in the matrix resisting the propagation of cracks outside the zone of stressed material. As the make up of panels vary due to size design etc. It is difficult to simulate real conditions but for comparison purposes Charpy tests have been carried on panels from 6-12mm thick which have achieved 15-25 N/mm/mm2. Considering panels and architectural features are a minimum of 12 mm thick it is safe to assume values in excess of this will be achieved.

Fire Resistance - GRC contains only small amounts of organic material in the form of polymer and binder on the glass fibres. When tested for ignitability, fire propagation and surface spread of flame it achieves the highest possible ratings and conforms to the requirements of class O. The smoke emission is very low and the emission of toxic fumes minimal.

Sound Insulation - As this is affected by panel thickness etc. it is difficult to provide exact results but GRC obeys Mass Law for transmission loss through a panel. As a guide a panel weight of 30-50kg/m2 gives insulation (average for range 100-1350 Hz) of 30-35 dB respectively.

Thermal Insulation - With a density of 1.8-2.1 Tonne/m3, GRC has a thermal conductivity in the range of 0.5 to 1 W/m°C depending on moisture content. GRC is therefore not a good thermal insulation material and where particular U-values need to be achieved this needs to be done with insulating materials fitted to the structure.

Typical Composition-

Portland Cement (Cem1)	40%
Silica Sand	40%
AR Glassfibre	3-5% by weight
Polymer Plasticiser	2%
Water	12%

Quality Control

BCM GRC Ltd. are members of the GRCA and were founder members of the association when it was formed in 1976. The GRCA is administered by the Concrete Society.

The GRCA run an Approved Manufactures Scheme (AMS) of which we are also founder members. The objective of the AMS is to provide an independent means of assessing the capability of a company to manufacture GRC products in accordance with international best practice and recognised procedures. A basic requirement for approval is that the applicant has a firm and comprehensive Quality Manual, which details the GRC production processes. To qualify for the scheme this manual needs to be in place and adhered to and an audit at the place of production needs to be carried out by the GRCA. Annual audits are then carried out to ensure ongoing conformity and quality.

As leaders in the production of GRC, BCM GRC Ltd have a testing regime in place which exceeds the requirements of the AMS.

Every day a "Test Board" is produced from each of the pumps producing GRC; this sample is then wet cured for 7 days and cut into 2 coupons for testing. Tests are carried out to establish Limit of Proportionality (LOP) and Modulus of Rupture (MOR). These are then checked to ensure they achieve the required 28 day strengths. Such is our understanding of the material and advanced production techniques we achieve the 28 day criteria at 7 days.

In addition a wash out test is carried out daily to ensure the correct fibre content, a slump test is carried out three times each day and a density test is carried out weekly.

All results are recorded and logged ensuring all material meets with all the relevant British and European Standards.

APPROVED MANUFACTURER GRCA INTERNATIONAL

GRCA GLASSFIBRE REINFORCED CONCRETE ASSOCIATION INTERNATIONAL

BCM GRC Ltd
Unit 22
Civic Industrial Park
Whitchurch
Shropshire
SY13 1TT

T: 01948 665321
F: 01948 666381

E: info@bcmgrc.com
www.bcmgrc.com