SPECIFIERS GUIDE

TO GLASS REINFORCED CONCRETE

WHAT IS GRC GLASS REINFORCED CONCRETE (GRC)?

GRC is a composite material comprising of cement, fine aggregates and alkali resistant glass fibres.

WHAT CAN GRC BE USED FOR?

Architectural Elements:-	Claddings Soffits Column Encasements Large Architectural Components & Embellishments Built in Components, Heads, Cills, Band Course
Civil Engineering Products:-	Permanent Formwork Drainage - General including Sewer Lining, Large Headwall and Retaining Structures
Decorative Products:	Plant Pots Garden Ornaments

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ARE THERE DIFFERENT TYPES OR GRADES OF GRC?

There are basically three different types or grades of GRC which can be considered for different applications; all provide varying strengths both in tension and in compression.

The types or grades are:-

1. A sprayable grade containing a high fibre content which can be sprayed into a mould to form any shape, texture or feature required by the specifier.

2. A pourable grade containing premixed chopped fibres which can be cast into a mould to form any shape, texture or feature required by the specifier.

3. A sprayable premixed grade, similar to 2 above, which can be sprayed into a mould to form any shape, texture or feature required by the specifier.

DO THE ABOVE GRADES PROVIDE DIFFERENT STRENGTHS OF GRC?

The strengths of the different grades are identified by the Modules of Rupture (MOR) which is defined as a value of between 8 to 18 – the higher the figure the stronger the GRC. Regular sample testing will confirm the MOR and the value given above will be obtained following polymer or moisture cure. (See the table below for material strength and testing frequency).

1. The sprayable grade containing a high fibre content provides a higher tensile strength and is more ductile than the other 2 grades given above. (See the table for material strengths and suitable application).

2. The pourable grade of premixed material containing chopped fibres provides a lower strength than the sprayable grade and is less ductile than the sprayable material. (See the table for material strengths and suitable application).

3. The sprayable premixed grade again provides a lower strength than the sprayable grade material, as 1 above. (See the table for material strengths and suitable application).

WHAT ARE THE KEY CONSIDERATIONS IN SPECIFYING OR ORDERING GRC?

1. All GRC grades should be chosen to suit the performance criteria of the component or project by undertaking an analysis in line with the shape, size and required performance as specified by the designer or end user.

2. For use in external elements such as cladding, formwork, architectural embellishments etc., the designer should consider the imposed loading and the support and restraint of each element together with the allowance of both thermal and shrinkage movements, these considerations should be confirmed by a structural analysis. Such an analysis may not be necessary for none cladding or formwork applications such as individually or small products and components utilising the pourable or sprayable premix grades.

3. A design warranty for the large external elements should be recommended.

4. When choosing a manufacturer it is advisable to choose a company that is a member of the Glass Reinforcement Cement Association (GRCA) and preferably a member of the Approved Manufacturers Scheme (AMS) as certified by the GRCA.

To assist specifiers and designers the table given below sets out the basic criteria for the information given above.

Further information and assistance in specifying GRC is provided by the GRCA at www.grca.org.uk

There are also available specific specifications by the National Building Specification (NBS) and the GRCA as well as performance specifications that are provided by both Specialist GRC Consultants and Manufacturers who are members of the GRCA.

Glassfibre Reinforced Concrete has many applications and can be used to manufacture products as diverse as Architectural Cladding for multi storey buildings, formwork for bridge decks or garden ornaments.

It is important when considering the use of GRC that the correct mix design of GRC is used.
Ultimately this needs to be confirmed by a competent design engineer but as an aid to specification the GRCA has prepared the guide document below.

MARKET SECTOR	TYPICAL APPLICATION	APPROX COMPONENT SIZE	GRC GRADES	GRADE (MOR)	POLYMER CURING METHOD	MOISTURE CURING METHOD	TESTING SAMPLES
Architectural	Claddings	> 1m² (face area)	Sprayable	18	Yes		Daily
	Soffits	> 1m² (face area)	Sprayable	18	Yes		Daily
	Column Encasements	> 1m² (face area)	Sprayable	18	Yes		Daily
	Large Architectural Components & Embellishments	> 1m² (face area)	Sprayable	18	Yes		Daily
	Claddings	< 1m² (face area)	Pourable or Sprayable Premix	10	Yes		Weekly
	Soffits	< 1m² (face area)	Pourable or Sprayable Premix	10	Yes		Weekly
	Column Encasements	< 1m² (face area)	Pourable or Sprayable Premix	10	Yes		Weekly
	Large Architectural Components & Embellishments	< 1m² (face area)	Pourable or Sprayable Premix	10	Yes		Weekly
	Architectural Perforated Sunscreens	< 1m² (face area)	Pourable or Sprayable Premix	10	Yes		Weekly
	Built in Components, Heads, Cills, Band Course	Self Supporting	Pourable or Sprayable Premix	8/10	Yes		Weekly
	Architectural Perforated Sunscreens	> 1m² (face area)	Pourable or Sprayable Premix	8/10	Yes		Weekly
	Built in Components, Heads, Cills, Band Course	Non Load Bearing	Pourable or Sprayable Premix	8	Yes		Weekly
	Architectural Perforated Sunscreens	> 1m² (face area)	Pourable or Sprayable Premix	8	Yes		Weekly
Civil Engineering Products	Permanent Formwork	All	Sprayable	18		Yes	Daily
	Drainage – General		Pourable or Sprayable Premix	8/10		Yes	Weekly
	Drainage – Large Headwalls, Retaining Structures	-	Sprayable	18		Yes	Daily
Decorative Products	Plant Pots	-	Pourable or Sprayable Premix	8		Yes	Weekly
	Garden Ornaments	-	Pourable or Sprayable Premix	8		Yes	Weekly

Note: These guidelines are based on UK experience and may vary for different countries. The information provided is for guidance only and the final specification should be agreed by the specifier, specialist GRC manufacturer and a competent engineer. This document should be used in conjunction with other GRC Specifications.