GRCA Approved Manufacturers Scheme

The Approved Manufacturers Scheme (AMS) is operated by the International Glassfibre Reinforced Concrete Association (IGRCA). Bob Faulding reports.

This page and overleaf – Process of manufacture: laboratory analysis; manufacturing control; bending test; and a typical product label.

The scheme's objective is to provide an independent and impartial means of assessing the capability of a company to manufacture GRC products in accordance with international best practice and recognised procedures. In turn this gives specifiers and purchasers confidence in the chosen manufacturer and, importantly for the wider industry, minimises the chances of any GRC failure in use and the consequent bad publicity that will always follow. It should be noted that due to its international nature certification does not indicate compliance with national Standards, which differ from country to country.

Only manufacturers who have been assessed by the IGRCA and issued an accreditation certification are allowed to display the AMS logo on their literature and websites. Registration is renewable on an annual basis subject to a satisfactory audit and inspection by suitably qualified staff employed on behalf of the IGRCA. The only exemption from annual inspections is where an organisation is accredited to ISO 9001[1]. Even in this situation the association reserves the right to carry out periodic visits.

Procedure manual

It is a prerequisite of any application to join the scheme that a fully documented quality control procedure exists and is presented at initial inspection and audit. This must clearly define the company's operational and organisational structure. The manual must detail the quality assurance systems covering the design, manufacture and testing of GRC products. Any significant changes to the manual must be notified to the Association.

Design and detailing

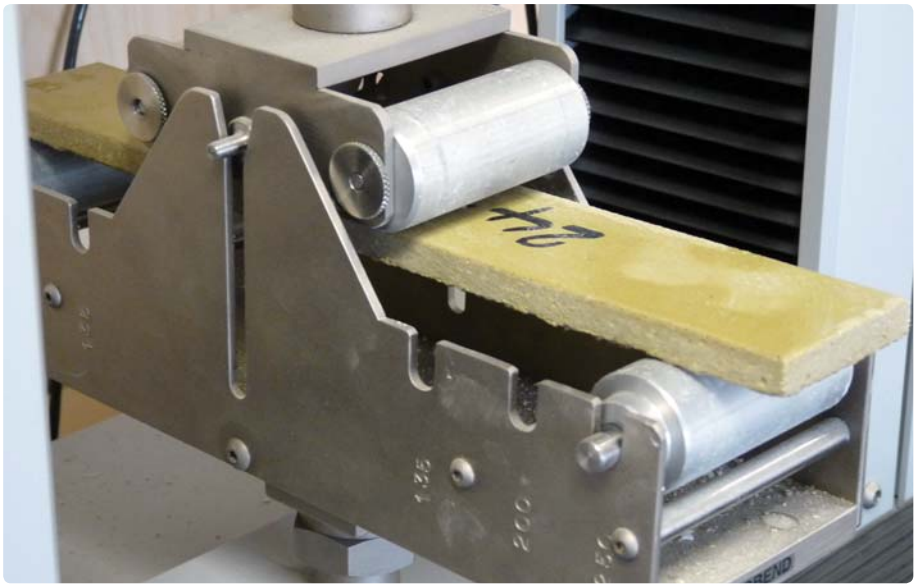
GRC has significantly different properties than other forms of precast concrete. As such it is absolutely essential that any manufacturer has access to, or directly employs, sufficiently qualified and experienced technical staff. This must include a qualified engineer to carry out the various calculations required in the design of the actual components and associated support and restraint systems.

Manufacture and curing

What GRC has in common with other forms of precast concrete is the need for high-quality and accurately dimensioned mould work. Due to the specialised nature of GRC this would generally be in-house. Work by outside subcontractors is acceptable provided the organisation employs a suitably qualified pattern maker or joiner to check all moulds.

Any accredited plant must have all the required equipment to manufacture high-quality GRC products. This will include specialist batching plant, spray equipment (Grade 18 GRC only), calibrated weighing facilities and adequate provision for curing and storage. If a manufacturer produces premix products then a two-stage or variable-speed mixer must be available to avoid fibres being damaged during the mixing process. All calibration certification, especially for weighing equipment, must be available to the inspector.

All raw materials must be compliant with the requirements of the IGRCA Specification[2] and correctly stored within the facility or other watertight structure. As accurate water:cement ratio (w/c) is essential to high-quality GRC production, all fine aggregates must have a moisture content of less than 2% and the manufacturer must be able to show how this is controlled. Critically, only glass fibre containing high levels of zirconium dioxide and is alkali resistant may



be used. Current and historical conformity certificates must be available to the inspector.

It will be necessary for the manufacturer to demonstrate that it has provision for controlled curing in accordance with IGRCA Specification 4.5. In the absence of such facilities then proof that a suitable acrylic thermoplastic polymer is being used in all GRC mixes must be provided. Where such additives are being used, plants must be capable of maintaining temperatures within the range detailed in the specification.

The organisation must demonstrate that it employs suitably competent and experienced operators. It is a requirement of the scheme that full training records be kept for everyone involved in the process of designing, manufacturing, testing and packing the components.

Testing

Regular testing is an absolutely essential part of any concrete production process but even more so with GRC products.

Where most forms of precast concrete are characterised by their compressive strength, this is not important in GRC. The material's main advantage is that components can be manufactured with sections as small as 10mm. This of course gives significant advantages with regard to item weight. As such the primary requirement on the material is high tensile or bending strength. The major factors which influence such strengths are w/c ratio and the correct fibre content.

In order to comply with the requirements of the scheme a manufacturer must have an on-site laboratory or access to certified third-party testing facilities. Certain tests must be carried out on a daily basis and within certain time frames. As such, the equipment to carry out these tests must be available on-site.

The critical and most important test is the bending test to determine the GRC's limit of proportionality (LOP) and modulus of rupture (MOR). As these are the primary data used in the design of any component, the viability of any individual item is determined by this test. In order to qualify as an AMS-accredited facility a manufacturer must be able to show a history of regular and compliant testing. Before any initial inspection at least 40 daily consecutive tests for each production method and each batching plant and/or spray machine must be carried out and the results made available to the assessor. Thereafter it is a mandatory requirement to carry out a bending test at least every week for each batching and spray plant.

All the test data must be made available to the assessor; in the case of an annual reassessment this will cover all test records kept since last inspection. If there have been any test failures, evidence will need to be shown to the assessor/auditor of what action was taken in respect of both products supplied and corrective actions.

Traceability

It is absolutely essential that all products can be traced from batching to installation and cross-referenced to relevant test results. All AMS manufacturers will operate a system whereby each day's production is fully recorded. Such a system will allow for each and every product to be referenced with the date of manufacture. In this way, in the event of any test failure, products at risk of failure can easily be identified prior to installation.

Reassurance

When selecting a manufacturer to supply GRC products, AMS accreditation effectively gives the specifier or purchaser reassurance that the producer has the equipment, knowledge, skills and procedures to manufacture high-quality GRC components in accordance with internationally recognised best practice.

The IGRCA has a responsibility to ensure that all its manufacturing members are encouraged to join the scheme. Therefore, the Association can ensure that all GRC supplied by members is manufactured in accordance with the published Specification and all relevant Standards. As such we encourage all manufacturing members to attain a level of competency and professionalism allowing them to join the scheme. ●

References

1. BRITISH STANDARDS INSTITUTION, BS EN ISO 9001. *Quality management systems. Requirements*. BSI, London, 2008.
2. INTERNATIONAL GLASSFIBRE REINFORCED CONCRETE ASSOCIATION. *Specification for the manufacture, curing and testing of GRC products*. IGRCA, Camberley, 2010.