26 The GRCA Approved Manufacturers Scheme

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INTRODUCTION

The Approved Manufacturers Scheme (AMS) is a scheme operated by the International Glassfibre Reinforced Concrete Association (IGRCA). 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 consequently bad publicity which will always follow.

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 web sites. 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.Even in this situation the association reserves the right to carry out periodic visits.

PROCEDURE MANUAL

It is a pre-requisite 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 & CURING

What GRC has in common with other forms of precast concrete is the need for high quality and accurately dimensioned mould work. Because of the specialized nature of GRC this would generally be in-house. Work by outside sub contractors 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 and correctly stored within the facility or other watertight structure. As accurate water/cement ratio 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 which are alkali resistant can be used. Current and historical conformity certificates must be available to the inspector.

It will be necessary for the manufacturer to demonstrate they have 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 within the specification.

The organisation must demonstrate 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 little as 10mm. This of course gives significant advantages in 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 water/cement ratio and the correct fibre content.

In order to comply with the requirements of the scheme a manufacture 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 this is 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 re-assessment 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

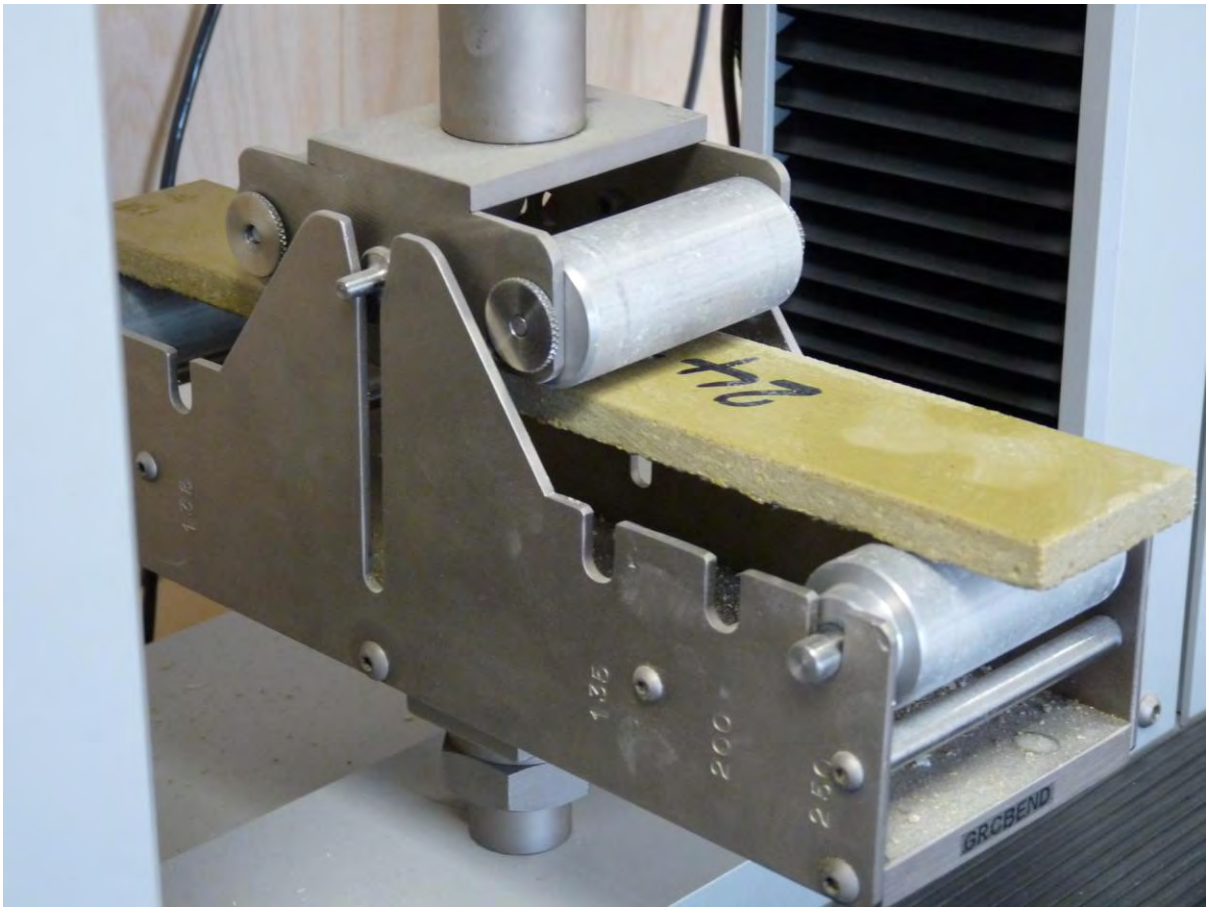
It is absolutely essential that all products can be traced from batching to installation and cross referenced to relevant test results. All AMS manufacturers will operate a system whereby each day's production is fully recorded. Such a system will allow for each and every product to be referenced with 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.

CONCLUSION

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. In this way 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.

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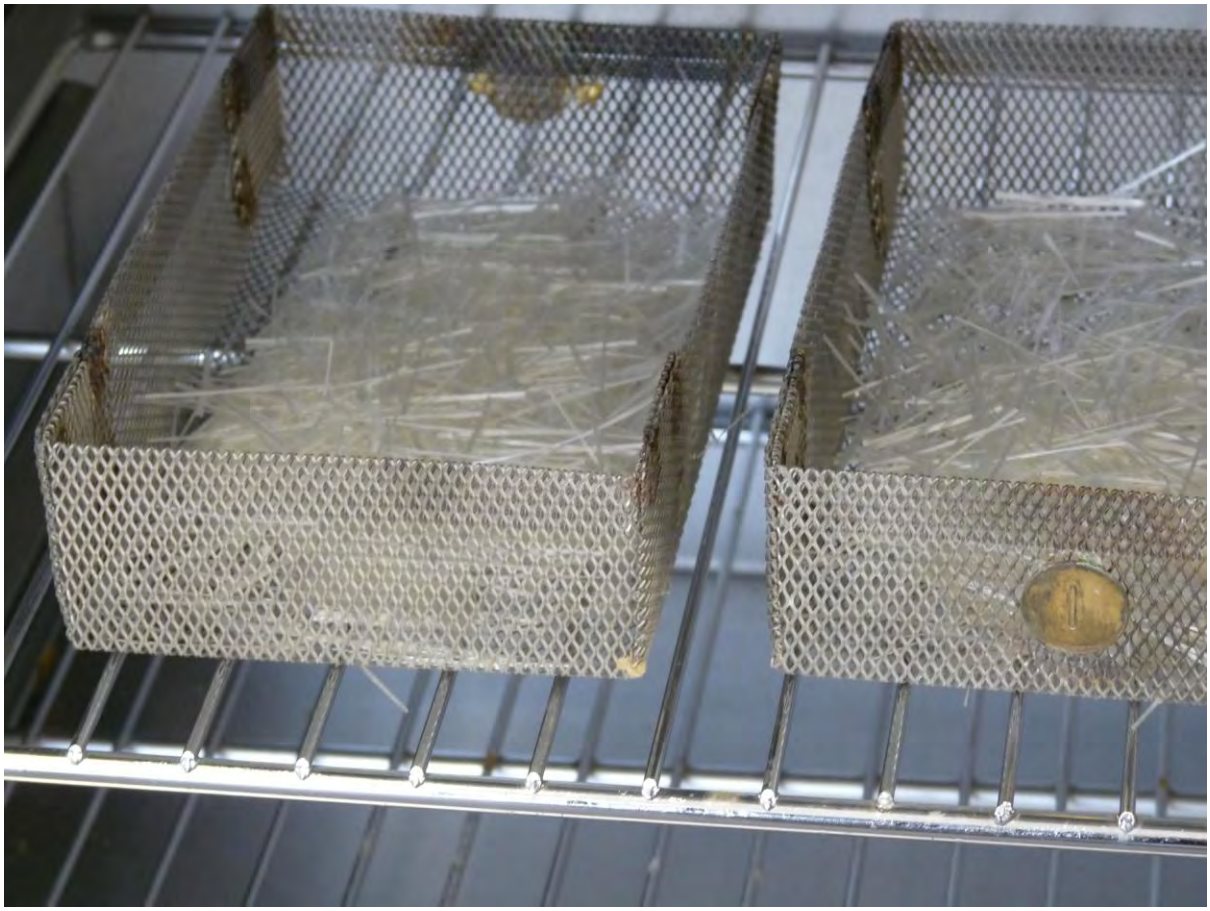

Item	Notes
Quality Manual	Details and defines all operational procedures
Organisation Chart	Allocates duties and responsibilities
Design Facilities	Required to ensure correct design of profiles and fixing systems
Production Planning System	Allows traceability and transparency of manufacture
Mould Manufacture	Systems to show dimensional accurancy
Control of Raw Materials	Ensures compliance to IGRCA requirements
Control of Formulations	Consistency of mix designs
Production Organisation	Correct and controlled production systems
Spray Process Procedures	Multi directional fibre orientation, compaction and thickness
Premix Process Procedures	Use of two speed mixers, correct mixing and mould filling procedures
Operator Training	Satisfactory and competant workmanship
Curing Facilities	Suitable curing or records to show use of acrylic thermoplastic polymers
Testing Facilities	Satisfactory facilities and equipment or formal contracts for regular testing
Testing Frequency	Demonstrates commitment to quality
Testing Methods	To BS EN 1170 or IGRCA Specification
Calibration Frequencies	Ensures accurate mix designs and compilation of test data
Product Marking	Allows full traceability from batching to installation