

Ready-mixed Concrete – Specifying, Site Sampling/Testing and Ordering/Placement Advice

The Mineral Products Association (MPA) was formed in March 2009 from the merger of the Quarry Products Association (QPA), the British Cement Association (BCA) and the Concrete Centre (TCC).

The Mineral Products Association is the trade association for the aggregates, asphalt, cement, ready-mixed concrete, lime, mortar and silica sand industries. The MPA represents 100% of GB cement production, 90% of aggregates production and 95% of asphalt and ready-mixed concrete production. Each year the industry supplies £5 billion of materials to the £100 billion construction and other sectors. The MPA has a growing membership of over 220 members across the UK.

Specifying a BS EN ISO 9001 certified supplier

What is accredited third party product conformity certification?

This is where a certification body that is totally independent of the ready-mixed concrete producer checks and certifies the producer's quality management systems, key process procedures, plant, factory production control, evaluation of conformity and any declaration of product conformity. The word 'accredited' means that the certification body has, in the UK, been certified by the United Kingdom Accreditation Service (UKAS) as being competent to do this task.

Who provides accredited third party quality assurance?



Figure 1 – UKAS Certifying Bodies

In the UK there is a free market in the provision of such services but in practice ready-mixed companies with accredited third party certification are either certified under the BSI Kitemark Scheme or under the Quality Scheme for Ready-Mixed Concrete (QSRMC). Both Schemes require ready-mixed concrete companies to comply with BS EN ISO 9001, as well as current quality and concrete standard requirements.

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What benefits does accredited third party certification give users?

Ready-mixed concrete is a sophisticated engineered material made from constituents that may vary and is delivered and placed before all the properties can be proven, e.g. its 28 day compressive strength. Each plant can supply hundreds of different concretes and all of these have to be controlled. The use of control charts, concrete families and the prediction of the 28 day strength from early test data are part of the normal control of concrete in the UK. Such sophisticated systems require 'experts' to assess whether they have been set up correctly and they are applied correctly. The accredited third party certification body provides the 'experts' to make this independent assessment. The user benefits from a system where the producers claims for the concrete are checked by an independent body.

While sophisticated production control and routine checks on the functioning of a plant minimises the risk of a significant error, they are not a guarantee that mistakes will never occur. Good systems result in the detection of an error relatively quickly and help identify the cause. While the producer remains responsible for the system operation and correcting any errors, the third party will check that this has been operated correctly and the user has been notified of any non-conformities.

Another benefit of specifying accredited third party product conformity certification is that if a significant error is detected at one company, the certification body will require amendments to the procedures of all companies operating a similar system. A real example was where air was getting into the admixture dispensing system under certain conditions. The problem was identified with the certification body informing all its members that on the next inspection their systems would be checked to make sure the problem would not be repeated.

How do I specify third party certification?

Include the following requirement within the contract specification:

The producer shall operate a product conformity certification scheme operating to BS EN 45011 and meeting the requirements of BS EN ISO 9001, accredited by UKAS or equivalent accreditation body.

Will it increase the costs of ready-mixed concrete?

The majority of ready-mixed concrete produced in the UK comes from MPA-BRMCA members. It is a condition of membership of the MPA-BRMCA that the producer holds current third party product certification meeting the requirements of BS EN ISO 9001 for all its ready-mixed concrete plants. Therefore specifying third party certification will not increase costs, as the costs are already built into current prices.

Site Sampling/Testing Advice

Ready-mixed concrete is produced to conform to the European standard, BS EN 206-1 and the complementary British Standard BS 8500-2.

Ready-mixed concrete producers are required to confirm conformity (in terms of compressive strength) to their clients, and in this respect the need for on-site testing undertaken by contractors is no longer required.



Figure 2 - Sampling Technique and Site Sampling/Testing Chart

This process includes a requirement for the producer to verify the claims it makes for its products, commonly referred to as **Conformity Testing**. For example, if a ready-mixed concrete producer declares a concrete as being C30/37, then they must have evidence that this claim is correct.

This evidence is examined and verified by independent third party UKAS accredited certification bodies (as described within the previous section of this article) via a series of audits undertaken each calendar year, covering all production at each and every supplying plant.

Minimum rates of testing are specified within BS EN 206-1, however, it should be noted that the actual rate of testing is always much higher, although it should also be equally recognised that there is no requirement for every single site being supplied to be tested, as this would prove impractical.

On-Site 'testing' (undertaken by the contractor) is no longer required, but unfortunately is still specified by reference to BS 5328. This standard has been superseded by BS EN 206-1 and the complementary standard BS 8500-2 and is therefore no longer valid.

This old system required contractors to undertake sampling/testing at set rates of say 1 test per 30m³ of delivered concrete (dependent upon the concrete design and position within the structure). However, this system is no longer valid and has been replaced by a process known as **Identity Testing**.

Generally, there is no need for contractors to undertake Identity Testing, and in this respect BS 8500-2 only recommends identity testing be carried out where there is no accredited third party certification, when there is doubt over a particular batch and/or for critical elements, e.g. high strength columns. For the reasons given above routine identity testing of concrete is not appropriate.

The key to ending site testing is confidence in the concrete producer, and in this respect we would always recommend using MPA-BRMCA member companies for all your concreting requirements.

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Ordering and Placement Advice

MPA-BRMCA have produced a number of publications offering best practice advice to contractors covering placement techniques for various applications.



Figure 3 – Do's & Don'ts Document and Site Placement Chart

Ordering - Enquiry and tender stage:

As much information as possible should be provided to the ready-mixed concrete company at the enquiry/tender stage. The contract specification may contain specific information pertaining to constituent material restrictions, minimum cement contents and/or maximum water cement ratios and it is therefore essential that the ready-mixed concrete supplier has sight of this in order to determine if the locally held materials will be suitable and/or whether alternative materials need to be sourced.

Please note that if you do not supply the full contract specification, this may lead to incorrect concrete being ordered.

Additionally, it is essential that the correct consistence/workability is specified for the job in hand at this stage (please see page 4 of this document for further information).

An estimate of the volume of concrete required is essential. However, any additional information pertaining to 'placement rates' would also be extremely useful, as forward planning will allow the ready-mixed concrete producer to plan for the use of additional vehicles and/or late working etc.

Ordering – Delivery request:

To avoid confusion, always make reference to the quotation and concrete reference number or letter when ordering rather than referring to the concrete description or part of it, as it is highly likely that a number of concretes will have the same compressive strength class, but may then differ in terms of the specified maximum water cement ratio and/or minimum cement content.

Your order and subsequent delivery of ready-mixed concrete will be based upon the requested consistence/workability, however this may be amended subject to additional cost where necessary. In this respect, additional costs may be incurred if the original consistence/workability of the concrete is increased, as additional

cementitious material will be required to maintain the strength and/or maximum water cement ratio requirements.

Please order the correct consistence for the job in hand, rather than adding water on site, as this is bad practice and will adversely affect the quality of the final product. It will also render void any guarantees with regard to the concrete. Please also allow sufficient lead in time for delivery when placing your order.

For information, the term 'workability' is now referred to as 'consistence'. The most common way of specifying consistence is by slump class. These classes are given below together with the likely target slump:

Slump class	Likely target slump (mm)
S1	20
S2	70
S3	120
S4	180

Slump is now specified and measured to the nearest 10 mm.

Further publications are also available as free downloads on the MPA-BRMCA web site www.brmca.org covering the following key topics:

Design Guides and Cost Model Studies
BRE Green Guide, Code for Sustainable Homes and BREEAM
Sustainability
Responsible Sourcing

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