Datasheet

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Ordering Premixed Concrete

INTRODUCTION

With the many different designers' specifications and suppliers' proprietary products, it is important that customers are very specific as to their requirements when ordering concrete.

Australian Standard AS 1379, *Specification and supply of concrete*, sets out minimum requirements for concrete specification. Concrete is specified to be either 'normal class' or 'special class'. The 'class' of concrete and all other requirements of the concrete will need to be set out on the plans and/or in the specification. They should not be varied without the designer's approval.

Normal-class concrete is the most commonly used concrete. It requires selection of values for the basic properties (or parameters) of the concrete, within certain limits.

These parameters are set out below, and a check list is also provided. Normal-class concrete is designated by the prefix 'N' before the strength grade. For example, a normal-class concrete having a strength grade of 20 is designated N20.

Special-class concrete is concrete whose properties/parameters are different, or whose limits fall outside those of a normal-class concrete. These may include colour, specific drying shrinkage or high-early-strength requirements, concrete containing lightweight aggregates or specialist cements.

ORDERING NORMAL-CLASS CONCRETE

When ordering normal-class concrete the following parameters need to be communicated to the supplier.

Quantity

The supplier must be advised of the volume, in cubic metres of concrete required – including an allowance for any on-site wastage. Possible yield discrepancies will be minimised by carefully estimating the required concrete volume.

Concrete volumes should be carefully estimated from on-site measurements and not from drawings or plans. Factors such as variations in slab thickness, deflection or distortion of forms, over excavation, uneven/irregular subgrade levels, placement over uncompacted sand or fill and use by other trades should be considered to reduce possible discrepancies in the quantity required.

Refer to CCAA Data Sheet Assessing Concrete Volumes for more information on how to minimise volume discrepancies.

It is important that customers are very specific as to their requirements when ordering concrete

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Strength Grade

Strength grade is a basic parameter which must be specified. The standard strength grades are N20, N25, N32, N40 and N50. Standard strength grades greater than 50 (ie 65, 80 and 100) and ordering concrete strengths other than one of the standard strength grades (not recommended) will require a special-class concrete.

Slump

Slump is a basic parameter which must be specified. Specified slumps can be in the range from 20 to 120 mm in 10-mm increments. The higher the value, the more workable the concrete is likely to be for ease of placement and compaction.

Slump can't be precisely assessed without carrying out a slump test – nor can it be controlled exactly from batch to batch. AS 1379 provides tolerances within which the supplier must deliver the concrete. For example, a specified slump of 100 mm has an acceptable tolerance of 80 to 120 mm. Tolerances are allowed because of variations from testing, raw materials, batching, mixing equipment etc. The supplier will target the specified slump and should not be asked to supply a slump range.

The slump specified should be fit for the intended purpose. For residential slabs and footings a 100-mm slump is generally specified to achieve a workable concrete that can be readily placed, compacted and finished. However, current pumping, site practices and placing techniques frequently demand higher slumps.

Complicated formwork or congested reinforcement may also require a higher slump to facilitate placement and compaction.

It is necessary to advise the supplier of the required slump, so that the concrete mix can be properly designed to achieve the required strength and other properties. AS 1379 notes that for residential slabs and footings, if the slump is not specified, then a 100-mm slump will be supplied.

Under no circumstances should 80-mm slump be ordered and a higher slump achieved by the on-site addition of water. Water which is added to the concrete without the supplier's approval is called 'excess water'. The addition of excess water at the customer's request may require an authorising signature from the customer's representative and may negate the supplier's warranty as this water addition can seriously affect the ability of the concrete to meet its performance requirements.

Maximum Nominal Aggregate Size

A 20-mm aggregate size will be supplied unless otherwise specified. Alternatively, 10- or 14-mm aggregate sizes may be specified. As with slump, aggregate size may be determined by the method of placement, formed section thickness and reinforcement spacing. The designer may specify the aggregate size after considering the element design and method of placement.

Method of Placement

The supplier needs to know how the concrete is going to be placed (eg chute, pump) as this method will influence the concrete mix design. In the case of placing by pump, the type of pump, size and length of line should be specified as these will affect the concrete mix design.

Rate of Placement

The required rate of placing the concrete is important to ensure the supplier can programme production and delivery accordingly. Also, the supplier should be advised of any delays that are likely to occur and of any other special factors such as site access conditions. It should be noted that the AS 1379 requirement for concrete to be discharged within 90 minutes of the commencement of mixing may be waived, or varied depending on weather conditions provided this is agreed between the customer and the supplier prior to supply.

Testing

Concrete is tested by the supplier in accordance with the requirements of AS 1379 to ensure that the plant (equipment and processes) delivers a consistent quality product. This is called 'production assessment testing'. To ensure that the customer's project is tested, there should be a requirement for additional strength testing on site, called 'project assessment testing'. The details of the test procedures and their frequency need to be considered at the specification stage. Such testing and associated costs need to be agreed upon prior to ordering.

Air Entrainment (Optional)

For the majority of work, air entrainment is not specified. Air entrainment may be specified for particular applications such as freeze-thaw conditions. If required, a maximum air entrainment of 5.0% may be specified. It should be noted that an allowable range of tested air content from that specified is +1.5% in accordance with Section 5.4.3 of AS1379.

ORDERING SPECIAL - CLASS CONCRETE

When ordering special-class concrete the class must be further qualified as performance or prescription. Where any concrete property other than strength grade is specified as a principal criterion for mix constituent proportions, then the special-class concrete becomes a prescription class. The following parameters may be specified in either performance or prescription:

Quantity

The requirements for quantity are the same as for Normal-Class concrete. Where a specifier has provided a mix design prescription to the supplier it then becomes the specifier's responsibility to ensure correct quantities will be achieved.

Strength Grade

Strength grade is a basic parameter which must be specified. The standard strength grades are as per Normal-Class concrete (N20, N25, N32, N40 and N50). While other strength grades than these may be specified as performance Special-Class, it is preferred that this is avoided and if used will need clear specification of conformance requirements.

Slump

Slump is a basic parameter which must be specified in Special-Class concrete and may be specified in accordance with Normal-Class concrete. Any specified slump other than the standard range of slump target values applicable to Normal-Class concrete will automatically deem that the concrete is Special-Class (for example a target slump of 180mm).

Maximum Nominal Aggregate Size

The maximum aggregate size will be as specified for Normal-Class concrete except that other sizes to the Normal-Class range may also be specified.

Method of Placement

The supplier needs to know how the concrete is going to be placed (eg chute, pump) as this method will influence the concrete mix design. In the case of placing by pump, the type of pump, size and length of line should be specified, as these will affect the concrete mix design.

Rate of Placement

The required rate of placing the concrete is important to ensure the supplier can programme production and delivery accordingly. Also, the supplier should be advised of any delays that are likely to occur and of any other special factors such as site access conditions. It should be noted that the AS 1379 requirement for concrete to be discharged within 90 minutes of the commencement of mixing may be waived, or varied depending on weather conditions provided this is agreed between the customer and the supplier prior to supply.

Testing

Special-Class concrete will generally not be tested by the supplier using “Production Assessment”. In general the specifier will be required to specify the type of testing, the frequency of testing and acceptance criteria for Special-Class concrete. The details of the test procedures and their frequency need to be considered at the specification stage. Such testing and associated costs need to be agreed upon prior to ordering.

Air Entrainment

For the majority of work, air entrainment is not specified. Air entrainment may be specified for particular applications such as freeze-thaw conditions. If the specifier requires air entrainment in excess of 5% or a varied maximum range than specified in AS1379 then this automatically deems that the concrete is Special-Class.

Other Specified Parameters

Table B1 in Appendix B of AS1379 outline a number of additional specification parameters that may be ordered for Special-Class concrete. These include:

- Cement type
- Early age strength
- Density
- Drying Shrinkage
- Chloride Content restriction
- Sulphate content restriction
- Flexural Strength
- Indirect tensile strength
- Durability – Exposure Classification
- Water/Cement ratio
- Admixtures & additives
- Maximum discharge time
- Temperature at discharge
- Special raw material verification
- Records on the delivery docket

Requirements for Special Class Concrete

Special-Class concrete can take a very large number of forms and so there is no simple checklist that can be developed to cover all of these options. Put simply, if a specified concrete does not conform to all of the requirements of Normal Class concrete, then it is Special-Class and the specifier and customer must be extremely clear on what the special requirements will be for that concrete. It is important that the specifier and customer discuss these requirements with the concrete supplier before ordering to avoid potential delays and additional costs.

CHECKLIST FOR NORMAL-CLASS CONCRETE

The table below provides a useful checklist aimed at ensuring that normal-class concrete ordered from the supplier is both what the customer requires and what the designer specified.

Further information on good concreting practices can be downloaded from the Cement Concrete and Aggregates Australia website at www.ccaa.com.au

CHECKLIST FOR ORDERING NORMAL-CLASS CONCRETE

Parameter	Default	Comment
Quantity Strength Grade (N20, N25, N32, N40, N50)	None None	Allow for wastage. One of the standard strength grades must be specified.
Slump (20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120 mm)	None (see comment)	Must be specified. For residential slabs and footings. A slump of 100 mm will be supplied if a value is not specified.
Aggregate Size (10, 14, 20 mm)	20 mm	Need not be specified.
Method of Placement (Chute, pump, spray, tremmie, etc.)	None	Must be specified.
Rate of Placement	None	Supplier should be advised of required intervals between deliveries and any special requirements (e.g. site access).
Testing	Production assessment	Need not be specified.
Air entrainment	None	Need not be specified. If required, 5.0% maximum.

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