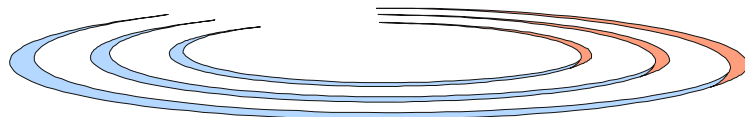


INDUSTRY STANDARD FOR
CONCRETE
SPECIAL CLASS
2002
WSA 114—2002



WATER SERVICES ASSOCIATION
of Australia

SECTION 1 SCOPE

The requirements for special class pre-mixed concrete have been developed for specification in the construction of principally sewerage infrastructure assets where concrete durability is critical to the life expectancy of such assets. Concrete provided shall be the class specified in the purchase order and / or referenced design plans, Specifications or Drawings.

The manufacture and supply of concrete shall comply with

1.1 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- | | |
|----------|---|
| 1012 | Methods of testing concrete |
| 1012.4 | Determination of air content of freshly mixed concrete |
| 1012.4.1 | Methods of testing concrete—Determination of air content of freshly mixed concrete—Measuring reduction in concrete volume with increased air pressure |
| 1012.4.2 | Methods of testing concrete—Determination of air content of freshly mixed concrete—Measuring reduction in air pressure in chamber above concrete |
| 1012.4.3 | Methods of testing concrete—Determination of air content of freshly mixed concrete—Measuring air volume when concrete dispersed in water |
| 1141 | Methods for sampling and testing aggregates |
| 1141.5 | Particle density and water absorption of fine aggregate |
| 1141.6 | Particle density and water absorption of coarse aggregate |
| 1141.6.1 | Weighing-in-water method |
| 1141.6.2 | Pycnometer method |
| 1379 | Specification and supply of concrete |
| 1478 | Chemical admixtures for concrete |
| 2758 | Aggregates and rock for engineering purposes |
| 2758.1 | Concrete aggregates |
| 3582 | Supplementary cementitious materials for use with Portland and blended cement |
| 3582.1 | Fly ash |
| 3582.2 | Slag—Ground granulated iron blast-furnace |
| 3582.3 | Silica fume |
| 3972 | Portland and blended cements |
| AS/NZS | |
| ISO 9002 | Quality systems—Model for quality assurance in production, installation and servicing |

SECTION 2 QUALITY ASSURANCE

2.1 GENERAL

Special class concrete shall be manufactured by quality endorsed companies that have a quality management system conforming to AS/NZS ISO 9001/2:2000.

2.2 SAMPLING, TESTING AND COMPLIANCE ASSESSMENT

Special class concrete shall be sampled, tested and assessed for compliance in accordance with AS 1379, Section 5, unless otherwise nominated in project specification. Sampling and testing of concrete shall be carried out by a NATA accredited laboratory that has current registration for concrete testing.

SECTION 3 SPECIAL CLASS CONCRETE DESIGNATION

3.1 DESIGNATION

Special class concrete complying with this specification shall be designated "SCC nn" where the suffix "nn" represents the 28-day compressive strength of the concrete.

SECTION 4 MIX DESIGN

A mix design shall be adopted that enables compliance with the performance requirements of Section 7 and the following:

- (a) The minimum $f'c$ shall be 40 MPa.
- (b) A minimum binder content shall be 350 kg/m³
- (c) A drying shrinkage strain at 56 d shall not exceed 700×10^{-6}
- (d) A total reactive alkali content not greater than 3.0 kb Na₂O / m³ (equivalent)
- (e) The design water:cement ratio shall not exceed 0.50

SECTION 5 MANUFACTURE

5.1 GENERAL

Special class concrete shall be manufactured to:

- (a) The specified mix design (see Section 4).
- (b) AS 1379 to the class specified in the purchase order or nominated in the referenced design plans, specifications or drawings.
- (c) Comply with the requirements additional to AS 1379 specified in Section 6.

5.2 CHEMICAL CONTENT

Each batch of concrete shall be sampled and the chloride and sulphate content determined in accordance with Clause 5.5 of AS 1379 to the acceptance levels of Clause 2.7 of AS 1379.

NOTE: Variations to this requirement may be imposed by a project specification.

SECTION 6 CONCRETE MIX CONSTITUENTS

6.1 CEMENT

Cement mix (binder) shall comply with AS 3972, Type SR.

6.2 FLY ASH

Fly ash incorporated into the cement shall comply with AS 3582.1. Fly ash shall be “fine” grade.

6.3 SLAG

Slag incorporated into the cement shall be from an iron blast furnace and shall comply with AS 3582.2.

6.4 SILICA FUME

Silica fume shall comply with AS 3582.3. The maximum amount of silica fume shall be 10% by weight of the total cement material.

6.5 AGGREGATES

Aggregates used in the manufacture of concrete shall be of clean, hard, chemically inert and durable particles that comply with AS 2758.1 for an exposure classification “C” and comprise either normal weight or heavy weight aggregates.

The water absorption of aggregate shall be less than 3% when tested in accordance with AS 1141.5, AS 1141.6.1 or AS 1141.6.2.

The alkali reactivity of the aggregate shall be assessed to Clause 10 of AS 2758.1.

6.6 WATER

Water used in the manufacture of concrete shall be of good quality complying with AS 1379.

6.7 CHEMICAL ADMIXTURES

Admixtures that enhance the workability, reduce water/cement ratio, control slump, minimise shrinkage and control the setting time of the concrete may be included in the mix in a controlled manner, provided they have been proven to not impair the performance of the concrete.

Air-entraining admixtures may be used provided that the air content, determined in accordance with AS 1012.4.1, AS 1012.4.2 or AS 1012.4.3, does not exceed 4%.

Admixtures shall comply with AS 1478.

SECTION 7 PERFORMANCE REQUIREMENTS

7.1 COMPRESSIVE STRENGTH

Unless otherwise nominated in the project specification, the characteristic compressive strength of each batch shall be determined in accordance with Clause 6.5.2 of AS 1379.

NOTES:

- 1 The frequency of testing may be varied by the project specification.
- 2 The party responsible for costs of such testing should be negotiated prior to such testing.

7.2 SLUMP

Slump shall be appropriate to the intended method of placement.

The slump at the point of acceptance shall be in the range 80 mm to 120 mm.

Slump shall be tested at the same frequency as compressive strength, except where otherwise nominated in the project specification.

NOTE: Approved admixtures that comply with AS 1478 may be used to adjust slump in a controlled manner.

SECTION 8 POST-BATCHING ADDITIONS

8.1 EXCESS WATER

The on-site addition of water or admixtures to concrete that takes it out of the allowable tolerance range, is not permitted.

8.2 SUPPLIER APPROVED ADDITIONS

If the supplier approves the addition of water or admixtures to a mixed batch the conditions of Clause 4.2.3 of AS 1379 shall apply.

SECTION 9 COMPLIANCE CERTIFICATE

A compliance certificate shall be issued for each batch of concrete.

The compliance certificate shall state the special class mix designation and confirm that product delivered to site complies to this specification and any other requirements specified in the purchase order.