

# Master Specification

## Part RD-EW-C4

### Controlled Low Strength Material

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**Government of South Australia**  
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## RD-EW-C4 Controlled Low Strength Material

### 1 General

- a) This Master Specification Part specifies the requirements for controlled low strength material (CLSM), including:
  - i) the documentation requirements, as set out in section 2;
  - ii) the materials requirements, as set out in section 3;
  - iii) the properties requirements, as set out in section 4;
  - iv) the placement requirements, as set out in section 5;
  - v) the test procedures, as set out in section 6; and
  - vi) the verification requirements and records, as set out in section 7.
- b) CLSM and its constituent materials must comply with the Reference Documents, including:
  - i) AS 1012 Methods of testing concrete;
  - ii) AS 1379 Specification and supply of concrete;
  - iii) AS 1478 Chemical admixtures for concrete, mortar and grout;
  - iv) AS/NZS 2566.2 Buried flexible pipelines, Part 2: Installation;
  - v) AS 3972 General purpose and blended cements;
  - vi) AS/NZS 3582 Supplementary cementitious materials; and
  - vii) AS/NZS ISO 9001 Quality management systems - Requirements.

### 2 Documentation

#### 2.1 Construction Documentation

In addition to the requirements of PC-CN3 “Construction Management”, the Construction Documentation must include details of the CLSM mix design, including:

- a) the source, type and proportions of the constituent materials;
- b) aggregate gradings and saturated surface-dry densities;
- c) details of the chemical admixtures and the manufacturer’s recommended method of use;
- d) the nominated slump;
- e) where a super-plasticizer is used, the final slump;
- f) evidence that the mix complies with the requirements of this Master Specification Part, from either:
  - i) previous production of the mix where test results are not more than 12 months old; or
  - ii) full details of a trial mix undertaken in accordance with AS 1012.2 Methods of testing concrete - Preparing concrete mixes in the laboratory; and
- g) evidence that the CLSM complies with the requirements of this Master Specification Part, from either:
  - i) trial mixes conducted in accordance with AS 1012.2 Methods of testing concrete - Preparing concrete mixes in the laboratory; or
  - ii) production testing.

## 2.2 Quality Management Records

In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Quality Management Records must include:

- a) the results of all testing undertaken in accordance with section 6; and
- b) the verification records required by Table RD-EW-C4 7-1.

## 3 Materials

CLSM must meet the following requirements:

- a) CLSM must be supplied from a manufacturing plant which has third-party certification to AS/NZS ISO 9001 Quality management systems - Requirements from an accredited assessment body;
- b) cement must comply with the requirements of AS 3972 General purpose and blended cements;
- c) admixtures must comply with the requirements of AS 1478.1 Chemical admixtures for concrete, mortar and grout - Admixtures for concrete;
- d) fly ash must comply with the requirements of AS/NZS 3582 Supplementary cementitious materials;
- e) aggregates must be free of reactive or expansive materials and be compatible with the CLSM flow characteristics; and
- f) the maximum size of coarse aggregates used must not exceed the values specified in Table RD-EW-C4 4-1.

## 4 Properties

CLSM must:

- a) comply with the properties in Table RD-EW-C4 4-1 for the relevant application; and
- b) be homogeneous, free of lumps of unmixed material and without segregation.

**Table RD-EW-C4 4-1 Material use criteria and properties**

Application	Description	28 day strength (MPa)	Slump (mm)	Maximum size of coarse aggregates (mm)
General purpose backfill	a) Early strength is not critical; b) high degree of flowability; and c) future excavation by hand.	<0.5	>180	19
Roadway trench backfill	a) High early bearing strength; b) normal flowability; and c) future excavation by machine.	1.5 - 2.0	150 - 200	19
Pipe embedment backfill	a) Normal flowability; and b) future excavation by machine.	0.6 - 3	150 - 200	10

Application	Description	28 day strength (MPa)	Slump (mm)	Maximum size of coarse aggregates (mm)
Structural backfill	a) Normal flowability; b) strength to be specified; and c) not to be used for pipe backfill or where future excavation is likely.	3.0 - 8.0	150 - 200	19

## 5 Placement

- The Contractor must ensure that the method of placement used for CLSM does not allow foreign materials to enter the mix.
- Where CLSM is used as conduit and culvert backfill, the Contractor must ensure that conduits and culverts do not float, or otherwise become dislodged, during placement of the CLSM. CLSM must be placed in accordance with the requirements of AS/NZS 2566.2 Buried flexible pipelines, Part 2: Installation, including Appendix K.
- The Contractor must retain a copy of the delivery information specified in AS 1379 Specification and supply of concrete.

## 6 Test procedures

- The Contractor must carry out testing of CLSM in accordance with the requirements of this Master Specification Part, including the Reference Documents and the test procedures listed in Table RD-EW-C4 6-1.
- The results of the testing required in section 6a) must be provided as part of the Quality Management Records.

Table RD-EW-C4 6-1 Test procedures

Test	Test procedure
Compressive strength of CLSM specimens	AS 1012.9 Methods of testing concrete - Compressive strength tests - Concrete, mortar and grout specimens
Slump test	AS 1012.3.1 Methods of testing concrete - Determination of properties related to the consistency of concrete - Slump test

## 7 Verification requirement and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-EW-C4 7-1 have been complied with.

Table RD-EW-C4 7-1 Verification requirements

Section reference	Subject	Record to be provided
5c)	Delivery information	Identification certificates in accordance with AS 1379 Specification and supply of concrete