# MISCELLANEOUS CONCRETE WORKS

DIPL Roadworks Master – July 2023

## Standards and Publications

Conform to the following Standards and Publication unless specified otherwise:

AUSTRALIAN STANDARDS

|  |  |
| --- | --- |
| **Table – Australian Standards** | |
| Use Standards, and their amendments, current as at the date for the close of tenders except where different editions and/or amendments are required by statutory authorities, including, but not limited to, NATA and the National Construction Code including the Building Code of Australia. | |
| **Designation** | **Title** |
| AS 1012(series) | Methods of testing concrete |
| AS 1141(series) | Methods for sampling and testing aggregates |
| AS 1289(series) | Methods of testing soils for engineering purposes |
| AS 1379 | The specification and manufacture of concrete |
| AS 1478.1 | Chemical admixtures for concrete, mortar and grout – Admixtures for concrete |
| AS 2350 | Methods of sampling portland and blended cements |
| AS/NZS 2350.0 | * General introduction and list of methods |
| AS/NZS 2350.1 | * Sampling |
| AS 2758.1 | Aggregates and rock for engineering purposes - Concrete aggregates |
| AS 2876 | Concrete kerbs and channels (gutters) - Manually or machine placed (Withdrawn, Available) |
| AS 3600 | Concrete structures |
| AS 3610.1 | Formwork for concrete - Specifications |
| AS 3972 | General purpose and blended cements |
| AS/NZS 4671 | Steel reinforcing materials |

**NT TEST METHODS AND MANUALS**

NTMTM NT Materials Testing Manual accessible via [https://dipl.nt.gov.au/industry/technical-standards-guidelines-and-specifications/materials-testing-manual](https://transport.nt.gov.au/infrastructure/technical-standards-guidelines-and-specifications/materials-testing-manual)

NTTM NT Test Methods

## General

This section specifies miscellaneous minor concrete works and does not apply to buildings, pavements, or bridges.

## Materials

Provide manufacturer's test certificates for quality of cement, aggregate and reinforcement.

### Cement

Type GP or GB to AS 3972.

Store cement in watertight containers or shelters until used.

Do not mix or store special cement with normal Portland cement.

### Fine Aggregate

Clean, hard, tough, durable, uncoated grains, homogeneous in quality, free from clay, dirt and organic material.

### Coarse Aggregate

Clean, hard, durable, crushed stone or gravel, free from clay, dirt and organic material.

### Water

Clean and free from oil, alkali, organic or other deleterious substances.

### Chemical Admixtures - Hold Point

**Hold Point** - Do not use admixtures without obtaining prior written approval from the Superintendent.

Admixtures and their use must conform to AS 1478.1.

Where two or more chemical admixtures are proposed for incorporation into a concrete mix, their compatibility must be certified by the manufacturers.

Store admixtures in accordance with the manufacturer’s recommendations.

### Reinforcement – Hold Point

Standard: To AS/NZS 4671

Supply, cut, bend and fix steel reinforcement as specified.

Secure reinforcement and bar or mesh reinforcement supports to prevent displacement during construction and concrete placement. Use plastic reinforcement supports.

**Hold Point -** Do not place concrete until the reinforcement has been inspected by the Superintendent.

### Recycled Crushed Glass (RCG)

Clean, hard, durable RCG free from clay, dirt and organic material. Source the material from glass food and beverage containers, drinking glasses, and window (or flat) glass and plain ceramic. Do not use glass from hazardous waste containers, reinforced and laminated glass, light bulbs, fluorescent tubes and cathode ray tubes. The source glass must be free of debris and contaminants such as paper and cardboard, plastic, fabrics, residues from original contents and toxins.

Use RCG conforming to Specifications for Recycled Crushed Glass as an Engineering Material Section 9 available via <http://tucows.nt.gov.au/infrastructure/techspecs/documents/ARRB_specifications_RCG.pdf>

### Under Path Growth Inhibitor

For pedestrian, cycle, and shared paths, where subgrade is above existing natural surface a layer of under path growth inhibitor (UPGI) is to be poured on to the exposed natural surface and be spread, by raking, at a rate of 2.5 kg/m2.

## Concrete

Refer to CONFORMANCE TESTING for sampling frequencies for fresh concrete.

### Ready‑mix Concrete

Unless otherwise specified, Production Assessment in accordance with AS 3600 shall be used.

[Change to Project Assessment for special-class concrete or where more significant structures involved]

Register the project with the concrete supplier for submittal of Production Assessment data and nominate the Superintendent for receipt of this information.

[Delete where Project Assessment used]

Supply concrete with the following properties unless specified otherwise:

|  |  |
| --- | --- |
| **Table – Concrete properties** | |
| **Property** | **Required measure** |
| Compressive strength | N25 |
| Aggregate size, generally | 20 mm |
| Aggregate size, machine extruded kerbs and gutters | 10 mm |
| Slump, generally | 80 mm, + or - 15 mm |
| Slump, machine extruded kerbs and gutters | 40 mm |

[Amend default values above if required for project]

Conduct slump testing on site for each and every truck.

### Job‑mixed Concrete

Use Project Assessment in accordance with AS 3600.

The Contractor will be responsible for sampling and testing.

Provide Project Assessment reports that encompass the period of concrete works.

[Delete where insignificant structures and volumes and/or remote locations are involved]

Provide concrete with properties as specified for ready‑mix concrete.

Determine the quantities of materials to be used by mass or by equivalent dry loose volume.

Provide and maintain gauges for measurement of the materials.

### Addition of Admixtures

Refer to the **Chemical Admixtures** clause in this worksection.

Chemical admixtures may only be added subsequent to slump test compliance confirmation. A further slump test post admixture addition may also be required.

Where Superintendent approval has been granted for the addition of superplasticisers at the plant prior to dispatch of concrete, a slump test of each batch must be performed and recorded by a NATA accredited testing laboratory prior to the addition of the superplasticiser. The slump test report shall record the time of the addition of the superplasticiser, amount of superplasticiser added and product identification.

Do not add chemical admixtures unless the exact amount required is measured using a regularly maintained and calibrated device of the required accuracy.

Make allowance for the reversion time of superplasticisers. Delay the addition of superplasticisers as long as practicable before the concrete is discharged from the mixer.

Agitate concrete for at least 5 minutes following the addition of superplasticiser before dispensing.

## Foundations

Provide a foundation compacted to 90% relative density within 150 mm of the base of concrete.

## Construction

### Kerbs and Gutters

Construct kerbs and gutters as integral units.

### Formwork – Witness Point

Design and construct forms so that they are mortar tight and can be removed without damaging the concrete.

Build forms true to line and braced in a substantial and non‑yielding manner.

**Witness Point -** Do not place concrete until the formwork has been inspected by the Superintendent.

### Placing of Concrete – Witness Point – Hold Point

**Witness Point** - Give the Superintendent sufficient notice so that inspection may be made before and during pouring concrete.

**Hold Point** - Provide verification that all constituent materials, formwork, falsework, reinforcement, reinforcement supports, and environmental conditions comply with all requirements. Do not cast any concrete without that verification.

Do not place concrete if the temperature of the concrete exceeds 35°C, or if the ambient air temperature exceeds 40°C.

Place and compact concrete within the following time after the addition of the mixing water to the mix:

| **Table - Maximum Time To Place Concrete After Mixing** | |
| --- | --- |
| **Concrete Temperature At Time Of Placing** | **Maximum Time**  **(minutes)** |
| 25°C to 28°C | 75 |
| 28°C to 32°C | 60 |
| 32°C to 35°C | 45 |

Place concrete in a continuous operation between construction joints so that the face of the concrete is in a plastic state when succeeding concrete is placed against it.

Do not allow concrete to free‑fall from a height greater than 1.5 metres.

Place all concrete in dry weather unless otherwise approved.

For each truck of premixed concrete provide an identification certificate on delivery listing the information required by AS 1379 and any other particular requirements for special class concrete.

### Jointing

CONSTRUCTION JOINTS

Roughen and clean face of hardened concrete before placing fresh concrete against it. Remove soft material, foreign matter and laitance. Thoroughly moisten the joint surface.

EXPANSION/CONTRACTION JOINTS

Joints to be 10 mm wide over full length and filled with a bitumen impregnated fibrous filler.

Provide vertical transverse expansion/contraction joints as follows:

* Footpaths: 6 m spacing maximum.
* At junctions with other concrete structures
* Inverts: 15 m spacing maximum.
* All other works: As shown on the drawings.

[Ensure these are shown on the drawings]

tooled JOINTS

Provide tooled joints as follows:

* Transverse vertical grooves 20 mm depth minimum.
* Joints at right angles to outer edge of concrete works.
* Footpaths: 2 m spacing maximum.
* Kerbs/Inverts: 3 m spacing maximum.
* All other works: As shown on the drawings.

[Ensure these are shown on the drawings]

### Surface Finishes

Finish surfaces to a smooth and even colour.

Remove free surface water during final screeding of unformed surfaces.

Round off exposed edges and corners.

Protect exposed surfaces from rain until final set has occurred.

Smooth tumbled RCG used as an exposed aggregate surface finish.

Conform to the ***Table - Concrete Finishes***.

| **Table – Concrete Finishes – Part 1 of 2** | | |
| --- | --- | --- |
| **Type** | **Description** | **Application** |
| S1 | Left rough to give key but not honeycombed or porous | Surfaces to be rendered. |
| S2 | Wood float | As specified. |
| S3 | Steel trowel without polish | Internal surfaces subject to foot traffic. Kerb and gutter. |
| S4 | Wood float and broomed finish - broom finish - broom across direction of traffic | Surfaces subject to vehicular traffic. |
| S6 | Steel float followed by moist hair broom | Surfaces subject to foot traffic. |

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| --- | --- | --- |
| **Table – Concrete Finishes – Part 2 of 2** | | |
| **Type** | **Description** | **Application** |
| F1 | Remove mortar fins, etc., repair minor blow holes by bagging where approved or rub down with Carborundum stone | Formed surfaces exposed to view. |
| F2 | Off forms | - |
| F3 | Exposed RCG | Application of RCG to be hand spread once application of the exposed mix has been bull floated.  RCG to be measured 1000 grams per square meter, or as otherwise specified by the Superintendent.  Colour and size of RCG to be specified by Superintendent. |

### Curing

Protect and cure all exposed surfaces immediately after the concrete has taken its initial set.

Maintain all surfaces, including those within loosened formwork, in a moist condition by:

* Flooding, or
* continuous spraying with water, or
* other methods approved by the Superintendent.

Prevent staining during the curing process of all concrete surfaces that will be visible in the completed works.

Continuously maintain the protection and curing of each element for the minimum time specified by AS 3600 to provide the concrete with durability corresponding to the specified exposure classification.

Do not use curing compounds in lieu of moist curing unless approved.

### Backfilling

Backfill areas around the concrete with specified material.

[Select fill may be specified]

Compact the backfilling in layers not exceeding 150 mm compacted thickness.

Reinstate damaged grassed areas with topsoil and grass seed.

## Rain Damage

Remove and replace rain damaged concrete.

## Existing Services – hold point

**Hold point** - Obtain the Superintendent's approval before altering the line or level of existing services.

Place an expansion joint between concrete works and service.

## Conformance

Refer to the DRAINAGE WORKS Section for culvert structures and pits.

Conform to the following:

|  |  |
| --- | --- |
| **Table – Tolerances for Miscellaneous Concrete Works** | |
| **Aspect measured** | **Tolerance** |
| Finished level | + or -15 mm from the specified level |
| Invert level | + or -5 mm from the specified level |
| Straight edge deviation of surface | 3 mm maximum in 3 m |
| 6 mm maximum in 15 m |
| Alignment | + or -10 mm from the specified alignment |
| Chainage at vehicle crossing | + or -150 mm |
| Width of vehicle crossing | + or -25 mm |

## Defective Concrete And Materials

Concrete which is not placed, cured or finished as specified, does not have the specified strength or other specified properties, is not sound, dense, durable or crack‑free will be considered defective.

Bear all cost and delays resulting from the rejection of concrete and subsequent rectification.

Remove the concrete to a point agreed with the Superintendent at which a visually and structurally acceptable construction joint can be made, and the defective element rebuilt.

Repair defective surface finishes if approved by the Superintendent. Approval will not be given if the defective area is too extensive or the techniques proposed are not adequate to ensure a visually acceptable and durable repair.