TS 03617:1.0

Specification

Concrete Sleepers

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Document information

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Document history

Revision	Effective date	Summary of changes
1.0	26/08/2025	This standard is a first issue as TS 03617 and supersedes SPC 232 *Concrete Sleepers*, version 1.2 and UGL Regional Linx standard TS 01098:1.0 (CRN CP 232) *Engineering Specification Concrete Sleepers*.

Preface

This document is a first issue as TS 03617 and supersedes SPC 232 *Concrete Sleepers*, version 1.2 and TS 01098:1.0 (CRN CP 232) *Engineering Specification Concrete Sleepers.*

This document specifies design requirements, performance criteria and type approval process for concrete sleepers in the TfNSW heavy rail network in the MRA and CRN.

The changes from the previous issue includes harmonisation of TS 03617 and TS 01098.

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1 Scope

This specification details requirements for the design, performance criteria and type approval of prestressed concrete sleepers complete with resilient fastenings and insulators.

2 Application

This specification applies to all concrete sleepers used in heavy rail in the MRA and CRN to meet the requirements of TS 03612.

This specification is intended for use by Technically Assured Organisations (TAOs) and is applicable to all of the MRA and CRN. This standard applies to the design of new track work, track renewal work and maintenance of existing track.

This standard is not specifically intended to cover light rail or metro however, the principles of this standard may be applicable to the light rail and metro environments.

Concrete sleepers for special applications, including multi-gauge tracks and turnout bearers, are not covered by this specification.

3 Referenced documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

Australian standards

AS/RISSB 1085.1 *Railway Track Material, Part 1: Steel Rails*

AS/RISSB 1085.14 *Railway track material, Part 14: Prestressed concrete sleepers*

Transport for NSW standards

TS 00172 *Glossary of Track Terms*

TS 03499 (ESC 210) *Track Geometry and Stability*

TS 03510 *Track System*

TS 03612 *Sleepers and Track Support*

TS 03619 *Resilient Fastenings*

UGL Regional Linx standards

TS 01045 *Track Geometry and Stability*

4 Terms, definitions and abbreviations

The following terms, definitions and abbreviations apply in this document in addition to the terms in TS 00172.

CRN Country Regional Network

MRA metropolitan rail area;

OC operating class; track operating classes are specified in TS 03510

RIM rail infrastructure manager; In relation to rail infrastructure of a railway, means the person who has effective control and management of the rail infrastructure, whether or not the person –

(a) owns the rail infrastructure; or

(b) has a statutory or contractual right to use the rail infrastructure or to control, or provide, access to it.

5 Design requirements

The design of concrete sleepers shall be in accordance with AS/RISSB 1085.14 unless otherwise specified in this specification. Fastenings and cast-in inserts shall comply with TS 03619. Rail seat pads and insulators shall be designed and manufactured to provide minimum service lives specified in TS 03619 provided concrete sleepers are installed as face work, where concrete sleepers are replaced systematically one after another.

5.1 Design and performance criteria

Concrete sleepers shall be designed in accordance with Table 1, which provides design information relating to track and rail operations where the prestressed concrete sleepers will be used.

Table 1 – Concrete sleepers design requirements

Criterion	Detail
Sleeper types	Monoblock sleeper, prestressed concrete sleeper cast in a single piece of which there are two types for use with resilient fastenings and insulators as follows: • heavy duty suitable for heavy freight tonnages and axle loads ≤ 30 tonnes • medium duty suitable for general use with axle loads ≤ 25 tonnes.
Track gauge	1435 mm gauge with installation tolerance ±4 mm (refer to TS 03499 for the MRA and TS 01045 for the CRN).
Rail	60 kg/m rail in accordance with AS/RISSB 1085.1 with the capacity to use 53 kg/m rail in accordance with AS/RISSB 1085.1.
Rail cant	All running rails shall slope towards the track centre-line at 1 in 20.

Criterion	Detail
Maximum grade	1 in 33.
Locomotive sanding	Sanding is applied for improved traction on extensive lengths of sharp curves and steep gradients. Concrete sleepers are to be designed to minimise the potential for soffit abrasion and rail seat erosion in the operating environment.
Curve radius	Minimum radius 200 m.
Electric traction	1,500 V dc.
Signalling	Track circuited signalling.
Climate	Temperate.
Nominal distance between axles	1.8 m 30 tonne axle load. 1.7 m 25 tonne axle load. 1.6 m 23 tonne axle load.
Minimum service life	50 years.
Electrical insulation	Rail or sleeper fastening assemblies and sleepers shall ensure a minimum electrical resistance between the running rails of 10 ohms per kilometre of track.
Impact factor	The combined quasi-static and dynamic load factor for medium duty concrete sleepers only is 2.04. For heavy duty concrete sleepers the impact factor in AS/RISSB 1085.14 shall apply.
Rail	60 kg/m rail shall be adopted to calculate the wheel load distribution factor for heavy duty sleepers. 53 kg/m rail shall be adopted to calculate the wheel load distribution factor for medium duty sleepers.
Thermal expansion and contraction	Thermal expansion and contraction forces act on the continuously welded rails with a rail temperature range from –10°C to 75°C about a neutral rail temperature of 35°C.

Maximum train speeds and axle loads shall be in accordance with TS 03510.

Maximum super deficiency for relevant traffic classifications and speed profiles shall be calculated in accordance with TS 03499 in the MRA and TS 01045 in the CRA.

Track geometry assumptions (curvature, gradient, superelevation, cant deficiency and so on) shall be in accordance with TS 03499 in the MRA and TS 01045 in the CRN.

Track configuration and operating requirements shall be as specified in TS 03510 and detailed in Table 2.

Table 2 – Track structure data (for use in conjunction with AS/RISSB 1085.14)

Parameter	Heavy duty concrete sleeper	Medium duty concrete sleeper	Medium duty concrete sleeper
Operating class	OC-2, OC-5	OC-3, OC-4, OC-5	OC-1, OC-6
Nominal ballast depth	350 mm	300 mm	250 mm
Nominal track modulus	30 MPa	30 MPa	25 MPa
Nominal track condition index (TCI)	40 to 45	45 to 50	45 to 50
Axle load	30 tonnes	25 tonnes	21 tonnes
Nominal sleeper centres	600 mm	600 mm	600 mm
Annual tonnage	70 MGT	20 MGT	20 MGT

5.2 Sleeper dimensions

The sleepers shall be designed to conform to the concrete sleeper dimensions in Table 3.

Table 3 – Sleeper dimensions

Parameter	Heavy duty sleepers	Medium duty sleepers
Length	2390 mm – 2500 mm	2390 mm – 2500 mm
Width (at base)	220 mm – 255 mm	220 mm – 255 mm
Depth (centre of rail seat)	230 mm maximum	180 mm maximum
Rail seat area (flat surface)	28,800 mm^2	25,620 mm^2
Rail pad size (for resilient rail clip such as Pandrol e-clip or approved equivalent)	Nominal 148 mm x 180 mm x 7.5 mm (+/- 0.5 mm)	Nominal 148 mm x 180 mm x 7.5 mm (+/- 0.5 mm)
Rail pad size (for resilient rail clip such as Pandrol Fastclip or approved equivalent)	Nominal 148 mm x 180 mm x 10 mm (+/- 0.5 mm)	Nominal 148 mm x 180 mm x 10 mm (+/- 0.5 mm)
Surfaces	Flat (non-curved) excepting the longitudinal top edges shall be rounded to a nominal 10 mm radius	Flat (non-curved) excepting the longitudinal top edges shall be rounded to a nominal 10 mm radius

6 Handling and maintenance performance

Sleepers shall be suitable for efficient transportation on special rolling stock and be stable for stacking on rolling stock or on-site. Medium duty sleepers shall also be suitable for installation by conventional track laying equipment of a type used for partial resleepering.

Trackwork fitted with the concrete sleepers shall be suitable for maintenance with conventional track maintenance equipment. Track maintenance equipment may include tamping machines, track adjustment jacks, track lining machines and fastening insertion or removal equipment.

For the purpose of track adjustment, rails shall move freely on the rail seats. To achieve this movement fastening systems shall be able to be released for the adjustment and re-fastened on completion of the work.

7 System performance

System performance requires the concrete sleeper assembly to function as part of the track structure. The sleeper shall be able to transfer all the relevant track forces generated by train operations and the forces of rail thermal expansion and contraction to the ballast.

Pads shall possess sufficient edge stiffness to prevent the sleeper tilting (about its longitudinal axis) in order to resist longitudinal track forces arising from thermal expansion, contraction and rail creep.

8 Allowance for retrofit

The longitudinal centre line of the sleeper, over the full length of the sleeper excluding the area of fastening, shall have a vertical section of at least 50 mm wide which is clear of any reinforcing steel. This is to allow for the attachment of ancillary equipment including train stops, magnets and so on.

9 Sleeper marking

The following marks shall be permanently displayed on each sleeper:

- mark of manufacturer
- year of manufacture with 50 mm high numbers
- batch number and date stamp
- letters H (for heavy duty) and M (for medium duty) plus a 2-digit identifier issued by the RIM to uniquely identify the sleeper design.

Lettering and marks shall be on the upper surface of the sleeper between the rail seats.

10 Type approval requirements

New concrete sleepers designs shall be tested in accordance with AS/RISSB 1085.14.

The following type approval submission requirements shall apply to new designs of concrete sleepers:

- One set of design calculations which shall include the following:
  - Tendon design stress including strain relaxation.
  - Tendon bond stress including losses from interface bond or anchorage.
  - Concrete strength including shrinkage creep and curing effects.
  - The effects on sleeper strength of manufacturing tolerances (for example, concrete shape and tendon placement) and the design attrition allowance.
- Two sets of fully detailed drawings shall be supplied for each combination of sleeper type, fastening assembly and rail size (60 kg/m and 53 kg/m). The drawing shall detail the following:
  - Tendon type, size and material.
  - Cast in shoulder type, detail and material.
  - Insulator type, detail and material.
  - Clip type, detail and material.
  - Concrete mixture specification and properties.