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CRN CS 230

Standard

Sleepers And Track Support

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Version 1.5	January 2022	TfNSW template applied
Version 2.0	30 January 2022	First full UGLRL release

Table of contents

1. Scope and application

This Standard establishes functional and design requirements, approved configurations, acceptance standards, repair standards for sleepers, turnout bearers, and sleeper fastenings. It also includes requirements for concrete guard rail sleepers and fastening requirements for transoms It is applicable to all Country Regional Network (CRN) main line and siding tracks.

2. References

2.1. Australian and International Standards

AS 1085.3 – Railway Track Material Part 3: Sleeper plates

AS 1085.8 – Railway Track Material Part 8: Dogspikes

AS 1085.13 – Railway Track Material Part 13: Spring fastening spikes for sleeper plates

AS 1085.14 – Railway Track Material Part 14: Prestressed Concrete Sleepers

AS 1085.17 – Railway Track Material Part 17: Steel Sleepers

AS 1085.18 – Railway Track Material Part 18: Screwspikes and threaded inserts

AS 1085.19 – Railway Track Material Part 19: Resilient fastening assemblies

AS 1214 – Hot-dip galvanized coatings on threaded fasteners

AS 1444 – Wrought alloy steels - Standard, hardenability (H) series and hardened and tempered to designated mechanical properties

AS 3818.2 – Timber - Heavy structural products - Visually graded; Part 2: Railway track timbers

Unless otherwise specified, all references relate to the latest standard versions, including amendments and relevant superseding standards.

2.2. CRN documents

CRN CS 200 - Track System

CRN CS 210 – Track Geometry and Stability

CRN CS 220 - Rail and Rail Joints

CRN CS 240 – Ballast

CRN CM 211 – Track Geometry and Stability

CRN CM 223 – Rail Adjustment

CRN CM 231 – Sleepers and Fastenings

CRN CP 231 - Timber Sleepers and Bearers

CRN CP 232 - Concrete Sleepers CRN CP 233 – Steel Sleepers

CRN CP 234 – Concrete Bearers

CRN CP 235 – Steel Turnout Bearers CRN CP 237 – Resilient Baseplates

2.3. Other references

Nil

2.4. Definitions

Definitions of terms used in this standard may be found in CRN Engineering Standard CRN CS 200 “Track System”.

3. Engineering authority

Design and selection of infrastructure detailed in this standard for use on the CRN may only be undertaken by persons who have been granted appropriate Engineering Authority by the Principal Track and Civil Engineer

4. Design & performance criteria

4.1. Track configuration

The configuration of track elements, including sleepers, turnout bearers, and sleeper fastenings is specified in CRN CS 200.

4.2. Sleepers and bearers

This standard has been developed in consideration of the following criteria:

4.2.1. Loading

- Service loads (and dynamic response) including effects of track alignment, maintenance standards, and traffic task.
- Resistance to impact loading (e.g. wheel flats).
- Rail seat loads, sleeper bending moments, rail to sleeper pressure and sleeper to ballast pressure.

4.2.2. Materials

- Sleeper material, type and spacing.

- Sleeper acceptance, inspection and testing requirements, and assessment of effectiveness prior to insertion in track.
- Sleeper life and treatment (e.g. timber preservatives).
- Deterioration of the sleeper material (e.g. rust, concrete reactivity, fungal rot, white ant attack).

4.2.3. Interfaces with other rail infrastructure

- Track circuit requirements.
- Support of point switching equipment where necessary.

4.2.4. Support Requirements

- Track support conditions and deflection criteria.
- Required track modulus.

4.2.5. Performance requirements

- Need to provide resistance to the lateral buckling of the track.
- Need to provide effective support, positioning and restraint of the rail (in conjunction with the rail fastening system).
- Geometric requirements including the length and orientation of bearers in points and crossings structures.

4.3. Fastening assembly design

The factors to be considered in determining rail to sleeper fastening assembly design should include the following:

Loading

- Service loads (and dynamic response) including effects of track alignment, maintenance standards, and traffic task.
- Attenuation of vertical impact loads and vibration.
- Pressure transmitted to the sleeper rail seat, for example the need for sleeper plates on timber sleepers.
- Need to control damage to sleepers by rail seat abrasion.
- Need to restrain longitudinal forces from train movement and thermal effects

Interfaces with other rail infrastructure

- The need to provide electrical insulation where required to enable track circuits to work or to avoid current leakage.

Support Requirements

- Required track modulus.

Performance requirements

- The need to provide effective support, positioning and restraint of the rail (in conjunction with the sleepers and bearers).
- The need to hold rails to gauge and at the correct inclination when subjected to lateral forces caused by vehicle curving, track alignment irregularities and wheelset steering and hunting.
- The need to provide lateral and torsional restraint (in the horizontal track plane) to the rail against buckling in hot weather.
- The need to provide rail longitudinal creep resistance when the rail is subjected to thermal loads and vehicle braking and traction forces.

5. Allowable configurations

Note: Approved non-standard configurations are documented in Appendix 4.

5.1. Selection of sleeper type

Sleeper type shall be selected in accordance with the Track class detailed in CRN CS 200. Approved alternative sleeper types for each Track class are detailed in Table 1 and Table 2. Selection of a different sleeper type may impose requirements for fastening type, rail welding, ballast depth or fastening type. These requirements are detailed in the track element standards referenced in CRN CS 200.

Table 1 – Selection of sleeper type – Main Line

Track Class	Preferred Sleeper Type	Approved Alternatives (Note 2)
1	Concrete	Steel (Note 1), Timber (Note 1)
2	Concrete	Steel (Note 1), Timber (Note 1)
3	Steel (Note 1)	Concrete, Timber (Note 1)
3G	Steel (Note 1)	Concrete, Timber (Note 1)
5	Steel (Note 1)	Concrete, Timber (Note 1)

Table 2 – Selection of sleeper type – Sidings

Track Class	Preferred Sleeper Type	Approved Alternatives (Note 2)
1	Concrete	Steel, Timber
2	Steel	Concrete, Timber
3	Steel	Concrete, Timber

Note 1 – Concrete sleepers shall be installed on a face in transition areas onto fixed assets such as transom top bridges and fixed level crossings level crossings (see Section 5.2)

Note 2 – Alternative sleepers options may only be installed on approval from the Principal Track and Civil Engineer

Alternative sleeper materials may only be used with the approval of the Principal Track and Civil Engineer.

Mixing of sleeper types shall only be permitted in accordance with the requirements of Section 7.

5.2. Transitions

In the case where open track interacts with a more rigid infrastructure (ie track slabs, transom top bridges), the track stiffness at the approaches shall be reviewed to ensure that there is no significant deterioration of track geometry at the interface. To achieve this, the track stiffness should be increases by a factor of 2 every 5 to 10m. Minimum approaches to transitioning track stiffness are detailed in Table 3, further treatment may be required in the form of longer bearer lengths or softening of the fixed structure

Table 3 – Standard transition details – Main Line

Sleeper Material	Timber Turnout Transition Arrangement	Concrete Turnout Transition Arrangement	Track Slab/Transom top bridge etc (note 1) Transition Arrangement
Timber	Nil	Minimum of 8 concrete sleepers in front of switch	• Minimum of 14 concrete sleepers, and • Consideration of resilient fasteners on track slab/transom top bridge, and • Consideration of approach slab or special sleepers

Sleeper Material	Timber Turnout Transition Arrangement	Concrete Turnout Transition Arrangement	Track Slab/Transom top bridge etc (note 1) Transition Arrangement
Steel	Minimum of 8 timber sleepers in front of switch	Minimum of 8 concrete sleepers in front of switch	• Minimum of 14 concrete sleepers, and • Consideration of resilient fasteners on track slab/transom top bridge, and • Consideration of approach slab or special sleepers
Concrete	Minimum of 8 timber sleepers in front of switch	Nil	• Consideration of resilient fasteners on track slab/transom top bridge, and • Consideration of approach slab or special sleepers

Note 1 Principal Track and Civil Engineer approval required

Note 2 There are no Transition requirements for Sidings.

5.3. Timber sleepers

Where timber sleepers have been selected for track maintenance or renewal, the following requirements shall apply.

5.3.1. Selection

For existing applications in ballasted plain track, detailed in CRN CS 200, sleeper size shall meet the requirements of Section 5.3.2 and the standard spacing shall be as detailed in 5.3.4.

For the design of new lines, the beam on elastic foundation (BOEF) analysis may be used to determine sleeper size and spacing.

All timber sleepers shall be inspected for compliance, and passed, by a timber inspector prior to use on the CRN Network in accordance with CRN CP 231.

5.3.2. Size

5.3.2.1 Standard sleeper size

Dimensions and acceptance tolerances for timber sleepers shall be in accordance with the requirements of Table 4.

Table 4 – Timber sleeper dimensions

Parameter	Dimension (mm)	Acceptance Tolerance (mm)
Length	2 440	+75 - 0
Width	230	+25 - 0
Depth	130	+10 - 0
Squareness	90°	±2°

5.3.3. Use

5.3.3.1 New timber sleepers

Sleepers shall be cut from timber species nominated in Groups 1 and 2 of Table 5.

Approval is required from the Principal Tack and Civil Engineer to use species from Group 3.

Treated sleepers are not approved for use.

Sleepers cut from dead timber are not approved for use

Want, wane and sapwood, separately or in combination, is not permitted to exceed 10% of the width of the face in or below the rail seat area.

Table 5 – Approved timber species

Group	Common Name	Botanical Name
Group 1	Ironbark Grey	E. Siderophloia
Group 1	Ironbark Grey	E. Paniculata
Group 1	Ironbark Grey	E. Drepanophylla
Group 1	Ironbark Red (Broad Leaved)	E. Fibrosa
Group 1	Ironbark Red (Narrow Leaved)	E. Crebra
Group 1	Ironbark Red	E. Sideroxylon
Group 1	Gum Slaty or Box Slaty	E. Dawsonii
Group 1	Box White	E. Albens
Group 2	Box Grey	E. Microcarpa
Group 2	Box Grey	E. Moluccana
Group 2	Tallow Wood	E. Microcorys
Group 2	Gum Grey	E. Punctata
Group 2	Gum Grey	E. Propinqua
Group 2	Gum Forest Red	E. Tereticornis
Group 2	Mahogany White	E. Acmeniodies

Group	Common Name	Botanical Name
Group 3	Gum River Red	E. Camaldulensis
Group 3	Blackbutt	E. Pilularis

5.3.3.2 Recycled timber sleepers

Recycled timber sleepers (i.e. sleepers that have previously been used in track) may not be used on main lines with the following exceptions:

- Sleepers are fitted with plates for resilient fastenings, and
- Sleepers have been assessed as having a minimum remaining life of 5 years at the new location, and
- The connection between the plates and the sleeper is sound with no evidence of plate movement.

Recycled sleepers may be used in crossing loops and in sidings under the following conditions:

- Sleepers have been assessed as having a minimum remaining life of 5 years at the new location.

5.3.4. Spacing

5.3.4.1 Spacing in open track

The spacing is defined as the distance between the centrelines of the sleepers. Steel and Timber sleeper shall be spaced during construction in accordance with “Sleeper Spacing” and the applicable “Acceptance Tolerance” specified in Table 6. At completion of construction activities, the sleeper spacing shall be evenly spaced and comply with the “Tolerance Limit” specified in Table 6.

Table 6 – Timber and steel sleeper spacing - ALL Track (mainline & sidings)

Track Class	Sleeper Spacing (mm)	Acceptance Tolerance (spacing or skew) (mm) (Note 1) (Note 2)	Tolerance Limit No. of sleepers/rail length (m)
1	600(Note 3)	± 20(Note 4)	25/15 (±50mm)
2	600(Note 3)	± 20 (Note 4)	25/15 (±50mm)
3/3G	623(Note 3)	± 20 (Note 4)	24/15 (±50mm)
5	610(Note 3)	± 20	25/15 (±50mm)

Note 1 Installation tolerance for new track or face resleepering only.

Note 2 Skew is the variation from square from one side of the sleeper to the other

Note 3 Except at rail joints (See Section 5.3.4.2)

Note 4 Up to 50mm for spacing to allow for missing a thermit weld (only over two sleepers) Permissible sleeper spacing for existing track is detailed in CRN CM 203.

5.3.4.2 Spacing at rail joints

Spacing of sleepers at rail joints in plain ballasted track shall meet the requirements detailed in Table 7.

Table 7 – Timber and steel sleeper spacing at joints

Rail (Kg/m)	Design Spacing (mm)	Acceptance Tolerance (mm)
53 Insulated	430	± 20
53 Mechanical	510	± 20
Bonded Insulated Joints (any rail size)	600	± 20
All Others	510	± 20

On certain lighter sections of track where angle fishplates are used, it may be necessary to adjust the sleeper spacing at joints to ensure dogspikes can be correctly located at the fishplate.

All sleepers shall be flat adzed when used with sleeper plates.

5.3.4.3 Spacing at bridge ends with ballast log

Spacing of rail support (sleepers, abutment and transoms) at transom topped bridge ends shall be adjusted in accordance with Table 8 - Support spacing at bridge ends

Table 8 – Support spacing at bridge ends

Track Class	Design Spacing (mm)	Acceptance Tolerance (mm)
All classes – New bridge structures	600	± 20
All classes – Existing bridge structures	600 preferred up to 900 subject to approval of Principal Track and Civil Engineer	± 20

5.3.5. Boring requirements in timber sleepers, transoms and bearers

Sleepers, transoms and bearers shall be bored to match the track plates used in the approved configuration. The patterns for sleeper plates using dogspikes, lockspikes, dogscrews and lockscrews are detailed in Appendix 3.

Hole sizes shall be as detailed in Table 9. Holes shall be bored completely through the timber.

Table 9 – Fastening hole diameters

Fastening type	Hole diameter (mm)
Dogspikes	21 ± 0.5
Lockspikes	16 ± 0.5
Dogscrews	17 ± 0.5
Lockscrews	14 ± 0.5
27 mm dia Screwspikes	25 ± 0.5
24 mm dia Screwspikes	18 ± 0.5
22 mm dia Screwspikes	18 ± 0.5

5.3.6. Proximity of plates to sleeper and bearer ends in turnouts

The outer end of sleeper plates shall, normally, be located no closer than 200mm to the end of timber sleepers or bearers. The District Engineer may approve a reduction to no less than 50mm in constrained situations at turnouts and special trackwork.

5.4. Steel sleepers

Steel sleepers are approved for installation in all classes of track in CRN. Steel sleepers are not approved for use in curves ≤ 200m radius. The steel sleeper design in AS 1085.17 is not valid in this range.

Where steel sleepers have been selected for track maintenance or renewal, the following requirements shall apply.

5.4.1. Selection

There are four types of steel sleepers as detailed in Table 10 below.

The sleeper type chosen for installation will depend on the operational requirement as detailed in CRN CS 200 and the current and future requirements for track circuiting.

Sleeper type shall be selected in accordance with Table 10.

Table 10 – Selection of steel sleeper type

Steel Sleeper Type	Application	Insulation	Minimum Approved configuration
1	Class 1 lines with ≥ 10MGT per year of 25t axle load traffic where NO track circuits are or may be provided	No	M8.5 (OneSteel)
1C	Class 1 lines with ≥ 10MGT per year of 25t axle load traffic where track circuits are or may be provided.	Yes	M10 (OneSteel)
2	All lines where type 1 sleepers are not required and where NO track circuits are or may be provided	No	M7.5 (OneSteel)
2C	All lines where type 1 sleepers are not required and where track circuits are or may be provided.	Yes	M8.5 (OneSteel)

Only approved products shall be used as sleepers, fastenings and insulators. Approved products are detailed in Appendix 1. Alternatively the steel sleeper system, including fastenings, may be approved by the Principal Track and Civil Engineer if it complies with the requirements of CRN Engineering Specification CRN CP 233 “Steel Sleepers”.

5.4.2. Size

The sleepers shall be designed to conform to the dimensions detailed in Table 11.

Table 11 – Steel sleeper dimensions

Parameter	Dimensions
Length	2500 mm
Width (at base)	250 - 260 mm
Width (at seat)	150 - 160 mm
Depth	95 - 100 mm

5.4.3. Use

Steel sleepers may be installed:

- In a face in long sections or in a full curve,
- Interspersed with timber sleepers as PRS
- As replacements for isolated timber sleepers

Conditions may be applied to their use. These are detailed in this section

Steel sleepers are different to timber and concrete sleepers. They rely on the ballast in the sleeper “pod” to add to their effective mass. Because of this the amount of and degree of compaction of the ballast in the pod is critical to the sleeper’s in-service performance

Steel sleepers shall be insulated where track circuits are present e.g. at approaches to level crossings with active protection.

Where one or more rails are to carry signalling current then both rails shall be insulated. Insulated sleepers shall comply with the insulation requirements specified in CRN CP 233.

Even with insulators fitted, contamination by conducting material around the fastenings or under the rail can cause signalling problems. This includes locations:-

- where contaminants regularly invade the track area (coal, minerals, mud, clay, dirt etc) - locations where the track is continually wet

Where these conditions exist in track circuited areas, steel sleepers shall not be used.

Steel sleepers are not recommended for use in locations where corrosion/ chemical damage is likely to be a problem. Such locations may include:-

- Slag ballast
- Areas of frequent sanding (e.g. steep grades)
- Areas of high salinity
- Continually wet or moist areas such as some tunnels or some types of level crossings
- Areas where corrosive materials invade the track area (coal, minerals, mud, clay dirt etc.)

Steel sleepers are not recommended for use in the following situations

- Where the ballast/ formation is poor and where deflection under load is high
- At locations where track dynamic forces are high, such as at joints or where the inherent rail surface condition is poor.

In such situations the stable bond between the sleeper and the ballast cannot be maintained.

Steel sleepers shall not be used as transoms

Steel sleepers shall not be used at permanent mechanical rail joints (i.e. one sleeper each side of the joint). Steel sleepers that have been welded, cut or otherwise altered from an approved design shall not be used.

Steel sleepers that have been bent or otherwise damaged by derailment or extraction process may be reused on sidings and lines carrying <3MGT (on curves >1000m radius and tangent rack) subject to the following requirements:

- Engineering inspection and assessment in accordance with CRN Engineering Manual CRN CM 231 “Sleepers and Fastenings”.

- They may be installed at intervals no closer than 1 in 2.

Where steel sleepers are to be reused the extent to which their fatigue life has been used up shall be considered. Guidelines for the assessment of fatigue life are contained in CRN CM 231.

Gauge widening is not required for steel sleepers used in low radius curves.

The full extent of any curves shall be resleepered in all cases (e.g. all timber, all steel, all concrete, all interspersed timber and steel etc.)

Steel sleepers shall not be interspersed with concrete sleepers unless approved as part of a strategy to upgrade the track to be 100% concrete sleepered.

Steel sleepers may only be interspersed with timber sleepers in LWR track where they are in accordance with a specific strategy developed in accordance with the guidelines in Section 7 and approved by the Principal Track and Civil Engineer.

Where steel sleepers are being installed leading into a fixed structures (such as transom top bridges, fixed level crossings and track slabs) to transition the track stiffness (see Section 5.2).

5.4.4. Compatibility with rail type

Steel sleepers shall only be used with rail sizes up to and including the size for which they have been designed and tested in accordance with CRN CP 233. Spacers may be used to provide adjustment so that more than one rail size can be accommodated.

Current approved steel sleeper types are able to accommodate variations in rail size as detailed in Table 12 - Hole punching and spacer selection in plain track and Table 13 below.

Table 12 – Hole punching and spacer selection in plain track

	M10*	**M8.5***	**M7.5***	**M7.5***
	M10 NI 60 M10 I 53 *	**M8.5 NI 53 M8.5 I 53 ***	**M7.5 NI 53 ***	**M7.5 NI 47 ***
Punched for foot size	146	146	146	127
Used without spacers for	60kg(Note 1) 53kg (+ equivalents)	60kg(Note 1) 53kg (+ equivalents)	60kg(Note 1) 53kg (+ equivalents)	50kg 47kg (+ equivalents)
Used with spacers for		47kg (+ equivalents)	50kg 47kg (+ equivalents) 41 kg (+ equivalents) 31kg (+ equivalents)	

* Sleeper type (OneSteel configuration)

NI = Non insulated

I = Insulated

Note 1 - It is not desirable to install 60kg rail on steel sleepers

Table 13 – Hole punching and spacer selection at Bonded Insulated Joints

	M10*	**M8.5***
	M10 I 53*	**M8.5 I 53***
Used without spacers for	60kg (Note 1) 53kg (+ equivalents)	60kg (Note 1) 53kg (+ equivalents) (NOT 100AS (1928))
Used with spacers for		100AS (1928) 47kg (+ equivalents) 41 kg (+ equivalents)

* Sleeper type (OneSteel configuration)

Note 1 - It is not desirable to install 60kg rail on steel sleepers

The term “equivalent” in Table 12 - Hole punching and spacer selection in plain track and Table 13 above relates to equivalent rail foot sizes as detailed in CRN CS 220. The selection of lock in shoulder, insulator (where required) and spacers (where required) is largely dependent on rail head dimensions. Selection of combinations of sleeper, lock in shoulder, insulator and spacers for individual rail sizes is detailed in CRN CM 231.

Where sleepers are to be used for rail sizes less than 47kg/m, then the sleeper systems to be used shall be adjustable to accommodate future rail upgrading to 53kg/m (or larger size) unless otherwise approved by the Principal Track and Civil Engineer.

5.4.5. Spacing

Steel sleepers shall be spaced in open track in accordance with the requirements of Table 6 and at rail joints in accordance with Table 7.

5.4.6. Anchors

Steel sleepers are attached to the rail with resilient fasteners that provide resistance to rail creep. Steel sleeper resilient fasteners typically provide at least equivalent creep resistance to fair type anchors. Fair type anchors shall be replaced against timber sleepers after PRS to restore the preexisting anchor pattern or, a minimum of one in three sleepers anchored (including both fair type anchors or resilient fasteners) whichever is greater.

5.5. Concrete sleepers

CRN CP 232 “Concrete Sleeper” details design requirements and type approval for design of new concrete sleepers.

Where concrete sleepers have been selected for track maintenance or renewal, the following requirements shall apply.

5.5.1. Selection

There are two types of concrete sleepers

- Heavy Duty - suitable for heavy freight tonnages and axle loads up to 30 tonnes or for providing greater lateral stability
- Medium Duty -suitable for general use with axle loads ≤ 25 tonne.

Only approved designs shall be used. Approved designs are detailed in Appendix 1

For existing applications, all new concrete sleepers shall meet the requirements of CRN Engineering Specification CRN CP 232 “Concrete Sleepers”.

5.5.2. Size

The sleepers shall be designed to conform to the dimensions detailed in Table 14.

Table 14 – Concrete sleeper dimensions

Parameter	Heavy Duty	Medium Duty
Length	2390 - 2500mm	2390 - 2500mm
Width (at base)	220 - 255 mm	220 - 255 mm
depth (centre of rail seat)	230mm maximum	180mm maximum
Rail seat area (flat surface)	28800mm^2	25620mm^2

5.5.3. Use

Concrete sleepers are only approved for installation with 53 and 60kg rail.

On sharp curves <400m radius where Pandrol e3003 clips are installed, heavy duty insulators shall be used for new installations and for replacement of insulators. Heavy duty insulators are not required with 'Fastclip' installations.

Where concrete sleepers are used as replacement sleepers within existing sections of concrete sleepers they shall reasonably match adjacent sleepers in dimensions and capacity.

transitional requirement for concrete sleepers adjacent to fixed structures and turnouts with timber bearers is detailed in Section 5.2.

Concrete sleepers may only be interspersed with timber sleepers where they are in accordance with a specific strategy developed in accordance with the guidelines in Section 7 and approved by the Principal Track and Civil Engineer.

5.5.4. Spacing

5.5.4.1 Spacing in open track

Concrete sleepers shall be spaced during construction in accordance with “Sleeper Spacing” and the applicable “Acceptance Tolerance” specified in Table 15 and Table 16. At the completion of construction activities, the sleeper spacing shall be evenly spaced and comply with the “Tolerance Limit” specified in Table 15 and Table 16.

Table 15 – Concrete sleeper spacing – Design Spacing

Track Class	Sleeper Spacing (mm)	Tolerance (spacing or skew) (mm) (Note 1)	Tolerance Limit No. of sleepers/rail length (m)
ALL mainline track	600	± 20 (Note 2)	25/15 (±50mm)

Table 16 – Concrete sleeper spacing – Maximum spacing (Sidings ONLY)

Track Class	Sleeper Spacing (mm)	Tolerance (spacing or skew) (mm) (Note 1)	Tolerance Limit No. of sleepers/rail length (m)
≤25T Axle load	720	± 20	21/15 (±60mm)
>25T Axle load	600	± 20	25/15 (±50mm)

Note 1 Installation tolerance for new or face resleepering of track sections

Note 2 Up to 50mm for spacing to allow for missing a thermit weld (only over two sleepers) Permissible sleeper spacing for existing track is detailed in CRN CM 203.

5.5.4.2 Spacing at bonded insulated joints in open track

Spacing of concrete sleepers at bonded insulated joints shall be 600mm (± 20mm).

5.6. Concrete guard rail sleepers

Concrete Guard Rail Sleepers are concrete sleepers that have been designed to allow attachment of guard rails inside the running rails in accordance with site specific designs.

Only approved designs shall be used. Approved designs are detailed in Appendix 1.

Selection, use and spacing shall be in accordance with similar requirements for concrete sleepers in Section 5.5.

5.7. Timber turnout bearers

The following requirements shall apply to the use of timber turnout bearers

5.7.1. Selection

The size and spacing of timber bearers for points and crossing structures may be designed using the beam on elastic foundation analysis (BOEF) similar to that used for sleepers, however the following additional considerations may be necessary:

- Allowance for additional length of timber bearers over standard sleepers.
- Allowance for centrifugal forces through curved pairs of rail.
- Allowance for forces and moment induced from points motors and other such equipment

For existing applications, all new timber turnout bearers shall meet the requirements of CRN CP 231

5.7.2. Timber bearer size

Dimensions of timber turnout bearers shall be selected as follows:

- Width – 250mm
- Depth – 150 and 180mm for general application

  200mm for bearers on which points motors will be attached.

  Boxed heart timber bearers are only approved for use in depths of 180mm and 200mm.
- Length – The minimum length of timber bearers shall be calculated as the measurement from the “Outside” gauge face to “outside” gauge face at the point at which the bearer is to be installed + 1.2m. The length shall be rounded up to match the next available size for the selected bearer depth in Table 17

The minimum dimensions for turnout switch and crossing timbers shall be in accordance with the requirements specified in Table 17.

Table 17 – Timber turnout bearer dimensions

Width (mm)	Depth (mm)	Standard Timber Lengths Turnouts and Crossovers (m)
250	150	2.8, 3.0, 3.2, 3.4, 3.6, 3.8
250	180	2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.8, 6.0, 6.2, 6.4
250	200	2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.8, 5.0, 5.2,

The dimensional tolerances shall be in accordance with Table 18.

Table 18 – Tolerances on timber bearer dimensions

Parameter	Tolerance
Length	+ 50 mm / - 0 mm

Parameter	Tolerance
Width	+ 25 mm - 0 mm
Depth	+ 10 mm / - 0 mm
Squareness	±2°

5.7.3. Usage

5.7.3.1 New timber turnout bearers

Turnout bearers shall be cut from timber species nominated in Groups 1 and 2 of Table 19.

Treated bearers are not approved for use.

Sleepers cut from dead timber are not approved for use

Want, wane and sapwood, separately or in combination, is not permitted to exceed 10% of the width of the face in or below the rail seat area.

Table 19 – Approved timber species

Group	Common Name	Botanical Name
Group 1	Ironbark Grey	E. Siderophloia
Group 1	Ironbark Grey	E. Paniculata
Group 1	Ironbark Grey	E. Drepanophylla
Group 1	Ironbark Red (Broad Leaved)	E. Fibrosa
Group 1	Ironbark Red (Narrow Leaved)	E. Crebra
Group 1	Ironbark Red	E. Sideroxylon
Group 2	Box Grey	E. Microcarpa
Group 2	Box Grey	E. Moluccana
Group 2	Tallow Wood	E. Microcorys
Group 2	Gum Grey	E. Punctata
Group 2	Gum Grey	E. Propinqua
Group 2	Mahogany White	E. Acmeniodies

5.7.3.2 Recycled timber bearers

Recycled timber bearers (ie bearers that have previously been used in track) may not be used on Class 1, 2, 3 or 3G main lines.

Recycled bearers may be used in Class 5 track and in crossing loops and in sidings in all classes of track under the following conditions:

- timbers have been assessed as having a minimum remaining life of 5 years at the new location.

5.7.4. Spacing

Nominal spacing of timber turnout bearers shall be 600mm. Variation of spacing to suit turnout requirements is permitted up to a maximum of 700mm (except at mechanical joints or mechanical insulated joints where the maximum is 600mm). Spacing shall not be less than 500mm.

5.8. Concrete turnout bearers

5.8.1. Selection

Only approved designs shall be used. Approved designs are detailed in Appendix 1

For existing applications, detailed in CRN CS 200, all new concrete turnout bearers shall be designed and manufactured in accordance with the requirements of CRN Engineering Specification CRN CP 234 “Concrete Bearers”.

5.8.2. Concrete bearer size

Limiting dimensions of concrete turnout bearers shall be selected as follows:

- Width – 240 – 300mm
- Depth – 220 – 300mm
- Length – Varies 2.5m to 7.5m

The dimensional tolerances for approved designs shall be in accordance with Table 20.

Table 20 – Tolerances on concrete bearer dimensions

Dimension	Tolerance
Length	+ 10 mm / - 5 mm
Width	± 3 mm
Depth	± 3 mm

5.8.3. Spacing

Nominal spacing of concrete turnout bearers shall be 600mm. Variation of spacing to suit turnout requirements is permitted up to a maximum of 700mm. Spacing shall not be less than 500mm

5.9. Steel turnout bearers

5.9.1. Selection

Only approved designs shall be used. For existing applications, detailed in CRN CS 200, all new steel turnout bearers shall be designed and manufactured in accordance with the requirements of CRN Engineering Specification CRN CP 235 “Steel Turnout Bearers”

5.9.2. Steel bearer size

Limiting dimensions of steel turnout bearers shall be selected as follows:

Width – 250 – 300mm

Depth – 95 – 200mm

Length – Varies 2.5m to 7.5m

The dimensional tolerances for approved designs shall be in accordance with Table 21.

Table 21 – Tolerances on steel bearer dimensions

Dimension	Tolerance
Length	+ 10 mm / - 5 mm
Width	± 3 mm
Depth	± 3 mm

5.9.3. Spacing

Nominal spacing of steel turnout bearers shall be 600mm. Variation of spacing to suit turnout requirements is permitted up to a maximum of 700mm. Spacing shall not be less than 500mm

5.10. Fastening systems

Resilient or non-resilient fastening systems shall be selected to suit the sleeper type and in accordance with the following requirements

5.10.1. Non-resilient fastening assemblies

Non resilient fastening systems are only approved for use with timber sleepers.

The assembly generally consists of:

- Sleeper plates - These shall be double shouldered and shall provide a nominal rail cant of 1 in 20 towards the centre of the track (except in special circumstances such as turnouts), and
- Dogspikes - 2 (two) 22 mm round shank dogspikes (or approved equivalent) per sleeper plate, and
- Spring fastening spikes - 2 (two) 16mm lockspikes (or approved equivalent) per sleeper plate shall be used.

Note: Double shouldered sleeper plates are not manufactured for 31kg/m (60lb/yard rail). On Class 5 lines where 60lb/yard rail is installed, re-punched second hand single shoulder plates shall be used if available. If not available, or where sleepers are placed at rail joints where angle fishplates are used, sleeper plates cannot be installed. In such cases, dogspikes are driven directly into the sleeper. Lockspikes are not used.

Non resilient fastening assembly components shall be designed and manufactured to conform to the appropriate Australian Standard as detailed in Table 22.

Table 22 – Australian standards for non-resilient fastening assemblies

Component	Standard
Fastenings – dogspikes (and equivalent fastenings) lockspikes (and equivalent fastenings) screw spikes	 AS 1085.8 AS 1085.13 AS 1085.18
Sleeper plates	AS 1085.3

Only approved fastenings and configurations shall be used. Approved non resilient fastenings are detailed in Appendix 1. Approved configurations are detailed in Table 24, Table 25, Table 26 and Table 27.

5.10.2. Resilient fastening assemblies

For timber sleepers and turnout bearers, the assembly generally consists of:

- Sleeper plates - These shall be double shouldered and shall provide a nominal rail cant of 1 in 20 towards the centre of the track (except in special circumstances such as turnouts), and
- Resilient rail clips - 2 (two) Pandrol clips (or approved equivalent) per sleeper plate, and
- Spring fastening spikes - 4 (four) 16mm lockspikes (or approved equivalent) per sleeper plate.

For steel sleepers, the assembly generally consists of:

- Lock-in shoulders, and
- Resilient rail clips - 2 (two) Trak-lok clips (or approved equivalent) per rail seat, and

- Spacers (where required), and
- Insulators (where required),

For concrete sleepers, the assembly generally consists of:

- Cast in shoulders - These are integral to the design of the sleeper, and
- Resilient rail clips - 2 (two) Pandrol clips (or approved equivalent) per rail seat, and - Insulators, and - rail seat pads.

For concrete turnout bearers, the assembly generally consists of: -

Base plates, and

- Screwspikes - 4 (four) 24mm screwspikes (or approved equivalent) per plate, and - Resilient rail clips - 2 (two) Pandrol clips (or approved equivalent) per rail.

Resilient Fastening design shall be in accordance with the requirements detailed in AS 1085.19.

Resilient fastening assembly components shall be designed and manufactured to conform to the appropriate Australian Standard as detailed in Table 23.

Table 23 – Australian standards for resilient fastening assemblies

Component	Standard
Fastenings – clips lockspikes screw spikes	 AS 1085.19 AS 1085.13 AS 1085.18
Sleeper plates	AS 1085.3
Threaded Inserts	AS 1085.18
Cast-in components	AS 1085.19

Only approved fastenings and configurations shall be used. Approved resilient fastenings are detailed in Appendix 1

Approved configurations for timber sleepers and turnout bearers are detailed in Section 0.

Approved configurations for steel sleepers are detailed in Section 5.10.4

Approved configurations for concrete sleepers are detailed in Section 5.10.5.

5.10.3. Fastenings for timber sleepers and bearers

Standard configurations of fastening assemblies for timber sleepers and turnout bearers are detailed in Table 24, Table 25, Table 26 and Table 27. Special arrangements apply for the fastening of chairs to A and B timber bearers in turnouts. These are detailed in Table 30, Table 31 and Table 32.

Table 24 – Timber sleeper fastening configuration - Non Resilient - Main Lines

Track Class	Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes(Note 2) No per Plate
1	2 Dogspikes (Note 1)	DF 30	2
2	2 Dogspikes (Note 1)	DF 10	2
3	2 Dogspikes (Note 1)	DF 10	2
3G		DF 30	2
5 (rail size 53. 47, 41kg) (Note 6)	2 Dogspikes (Note 1)	DF 10 (41,47kg) DF 30 (53)	2
5 (rail size 31kg) (Note 7)	4 Dogspikes (Note 1)	Nil	Nil

Table 25 – Timber sleeper fastening configuration - Non Resilient - Sidings

Track Class	Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes(Note 2) No per Plate
1	2 Dogspikes (Note 1)	DF 30	2
2	2 Dogspikes (Note 1)	DF 10	2 (curves only)
3	2 Dogspikes (Note 1)	Nil	Nil

Table 26 – Timber sleeper fastening configuration - Resilient – Main Lines

Track Class	Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes(Note 2) No per Plate
Class 1 and 2	2 Resilient E2003	DF 62 & cast plates	4
3	TBA		
3G	2 Resilient E2003	DF 62	4
ALL classes - For existing installations ONLY CANNOT be reinstalled when sleeper is replaced	2 Resilient E1853	Reformed plates	2 lockspikes + 2 Gauge lockspikes (or approved alternatives) (Note 3)
Turnouts in ALL classes	2 Resilient	Appropriate baseplates	4
Transoms in ALL classes	2 Resilient E2003	DF 62 & cast plates	4 (Note 4)
Transoms in ALL classes	2 Resilient	Type ISP95098 plates	4 X 24mm screw spikes (Note 4)

Track Class	Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes(Note 2) No per Plate
Insulated Joints in ALL classes	Low profile clips e1627 (timber)	DF 62	4

Table 27 – Timber sleeper fastening configuration - Resilient – Sidings

Track Class	Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes(Note 2) No per Plate
ALL classes	2 Resilient E2003	DF 62	4
ALL classes - For existing installations ONLY CANNOT be reinstalled when sleeper is replaced	2 Resilient E1853	Reformed plates	2 lockspikes + 2 Gauge lockspikes (or approved alternatives) (Note 3)
Turnouts in ALL classes	2 Resilient	Appropriate baseplates	4

Note 1 Round shank dogspikes or approved alternative fastenings may be used. Approved alternatives are detailed in Section 5.10.7 and Appendix 1

Note 2 Lockspikes (L6) or approved alternative fastenings may be used. . Approved alternatives are detailed in Section 5.10.7 and Appendix 1

Note 3 Gauge lockspikes are approved for existing installations only and shall not be used in new installations. They CANNOT be re-installed when a sleeper is replaced.

Note 4 In track circuited areas, where one of the spikes would cause shorting to the underframe of a steel underbridge, 3 (three) screw spikes per plate may be used on curves ≥300m radius, preferably with the two screw spikes on the gauge side of the rail.

Note 5 Non resilient fastenings on transoms should be upgraded to resilient fastenings when transoms are renewed

Note 6 Double shoulder sleeper plates shall be installed where 53, 47 or 41kg/m rail has been installed on Class 5 lines.

Note 7 On Class 5 lines with 31kg/m (60lb/yard) rail, re-punched single shoulder sleeper plates shall be used if available. Otherwise sleeper plates shall not be installed and sleepers shall be cant adzed (1:20)

5.10.4. Fastenings for steel sleepers

Standard configurations of fastening assemblies for steel sleepers are detailed in Table 28.

Table 28 – Steel sleeper fastening configuration

Sleeper Design	Fastening Type No. per Plate/ Rail	Connection
All designs	2 Track-Lok	2 lock-in shoulders

5.10.5. Fastenings for concrete sleepers and bearers

Resilient fastening systems shall be used with concrete sleepers and bearers.

Conforming fastening systems shall use Pandrol E-2003 clips, Fastclip or other approved alternatives.

Rail pads of nominal 7.5mm thickness for E-clip fastenings and 10mm thickness for Fastclip fastenings shall be used.

Resilient fastenings are interchangeable for 53 and 60kg rail sections.

Standard configurations of fastening assemblies for concrete sleepers and turnout bearers are detailed in Table 29.

Table 29 – Concrete sleeper fastening configuration

Sleeper Design	Fastening Type No. per Plate/Rail
Medium Duty (Low Profile)	2 Resilient E2003 or 2 Fastclip FC1507
Heavy Duty	2 Resilient E2003 or 2 Fastclip FC1507

5.10.6. Resilient fastenings on welded track (LWR and CWR) on bridges

5.10.6.1 Transom top steel openings with spans less than 18m (centre of bearings)

On bridges where resilient fastenings are installed, normal resilient fastenings shall be installed on the entire length of each span.

5.10.6.2 Transom top steel openings spans 18m long and greater, but less than 80m.

On bridges where resilient fastenings are installed, normal resilient fastenings shall be installed on one third of the span from the fixed end and Zero Load Restraint (ZLR) assemblies installed on the remaining two thirds of the span. Where spans are located on curves <400m radius, advice on fastening requirements shall be obtained from the Principal Track and Civil Engineer.

Provision shall be made for play at the movable end of a bridge for the guard rail "V" to expand and contract (depending on length). This can be achieved when using MDFC concrete termination sleepers by setting the lock-in shoulders 6mm clear of the nose end rail. ZLR assemblies are used to secure the guardrail nose ends, allowing limited movement.

5.10.6.3 Steel bridge spans >80m

Steel bridge spans longer than 80m should be considered for expansion switches.

On bridges where resilient fastenings are installed, normal resilient fastenings shall be installed on the entire length of each span.

5.10.7. Alternative and special configurations

5.10.7.1 Pandrol clips at insulated joints

Special low profile pandrol clips shall be used at insulated joints in 53 & 60Kg rails to eliminate contact between clips and fishbolts.

The clips are:

- For concrete sleepers and bearers - ‘e’1629 or Fastclip FC1507
- For timber sleepers and bearers - ‘e’1627

Clearances are compromised with the low profile clips in timber bearers with type PZ 147 and type 1 baseplates. Any clips that may become foul may be removed as long as sufficient fastenings retain in place to retain gauge security.

5.10.7.2 Steel sleepers at insulated joints

Use modified clip JB296 with insulation pad 2218 for steel sleepers around insulation joints. The lock in shoulder has various options depending on sleeper and rail size. Refer to sizing selection charts in CRN CM 231.

5.10.7.3 Approved alternatives to dogspikes and lockspikes

The Pandrol (AJAX) Dogscrew and Lockscrew are approved alternatives to dogspikes and lockspikes respectively. They may be installed with the approval of the District Engineer.

The Dogscrew consists of a 19mm threaded shank with a 22mm shoulder below the flange. On top of the flange is a 6-lob head designed to fit an E24 drive socket.

The Lockscrew consists of a 16mm threaded shank with a flange and 6 lob head, the same as the Dogscrew. There are two types of Lockscrew:

- Small flange – for general use

- Large flange – for use with the automatic magnet pickup machine used by production gangs. This type cannot be used on rolled Pandrol plates because of the flange interferes with the rolled shoulder and does not sit flush on the plate.

5.10.7.4 Resilient baseplate assemblies

Resilient baseplate assemblies may be used as an alternative to standard base plates on timber sleepers, transoms and bearers, concrete sleepers and bearers and for direct fixation track applications in the following applications:

- bridges where noise and / or vibration reduction is required,
- ballasted track where noise and / or vibration reduction is required,
- direct fixation track where noise and / or vibration reduction is required, and
- at interfaces between ballast and non-ballasted track where graded changes in track stiffness are required

Only approved designs shall be used. Approved designs are detailed in Appendix 1.

All new Resilient Baseplate assemblies shall be designed and manufactured in accordance with the requirements of CRN Engineering Specification CRN CP 237 “Resilient Baseplates”.

5.10.7.5 Holding down bolts for timber bearers

Table 30 – A & B Timber Bearer fastening configuration - New Installations

60kg/m steelwork	Screwspikes
Other rail sizes	Holding down bolts or approved equivalent swage fastenings

Table 31 – A & B Timber Bearer fastening configuration - For Repair/ Replacement

60kg/m steelwork	If the screwspikes are no longer able to provide adequate grip or if timber quality is suspect use holding down bolts or approved equivalent swage fastenings
Other rail sizes	Holding down bolts or approved equivalent swage fastenings

Table 32 – A & B Timber Bearer fastening configuration - For non-interlocked points

All rail sizes	Screwspikes

5.10.7.6 Zero Load Restraint (ZLR) assemblies

Zero Load Restraint assemblies allow longitudinal rail movement whilst retaining gauge and limiting upward movement of the rail. They shall be used in accordance with Section 5.10.6. Approved designs are listed in Table 33 and detailed in Appendix 1.

When used in conjunction with resilient baseplate assemblies, special configurations are required to fit the dimensional restrictions of the baseplate.

Table 33 – Zero Load Restraint assemblies

Configuration type	Assembly	Components
Standard baseplates (with lockspikes or screwspikes)	Pandrol PMP 41027 for AS60kg rail	ZLR Cap 41027 Clip e2079
Alternative 1 resilient baseplates	Pandrol 12730 for AS60kg rail	ZLR Cap 12731 Clip e2079 Insulator IN55088 5 mm Rail Pad RP-65026
"Delkor Egg" resilient baseplates	Pandrol 12730 for AS60kg rail	ZLR Cap 12731 Clip e2079 Insulator IN55088 5 mm Rail Pad RP-65026

6. Prohibited configurations

The following configurations are not permitted for permanent works on CRN trackwork:-

- Non-resilient fastening systems with 60kg/m rail
- Non-resilient fastening systems with concrete sleepers or steel sleepers
- Steel sleepers mixed with concrete sleepers
- Resilient and non-resilient fastenings on the same sleeper
- Resilient fastenings on more than 1 in 3 sleepers in LWR track (unless a management strategy has been approved by the Principal Track and Civil Engineer in accordance with the requirements detailed in Section 7.)

7. Mixed configurations

There are some limitations and special requirements when configurations are mixed. They are applicable to existing track on the CRN network ONLY.

7.1. Mixing concrete and timber sleepers

Concrete sleepers may be interspersed with timber sleepers in accordance with the following guidelines. Interspersing:

- must be part of an approved line strategy, not ad hoc
- may only be used with Medium Duty sleepers, and on line sections where medium duty sleepers may be used
- must lead eventually to 100% concrete
- may be installed to a standard pattern of 1:2, 1:3 or 1:4 but with variation of one sleeper position to suit local conditions
- whole curves shall be resleepered and reasonable lengths of tangent track should be done to a consistent pattern
- is not suitable for jointed track beyond the limits detailed in Section 7.3.1 for timber sleepers.
- may be used in patterns of 1:3 and 1:4 in poor ballast conditions, but more than this may only be used in track where design concrete sleeper ballast depth is achieved and ballast is free draining.

7.2. Mixing steel and timber sleepers

Steel sleepers may be interspersed with timber sleepers in accordance with the following requirements:

Minimum tie patterns are detailed in Table 34. Denser tie patterns may be used to address sleeper fatigue and fastening failure issues.

Table 34 – Minimum Tie Patterns for steel sleepers in timber sleepered track

Track Class	Curvature - MGT/year	Curvature - < 400m Radius	Curvature - <600m radius	Curvature - >600m radius & tangent track
1		1 in 4 (Note 2)	1 in 4	1 in 4 (Note 3)
2	≥ 2	1 in 4	1 in 4	1 in 4(Note 3)
2	<2	1 in 4	1 in 6	1 in 6
3, 5		1 in 4	1 in 6	1 in 6

Note 1: A variation in the tie placement of one sleeper is still considered to be to pattern as long as the pattern is generally maintained (e.g. 1 in 4 would allow odd sleepers to be 3rd or 5th sleeper) excepting that clumping should be avoided.

Note 2: Steel sleepers not recommended. Concrete sleepers preferred as they provide better lateral stability. If steel sleepers are installed, use a denser tie pattern.

Note 3: may be extended to 1 in 6 if sleeper condition permits.

When undertaking planned PRS sleeper replacement shall be planned to meet “clumping requirements detailed in Table 35

Table 35 – Clumping” of steel sleepers

Track Class	General Steel Sleeper Pattern	2 together	≥3 together
1, 2	1 in 2	Permitted	Permitted
1, 2	1 in ≥3	Not recommended	Prohibited
3,3G	1 in 2	Permitted	Permitted
3,3G	1 in ≥3	Permitted	Prohibited
5	1 in ≥2	Permitted	Permitted
Sidings	1 in ≥2	Permitted	Permitted

Where face renewal is normal practice at special locations such as level crossings, this practice is exempt from clumping requirements.

Single sleepers may be installed as required

A track length is considered “face resleepered” (not clumped) when the rail length with 100% steel sleepers reaches 110m on straights or the full curve (TP to TP) in curved track.

This also applies to shorter lengths of face resleepering on “whole” structures e.g. ballast top bridges and level crossings.

7.3. Mixing resilient and non-resilient fastenings

7.3.1. In track with Loose Rail

There are no restrictions on the installation of resilient fastened timber or steel sleepers mixed with non-resilient fastened timber sleepers in track with loose rail.

7.3.2. In LWR track

Sleepers with resilient fastenings must NOT be interspersed with timber sleepers with non-resilient fastenings in LWR where this would result in them being more frequent than 1 in 3 unless a management strategy has been approved by the Principal Track and Civil Engineer in accordance with the following guidelines.

- Where sleeper installation is part of a PRS program, rail adjustment of the rail section (110m minimum) shall be checked and corrected. Consideration should be given to conversion of LWR to CWR in these circumstances.
- Before achieving an average pattern of 1 in 2 resilient fastenings the rail length shall be converted to CWR.

- Where individual sleepers are being installed to replace failed sleepers, free up rail stresses in the local area by releasing adjacent non-resilient fastenings and anchors and destressing the rail (see CRN Engineering Manual CRN CM 223 “Rail Adjustment for method”). This should be done at Rail Neutral Temperature.
- Record locations so they are identified for special attention during Track Examination and Welded Track Stability Analysis
- Apply additional controls e.g. extra ballast, additional anchors etc., Reduce other Welded Track Stability issues to a minimum. See CRN Engineering Manual CRN CM 211 “Track Geometry and Stability” for guidance.

7.3.3. In CWR track

- Timber sleepers with resilient fastenings may only be interspersed with timber sleepers with non-resilient fastenings in CWR track where they are in accordance with a specific strategy and provided a consistent tie pattern is maintained (e.g. 1 in 2, 1 in 3 etc.).
- Where backcanting is evident in timber sleepers with non-resilient fastenings, replacement with -resilient fastenings shall meet the minimum tie patterns detailed in Table 36 to avoid clip breakage:

Table 36 – Minimum resilient fastening patterns in backcanted track

Tie Pattern	Limit of backcanting (mm) - DS Plates	Limit of backcanting (mm) - Resilient Plates
1 in 3	3	5
1 in 2	6	10

Where backcanting is ≥ 8mm, complete renewal in resilient fastenings may be required to prevent clip breakage.

8. Changing configurations

The following configurations are not desirable. Renewal strategies should be directed to their elimination:

- Timber sleepers on curves < 400m radius on CWR track
- Steel sleepers on curves <400m radius on CWR track
- Non--resilient fastenings in timber sleepers on CWR track
- Resilient fastened track on transom topped steel bridges with spans >18m that does not meet the requirements of Section 5.10.6 relating to the installation of Zero Load Restraint fastenings.

9. Acceptance standards

9.1. General

Acceptance standards for condition and installation of sleepers, bearers and fastenings shall be as detailed in Sections 5, 6 and 7. The following additional requirements apply.

9.2. Sleeper plates

Acceptance Standards for re-use of sleeper plates shall be as follows

- DO NOT use reformed pandrol plates, old pattern plates or single shoulder plates
- DO NOT use any sleeper plates with evidence of excessive corrosion, notch marks or oxyacetylene burn marks on the rail seat, shoulder or at spike holes.
- DO NOT use any sleeper plates with shoulders that are worn to a sharp edge.
- DO NOT use any sleeper plates with cracks
- DO NOT use any sleeper plates with plate underside concavity or convexity greater than 1mm.
- DO NOT use any sleeper plates with lockspike holes wider than 19 mm at bottom surface.
- DO NOT use any sleeper plates with dogspike holes wider than 25.5 mm at bottom surface.
- DO NOT use any sleeper plates with rail seat width greater than 150 (+1) mm.

9.3. Installation of steel sleepers

All sleepers in the area covered by a steel sleeper installation program shall be resurfaced at the completion of the installation process. This includes new and existing steel and timber sleepers.

Following resurfacing

- the height of the ballast in the sleeper pods shall be such that the gap between the underside of the sleeper deck and the ballast in the sleeper pod shall be ≤ 25mm.
- The ballast within the sleeper shall be “tight”
- Deflection of steel and timber sleepers under normal traffic loadings should be consistent and no more than 5mm,
- There should be no cyclic top or line in evidence

The method of measurement is detailed in CRN CM 231

The ballast profile for steel sleepers shall meet the minimum standards in CRN Engineering Standard CRN CS 240 “Ballast”. Extra ballast may be placed on the outside of the sleeper ends but shall be no higher than the superelevated rail height.

Track geometry shall comply with the geometry maintenance limits specified CRN Engineering Standard CRN CS 210 “Track Geometry and Stability”.

10. Repair standards

10.1. Timber sleepers and bearers

Timber sleepers and bearers may be cross-bored (once only on each side of each rail) if they are otherwise sound

10.2. Concrete sleepers

Cast in-situ shoulders may be replaced using an approved process. Approved processes are detailed in Appendix 2.

10.3. Fastenings

Sleeper fastening components may be repaired using an approved process. Approved processes are detailed in Appendix 2

A.1. Appendix 1 Approved sleeper and fastening products

Approvals for products (Appendix 1) and repair processes (Appendix 2) are dependent on both the manufacturer and supplier. If either changes, the product approval may no longer be valid. Seek advice from the Principal Track and Civil Engineer.

Product Approval Numbers are shown for all products approved by UGLRL CRN. Other products listed were approved for use on CRN prior to January 2012 and have been accepted by UGLRL CRN.

Non-Resilient Fastenings

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 CV0046205	Greg Sewell Forgings ARSC

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 Dwg CV0046205	Greg Sewell Forgings ARSC
	Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 Dwg CV0046205	Greg Sewell Forgings
	Gauge Lockspike	Spike, track, square shank lock type L6, XS1070	AS 1085.13	Greg Sewell Forgings
	Lockspike	Spike, track, square shank lock type L1, , XS1070	AS 1085.13	Greg Sewell Forgings
	Dogscrew	DogScrew 22mm Shouldered; 9mm Thick Flange; Galvanised	Ajax Fasteners Dwg No SRSG19.135 19/10/04	Cold Forge Pandrol
	Lockscrew	LockScrew 16mm; Galvanised	Ajax Fasteners Dwg No TLSB16.125 10/11/03	Cold Forge Pandrol
	Screw spike	Spike, track Screw spike; 27mm dia 165mm long. For timber, galvanized	AS 1085.18 Dwg CV0024139 or 205A-374	Cold Forge
	Screw spike	Spike, track Screw spike; 24mm dia; 122mm long; galv; For half polymer/concrete sleepers and 90mm nylon insert; galvanized to as 1214	SRA Dwg 885-067b or Delkor Dwg HSR-602e	Cold Forge

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Screw spike	Spike, track Screw spike; 24mm dia; 165mm long; galv; For concrete sleepers; Galvanized to AS 1214	SRA W&W 205a-381b or Delkor Dwg HSR-602d	Cold Forge
	Screw spike	Spike, track Screw spike; 24mm dia		Cold Forge
	Washer, lock	25mm ID; 46mm OD; 6mm thick; high tension double helical spring type;fe6; Galvanized to AS 1214	Delkor Dwg DSW - 01	Cold Forge
	Screw spike	Spike, track Screw spike; 22mm dia; 150mm long; galv; For timber sleepers; city underground; Galvanized to AS 1214	RSA Consult. Dwg 885-066b	Cold Forge

Resilient Fastenings

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
CRN 018	Track-Lok II Clip	Track-Lok II – for use with steel sleepers Part No. B296	Dwg 2116-14A or CRN CC000044	Liberty Onesteel
CRN 018	Track-Lok II Clip	Track-Lok II – for use with steel sleepers at BIJs Part No. JB296	Dwg 2118-2A or CRN CC000291	Liberty Onesteel
CRN 018	Lock in shoulder	Track-Lok II – for use with steel sleepers Part No.2406 / 2410 / 2411	Dwg 2410-8 or CRN CC000046	Liberty Onesteel

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
CRN 018	Lock in shoulder	Track-Lok II - for use with steel sleepers Part No.2408	Dwg 2408-10B or CRN CC000074	Liberty Onesteel
CRN 018	Lock in shoulder	Track-Lok II – for use with steel sleepers Part No. 2409	Dwg 2409-10B or CRN CC000045	Liberty Onesteel
CRN 018	Lock in shoulder	Track-Lok II – for use with steel sleepers Part No. 2425	Dwg 2425-1B or CRN CC000284	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2509	Dwg 2509-2B or CRN CC000048	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2518	Dwg 2518-0A or CRN CC000289	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2519	Dwg 2519-0A or CRN CC000290	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2528	Dwg 2528-3B or CRN CC000287	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2545	Dwg 2545-0B or CRN CC000050	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2552 (gauge side), Part No. 2551 (field side)	Dwg 2551-3B or CRN CC000052	Liberty Onesteel
CRN 018	Steel sleeper spacers	Track-Lok spacers - Part No. 2554 (gauge side), Part No. 2553 (field side)	Dwg 2553-0B or CRN CC000051	Liberty Onesteel
	Pandrol Clip E series	Rail clip Type e2003; 20 mm dia; 106 mm l; 103 mm w; material XK 9261b; AS 1444;	Dwg e-21027	Pandrol

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Pandrol Clip E series	Rail clip E1600 series; timber sleeper insulated Joints; painted red; 16 mm dia; 100 mm l; 85 mm w; type e1627	Dwg e16-20002	Pandrol
	Pandrol Clip E series	Rail clip E1600 series; concrete insulated Joints; painted blue; 16 mm dia; 100 mm l; 85 mm w; type e1629	Dwg e16-20021	Pandrol
	Pandrol Clip E series	Rail clip E1829 series;18mm dia;98mm lg;90mm w; 52.5mm 47mm heel;54mm toe; steel; black; (non insulated joints on timber sleepers);	Dwg e18-20002	Pandrol
	Pandrol Clip E series	Rail clip e2079 series; 20mm dia; 106mm l; 102.5 mm w; material XK 9261b; AS 1444	Dwg e-21108	Pandrol
	Pandrol Zero Load Restraint (ZLR) Plate	Zero Load Restraint Plate 41027 to suit 60kg rolled steel sleeper plate and e2079clip.	PMP-41027	Pandrol
	Pandrol Zero Load Restraint (ZLR) Cap	Plate, ZLR Cap 12731 to suit 60kg Delkor Cologne Egg	Pandrol 12730	Pandrol

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Fastclip FC1507	Pandrol fastclip; type FC1507; silicomanganese spring steel XK9261b with plastic toe insulator	Pandrol FC 1507 and Pandrol 8494	Pandrol
	Fastclip type FC1509	Pandrol fastclip; type FC1509; silicomanganese spring steel XK9261b with toe insulator 10293 (white) and Sidepost Insulator 10292 (white)	Dwg No 10291	Pandrol
	Sliding shoulder head	For concrete guard rail sleepers; e-clip fastening (multilok system); to suit 4760kg rail	Amatek Rocla Dwg SSP 1456	Pandrol
	Rail clip, railway	Track; tunnel clips; scheridised;		Pandrol
	Rail Clip, Railway	'A' Clip for guardrails, SG Iron	Delkor S.85.745	Pandrol

Pads and Insulators

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
CRN 018	Rail Insulated pad for steel sleepers	Track-Lok insulators – Part No. 2212	Dwg 2211-10A or CRN CC000054	Liberty Onesteel
CRN 018	Rail Insulated pad for steel sleepers	Track-Lok insulators – for use with BIJs Part No. 2218	Dwg 2217-8A or CRN CC000288	Liberty Onesteel

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Rail Insulator	Insulator, rail 2 piece: composite insulator in-55058 with a slope of 1 in 45; including cover Plate in-55057;125mm long x 54mm w; 53/60kg rail;	Pandrol In-55061	Pandrol
	Insulator, rail, concrete sleeper	Glass reinforced nylon insulator ;for use with concrete sleeper having pandrol eclip fastenings;to suit 53/60kg rails	Pandrol In-55088	Pandrol
	Rail Insulator	Insulator, rail, concrete sleeper Dual function spacer/insulator for use with 47kg rail in 60kg rail seat;glass reinforced nylon;		Pandrol
	Rail Insulator	G.R.H. Insulator to suit insulated joint Assemblies; 108mm long x 40mm w x 20mm h; 53/60kg rail;	Pandrol In-55186	Pandrol
	Rail Insulator side post Fastclip	Pandrol side post insulator type 7551; for use with concrete sleeper having Pandrol Fastclip fastenings	Pandrol 7551	Pandrol
	Rail Insulator toe Fastclip	Pandrol toe insulator type 8494;for use with concrete sleeper having Pandrol Fastclip fastenings	Pandrol 8494	Pandrol
	Rail Insulator	Heavy duty insulator assembly type hda2; 8mm pad x 110mmw;	Pandrol In-55185	Pandrol
	Rail pad	Rail pad, railway Fabreeka/rubber;190mm lg x 170mm w x 7mm thk		Pandrol

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Rail pad	Grooved;HDPE plastic;180mm w x 186mm lg x 7.5mm thk; black; for 53/60kg rail/ concrete sleeper;		Pandrol
	Rail pad	163mm wide x 180mm long x 7.5mm thick; HDPE.; Used with 53kg and 60kg rails	Pandrol RP-65184C	Pandrol
	Rail pad	190mm wide x 190mm long x 5mm thick; H.D.P.E.; Used with 53kg and 60kg rails	Pandrol RP-65026	Pandrol
	Rail pad	Pandrol HDPE rail pad; type 8853; for use with concrete sleeper having pandrol e-clip fastenings	Pandrol 8853	Pandrol
	Rail pad Fastclip	Pandrol HDPE rail pad;type 9154;for use with concrete sleeper having pandrol fastclip fastenings	Pandrol 9154	Pandrol

Sleeper plates

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Sleeper Plate Screwspike	Screw spike; clip type; 146mm rail base; 1 in 20 cant; cat no 086s;	Pandrol isp95086	Pandrol Cold Forge ARSC
	Sleeper Plate Clip type	Clip type; 4hole; 146mm rail base; 1 in 20 cant; cat no 486;	Pandrol ISP95486	Pandrol Cold Forge ARSC
	Sleeper Plate dogspike	Double shoulder type; 127 mm rail base; 1 in 20 cant; Cat no 430;	BHP 2705 127dstb-df10	Pandrol Cold Forge ARSC
	Sleeper Plate dogspike	Double shoulder type; 146mm rail base; 1 in 20 cant; cat no 420;	BHP 2706 146dstb-df30	Pandrol Cold Forge ARSC

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Sleeper Plate Clip type	Clip type; 6hole; 127mm rail base; 1 in 20 cant;	Pandrol isp-95064	Pandrol Cold Forge ARSC
	Sleeper Plate Screwspike	Screw spike; clip type; 148mm Rail base; 1 in 20 cant; cat no 054	Pandrol ISP95054	Pandrol Cold Forge ARSC
	Sleeper Plate Clip type	Screwspike clip type; 148mm rail base; 1 in 20 cant; cat no 098s; bridge type;	Pandrol ISP95098	Pandrol Coldforge ARSC
	Sleeper Plate Clouth alternative 1	Clouth alternative 1; 60kg rail; cast Ironrubber; sound damping, double Shouldered 1:20 cant, end holes at 130mm centres	Delkor RF 0. 02 192 CLA	Delkor
	Sleeper Plate Clouth alternative 1	Clouth alternative 1; 60kg rail; cast Ironrubber; sound dumping, double Shouldered 1:20 cant, end holes at 95mm centres	Delkor RF 0.10.092 CL	Delkor
	Sleeper Plate Clouth alternative 1	Clouth alternative 1; 60kg rail; cast Ironrubber; sound damping, double Shouldered 1:20 cant, side holes	Delkor RF 0.29.092 CLA	Delkor

Timber Sleepers

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Timber Sleeper	Sleeper, railway Timber; unbored; 230mm x 130mm x 2440mm ironbark or approved hardwood	AS 3818.2	

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Timber Sleeper	Sleeper, railway Timber; 230mm x 130mm x 2440mm lg; bored 47kg/80lb AS "A"; ironbark or approved hardwood	AS 3818.2	
	Timber Sleeper	Sleeper, railway Timber; 230mm x 130mm x 2440mm; Bored; 53kg new pattern; Ironbark or approved hardwood	AS 3818.2	
	Timber Sleeper	Sleeper, railway Timber; 230mm x 130mm x 2440mm; Bored for Pandrol fastenings	AS 3818.2	
	Timber Sleeper	Timber, Dog Screw, new pattern, 230mm x 130mm x 2440mm, Bored	AS 3818.2	
	Timber Sleeper	Timber, Dog Screw, Pandrol pattern, 230mm x 130mm x 2440mm, Bored	AS 3818.2	

Steel Sleepers

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
CRN 018	M7.5 Non-insulated (AS47)	Steel – 7.5mm thick 1435mm gauge Non-insulated Track Lok II fastening system – Part No. 7.5SG12105TSS (NSW)	AS 1085.17 Dwg 12105-2A or CRN CC000286	Liberty Onesteel
CRN 018	M7.5 Non-insulated (AS53)	Steel – 7.5mm thick 1435mm gauge Non-insulated Track Lok II fastening system – Part No. 7.5SG2072TSS (NSW)	AS 1085.17 Dwg 2072 4A or CRN CC000060	Liberty Onesteel

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
CRN 018	M8.5 Non-insulated (AS53)	Steel - – 8.5mm thick 1435mm gauge Non-insulated Track Lok II fastening system – Part No. 8.512142TSS (NSW)	AS 1085.17 Dwg 12142-1A or CRN CC000061	Liberty Onesteel
CRN 018	M8.5 Insulated (AS53)	Steel - – 8.5mm thick 1435mm gauge Insulated Track Lok II fastening system – Part No. 8.5SG12125TSS (NSW)	AS 1085.17 Dwg 12125-1A or CRN CC000062	Liberty Onesteel
CRN 018	M10 Non-insulated (AS60)	Steel - 10mm thick 1435mm gauge Noninsulated Track Lok II fastening system – Part No. 10SG12126TSS (NSW)	AS 1085.17 Dwg 12126-1A or CRN CC000063	Liberty Onesteel
CRN 018	M10 Insulated (AS53)	Steel - 10mm thick 1435mm gauge Insulated Track Lok II fastening system – Part No. 10SG12195TSS (NSW)	AS 1085.17 Dwg 12195-1A or CRN CC000064	Liberty Onesteel

Concrete Sleepers

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Concrete Sleeper Medium Duty Fastclip (MDFC), 25T	Concrete; Medium duty low profile 25t axle load; Pandrol Fastclip fastening system; mass 232kg	AS 1085.14 Dwg 91750	Rocla
	Concrete SleeperMedium Duty E-clip (MDEC), 25T	Concrete; Medium duty low profile 25t axle load; Pandrol e2003 fastening system; mass 232kg	AS 1085.14 Dwg 90744	Rocla
	Concrete Sleeper Heavy Duty E-clip (HDEC), 30T	Concrete;Heavy Duty Type 5 30t axle load; Pandrol e-clip fastening system; mass 285kg;	AS 1085.14 Dwg 90699	Rocla

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Concrete Sleeper Heavy Duty Fastclip (HDFC), 30T	Concrete; Heavy Duty 30t axle load; Pandrol Fastclip fastening system; mass 285kg	AS 1085.14 Dwg 91749	Rocla
	Concrete Sleeper Type 6M 30t E-clip	Concrete; Type 6M 30t axle load; 20 wire Pattern; Pandrol e2003 fastening system; (mass 275kg);	AS 1085.14	Rocla
	Concrete Sleeper track circuit Fastclip	Concrete; track circuit sleeper; Medium duty 25t axle load; Pandrol Fastclip fastening	AS 1085.14	Rocla
	Concrete Sleeper Heavy Duty E-clip (HDEC), 30T	Concrete;Heavy Duty 30t axle load; Pandrol e-clip fastening system; mass 285kg;	AS 1085.14 Dwg 217-20S-E-C	Austrak
	Concrete Sleeper Heavy Duty Fastclip (HDFC), 30T	Concrete; Heavy Duty 30t axle load; Pandrol Fastclip fastening system; mass 285kg	AS 1085.14 Dwg 217-20S-F-C	Austrak
	Concrete Guardrail Sleeper Heavy Duty E-clip (HDEC) 30T No.1 to No. 6	Concrete, Heavy Duty E-clip Guardrail sleeper, GR1 to GR6, 30T axle load, Pandrol E-clip fastening system	AS 1085.14 Dwg 91935	Rocla
	Concrete Guardrail Sleeper Medium Duty E-clip (MDEC) 25T No. 1 to No. 6	Concrete, Medium Duty E-clip Guardrail sleeper, GR1 to GR6, 25T axle load, Pandrol E-clip fastening system	AS 1085.14 Dwg 91933	Rocla
	Concrete Guardrail Sleeper Heavy Duty Fastclip (HDFC) 30T No. 1 to No. 6	Concrete, Heavy Duty Fastclip Guardrail sleeper, GR1 to GR6, 30T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14 Dwg 91936	Rocla

Product Approval No.	Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
	Concrete Guardrail Sleeper Medium Duty Fastclip (MDFC) 25T No. 1 to No. 6	Concrete, Medium Duty Fastclip Guardrail sleeper, GR1 to GR6, 25T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14 Dwg 91934	Rocla
	Concrete bearer	Concrete bearer, FLAT 1, 30T, 8 ferrules cast in for cant reducing sleeper plates	AS 1085.14 Dwg 785-576	Rocla
	Concrete Guardrail Bearer	Concrete Guardrail Bearer, Type AGR1 to AGR7 for “Alternative 1” sleeper plates under running rail, ‘A’ clips hold the guardrail	AS 1085.14 Dwg 785-030 / 785-031	Rocla
	Concrete Guardrail Sleeper Heavy Duty Fastclip (HDFC) 30T No. 1 to No. 6	Concrete, Heavy Duty Fastclip Guardrail sleeper, GR1 to GR6, 30T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14 Dwg 217-20S-F-GA Dwg 217-20S-F-GR1 - 6	Austrak

A.2. Appendix 2 Approved repair processes

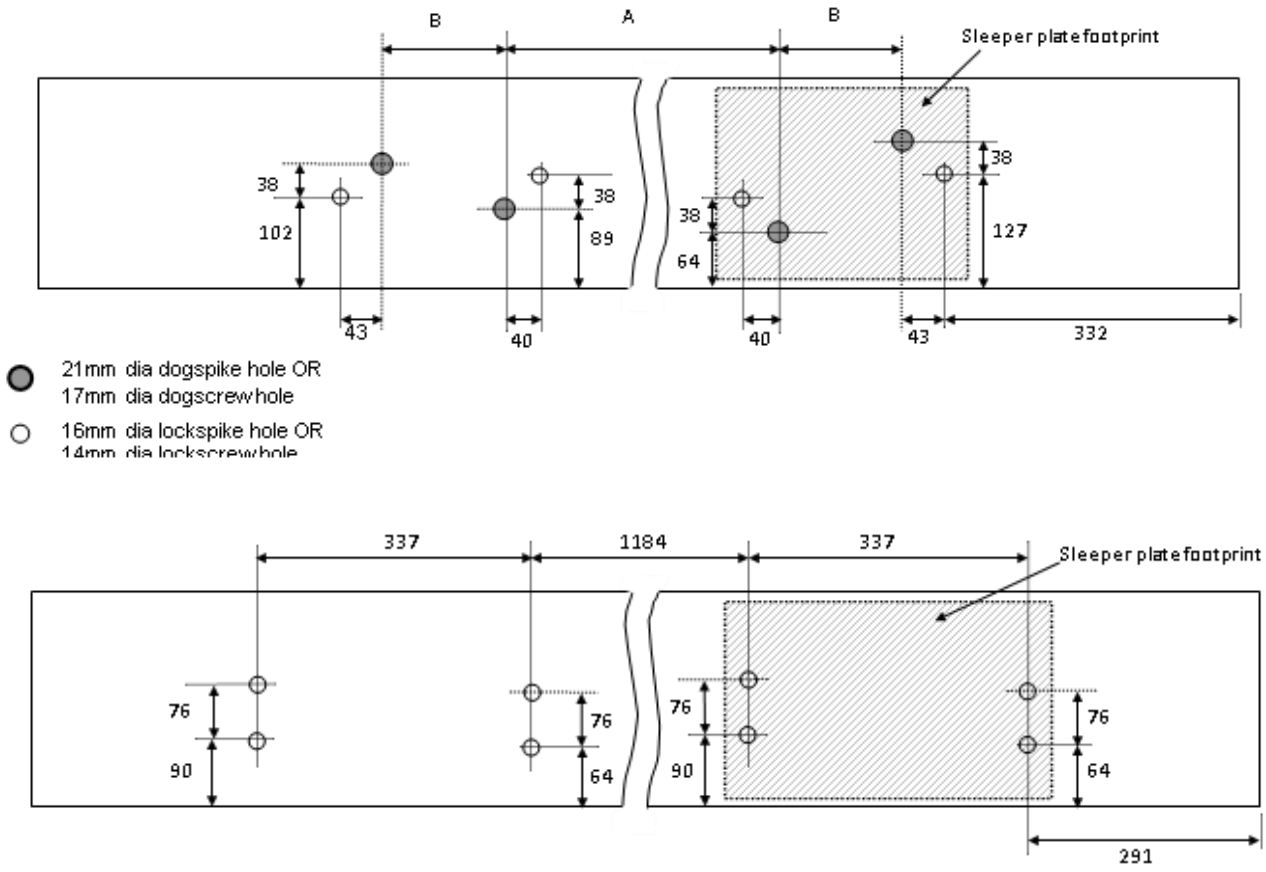
Product Approval No.	Repair Item	Description	Standard/ Drawing	Manufacturer/ Supplier
	Pandrol Cast in shoulders	Epoxy concrete repair of damaged concrete shoulders		Pandrol
	Pandrol Fastclip shoulders	Welded repair of Fastclip cast-in shoulder components		Pandrol

A.3. Appendix 3 Sleeper boring patterns

Rail Section	Plate Cat No.	A (mm)	B (mm)	Comment
53 kg	DF 30 New Pattern	1348	171	Lockspike and dogspike arrangement is a mirrored and inverted image of Old Pattern
53 kg	DF 30 Old Pattern	1348	171	
100lb AS	DF 30 Old Pattern	1348	171	
100lb AS 1916	DF 10 Old Pattern	1354	171	
AS 50, AS 47, 90lb 1925/28, 80lb AS 'A' 1928	DF 10	1366	152	
90lb AS 1916		1346	162	Unplated. i.e. not on tapered base or cant adzed and no lockspike holes
				Unplated. i.e. not on tapered base or cant adzed and no lockspike holes
90 'J' 1913		1343	162	Unplated. i.e. not on tapered base or cant adzed and no lockspike holes
80lb AS 'B' 1928, A, A1,2&3		1346	152	Unplated. i.e. not on tapered base or cant adzed and no lockspike holes
71½lb 'D' 1875		1346	146	Unplated. i.e. not on tapered base or cant adzed and no lockspike holes
60lb AS 1916, AS 'A', AS 'B'		1365	133	Unplated. i.e. not on tapered base or cant adzed and no lockspike holes

For can't adzed increase 'A' by 6mm

'A' dimension based on tapered base sleeper plates except for unplated All dimension tolerance are + - 1mm.



A.4. Appendix 4 Approved special configurations

The following configurations are approved variations from standard configurations. They are applicable to the nominated locations only. When due for replacement they shall be replaced by standard configurations.

Configuration Type	Approved variation	Location	Controls	Original Waiver
Concrete sleepers	Reduction in MDFC sleeper shoulder tilt tolerance	Where installed in CRN	• Only for MDFC sleepers produced by Rocla Braemar in 2002 and installed before 15/1/2012	CCW 12/001 15/01/2012
Steel sleepers	Use of 53kg/m insulated steel sleepers on 80A rails	Yanco to Griffith 659km to Griffith	• Monthly visual inspection. • Monitor geometry conditions by track geometry recording car. • Check the sleeper fastenings for signs of movement or wear.	CCW 12/007 15/01/2012

Configuration Type	Approved variation	Location	Controls	Original Waiver
Steel sleepers	Retain steel sleepers at mechanical joints	The Rock to Boree Creek 554.100km to 607.840km	• For previously installed sleepers only • Steel sleeper type marked as • 53.60BJ13S drawing 12287-0-A, • Sleeper spacing at joints to be managed in accordance with limits and responses CRN CM 203 C5-5.1 (At a joint) for track speed of 50km/hr (i.e. 60km/hr band). • Indications of poor performance e.g. fastenings breaking/loosening; to be advised to Engineering.	CCW 15/022 17/09/2015
Steel Sleepers	Use of non-compliant M7.5 sleepers	Parkes Yard No. 3, 4, 5 & 6 Down Sidings	• Populate maximo with locations • Locations of poor performance are to be advised to Engineering	CCW 18/026 13/12/2018