

Engineering Standard

Track

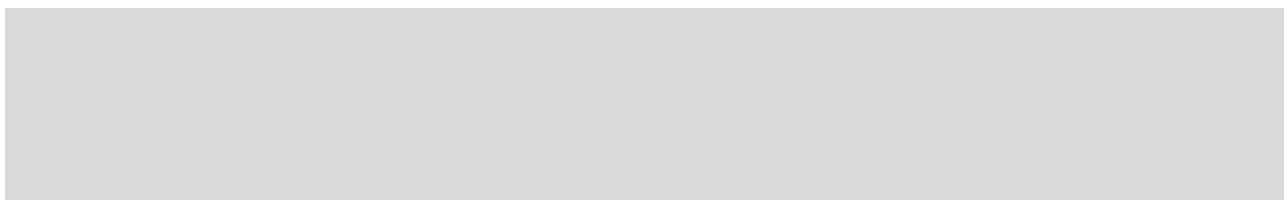
OTCS 230

SLEEPERS AND TRACK SUPPORT

Version 1.0

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1.0	August 2018	First Issue. Includes content from the following former RIC standards: C 2501, C 3108, C 3109, C 3110, C 5200, BI 1126, TS 3101, TS 3306, TS 3341, TS 3342, TS 3397, CSI 018, CTN 04/06, CTN 04/17, TS 20 540 3 01 and CRN CS 230

Summary of changes from previous version

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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 main line and siding tracks.

2 References

2.1 Australian and International Standards

AS 1085.3 -2002: Railway Track Material Part 3: Sleeper plates

AS 1085.8 -2002: Railway Track Material Part 8: Dogspikes

AS 1085.13 -2002: Railway Track Material Part 13: Spring fastening spikes for sleeper plates

AS 1085.14 -2003: Railway Track Material Part 14: Prestressed Concrete Sleepers

AS 1085.17 -2003; Railway Track Material Part 17: Steel Sleepers

AS 1085.18 -2003: Railway Track Material Part 18: Screwspikes and threaded inserts

AS 1085.19 -2003: Railway Track Material Part 19: Resilient fastening assemblies

AS 1214 – 1983 Hot-dip galvanized coatings on threaded fasteners

AS 1444 – 2007 Wrought alloy steels - Standard, hardenability (H) series and hardened and tempered to designated mechanical properties

AS 3818.2 -2010: Timber - Heavy structural products - Visually graded; Part 2: Railway track timbers

2.2 BBRC documents

OTCS 200 - Track System Standard

OTCS 210 – Track Geometry and Stability Standard

OTCS 220 - Rail and Rail Joints Standard

OTCS 240 – Ballast Standard

2.3 Other references

CRN CM 211 – Track Geometry and Stability

CRN CM 223 – Rail Adjustment

CRN CM 231 – Sleeper Manual

CRN CP 231 - Timber Sleeper and Bearer Specification

CRN CP 232 - Concrete Sleeper Specification

CRN CP 233 – Steel Sleeper Specification

CRN CP 234 – Concrete Bearer Specification

CRN CP 237 – Resilient Baseplates Specification

2.4 Definitions

Definitions of terms used in this standard may be found in OTCS 200.

3 Engineering authority

Design and selection of infrastructure detailed in this standard may only be undertaken by persons who have been granted appropriate Engineering Authority by the Engineering Manager.

4 Design & performance criteria

4.1 Track configuration

The configuration of track elements, including sleepers, turnout bearers, and sleeper fastenings is specified in OTCS 200 "Track System".

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

5.1 Selection of sleeper type

Sleeper type shall be selected in accordance with the Track class detailed in OTCS 200. Approved alternative sleeper types for each Track class are detailed in Table 1. 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 OTCS 200.

Track Class	Sleeper Type	
	Preferred	Approved Alternatives
Main Line		
1	Steel	Concrete, Timber
2	Steel	Timber
3	Steel	Timber
3G	Steel	Timber
5	Steel	Timber
Sidings		
1	Steel	Timber
2	Steel	Timber
3	Steel	Timber

Table 1 – Selection of sleeper type

Concrete sleepers may be installed on Class 2, 3 and 5 lines where rail has been upgraded to 53 or 60kg.

Concrete sleepers may be installed on a face in road level crossings on Class 2, 3 and 5 lines. Where used for this purpose they shall be installed with 53 or 60kg rail.

Alternative sleeper materials may only be used with the approval of the Engineering Manager.

5.2 Timber sleepers

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

5.2.1 Selection

For existing applications in ballasted plain track, detailed in OTCS 200, sleeper size shall meet the requirements of Section 5.2.2 and the standard spacing shall be as detailed in 5.2.4.

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

All new timber sleepers shall meet the requirements of CRN CP 231.

5.2.2 Size

5.2.2.1 Standard sleeper size

Dimensions and acceptance tolerances for timber sleepers shall be in accordance with the requirements of Table 2.

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

Table 2 – Timber sleeper dimensions

5.2.3 Use

5.2.3.1 New timber sleepers

Sleepers shall be cut from timber species nominated in Groups 1 and 2 of Table 3..

Treated sleepers are not approved for use.

Group	Common Name	Botanical Name
Group 1	Ironbark Grey	E. Siderophloia
	Ironbark Grey	E. Paniculata
	Ironbark Grey	E. Drepanophylla
	Ironbark Red (Broad Leaved)	E. Fibrosa
	Ironbark Red (Narrow Leaved)	E. Crebra
	Ironbark Red	E. Sideroxylon
	Gum Slaty or Box Slaty	E. Dawsonii
	Box White	E. Albens
Group 2	Box Grey	E. Microcarpa
	Box Grey	E. Moluccana
	Tallow Wood	E. Microcorys
	Gum Grey	E. Punctata
	Gum Grey	E. Propinqua
	Gum Forest Red	E. Tereticornis
	Mahogany White	E. Acmeniodies
Group 3	Gum River Red	E. Camaldulensis
	Blackbutt	E. Pilularis

Table 3 – Approved timber species

5.2.3.2 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.

5.2.4 Spacing

5.2.4.1 Spacing in open track

The spacing is defined as the distance between the centrelines of the sleepers. Timber sleeper spacing shall be in accordance with Table 4.

Track Class	Sleeper Spacing (mm)	Acceptance Tolerance (spacing or skew) (mm) ^(Note 1) ^(Note 2)	Tolerance Limit No. of sleepers/rail length (m)
ALL Track (mainline & sidings)			
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)

Table 4 - Timber and steel sleeper spacing

- Note 1 Installation tolerance for new track or face resleepering of track sections
 2 Skew is the variation from square from one side of the sleeper to the other
 3 Except at rail joints (See Section 5.2.4.2)
 4 Up to 50mm for spacing to allow for missing a thermit weld (only over two sleepers)

5.2.4.2 Spacing at rail joints

Spacing of sleepers at rail joints in plain ballasted track shall meet the requirements detailed in Table 5.

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

Table 5 – Timber and steel sleeper spacing at joints

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.

5.2.4.3 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 6

Track Class	Design Spacing (mm)	Acceptance Tolerance (mm)
All classes – New bridge structures	600	± 20
All classes – Existing bridge structures	600 preferred	± 20

Table 6 - Support spacing at bridge ends

5.2.5 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 7. Holes shall be bored completely through the timber.

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

Table 7 – Fastening hole diameters

5.2.6 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. A reduction to no less than 50mm in constrained situations at turnouts and special trackwork may be approved.

5.3 Steel sleepers

Steel sleepers are approved for installation in all classes of track. 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.

5.3.1 Selection

There are three types of steel sleepers

- Type M10 - to suit Class 1 tracks with 25t axle loads
- Type M8.5 insulated - to suit all classes of tracks
- Type M7.5 non insulated - to suit all classes of tracks

The sleeper type chosen for installation will depend on the operational requirement as detailed in BCS 200 and the track curvature.

Normally the steel sleeper type chosen shall be the same for the whole line.

Sleeper type shall be selected in accordance with Table 8.

Track Class	Curve radius (m) ^(Note 1)		Annual Tonnage (MGT)	
	≥400	< 400	<3	≥ 3
1 ^(Note 2)	M8.5	M8.5	M8.5	M8.5
2	M7.5	M7.5	M7.5	M7.5
3	M7.5	M7.5	M7.5	M7.5
3G	M7.5	M7.5	M7.5	M7.5
5	M7.5	M7.5	M7.5	M7.5

Table 8 - Selection of steel sleeper type

- Note 1 for lines with a significant proportion of curved track, especially sharp curves <400m radius
- 2 On lines with a significant tonnage of 25t axle load traffic, M10 steel sleepers shall be used.

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 Engineering Manager if it complies with CRN CP 233.

5.3.2 Size

The sleepers shall be designed to conform to the dimensions detailed in Table 9.

Parameter	Dimensions
Length	2500 mm
Width (at base)	250 - 260 mm
Width (at seat)	150 - 160 mm
Depth	95 - 100 mm
Thickness (at shoulder)	7.5 - 10 mm

Table 9 - Steel sleeper dimensions

5.3.3 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 (eg 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 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 engineering inspection and assessment in accordance with CRN CM 231. 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 following interfaces are not permitted within the body of curves < 600m radius:

- 100% steel sleepers with timber sleepers or a timber steel mix
- steel sleepers and concrete sleepers

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.)

5.3.4 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, or sleepers with additional holes 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 10 below:

	M10	M8.5	M7.5
Punched for foot size	146	146	146
Used without spacers for	53, 60kg	53, 60kg	53, 60kg
Used with spacers for		47kg	50, 47, 41, 30kg

Table 10 - Hole punching and spacer selection

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).

For Class 2 lines steel sleepers may be punched for 47 or 50 kg rail to avoid use of spacers.

Steel sleepers shall not be interspersed with concrete sleepers

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.

5.3.5 Spacing

Steel sleepers shall be spaced in open track in accordance with the requirements of Table 4 and at rail joints in accordance with Table 5.

5.3.6 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 pre-existing anchor pattern or, a minimum of one in three sleepers anchored (including both fair type anchors or resilient fasteners) whichever is greater.

5.4 Concrete sleepers

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

5.4.1 Selection

There are two types of concrete sleepers

- Heavy Duty - suitable for heavy freight tonnages and axle loads up to 30tonne or for providing greater lateral stability
- Medium Duty -suitable for general use with axle loads \leq 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 CP 232.

5.4.2 Size

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

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

Table 11 - Concrete sleeper dimensions

5.4.3 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.

Where concrete sleepers are installed adjacent to turnouts with timber bearers, a transition zone of eight (8) timber bearers or sleepers is required between the concrete sleepers and the toe of the points.

To improve the stability of track approaching transom top bridges, where concrete sleepers are installed adjacent to transom top bridges, twenty (20) Heavy Duty concrete sleepers shall be installed.

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

5.4.4 Spacing

5.4.4.1 Spacing in open track

Concrete sleepers shall be spaced in accordance with the requirements of Table 12.

Track Class	Sleeper Spacing (mm)	Tolerance (spacing or skew) (mm) ^(Note 1)	Tolerance Limit No. of sleepers/rail length (m)
Design Spacing			
ALL mainline track	600	± 20 ^(Note 2)	25/15 (±50mm)
Maximum spacing (Sidings ONLY)			
≤25T Axle load	720	± 20	21/15 (±60mm)
>25T Axle load	600	± 20	25/15 (±50mm)

Table 12 - Concrete sleeper spacing

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

2 Up to 50mm for spacing to allow for missing a thermit weld (only over two sleepers)

5.4.4.2 Spacing at bonded insulated joints in open track

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

5.5 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 5.4.

5.6 Timber turnout bearers

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

5.6.1 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

5.6.2 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 13

The minimum dimensions for turnout switch and crossing timbers shall be in accordance with the requirements specified in Table 13.

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
	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
	200	2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.8, 5.0, 5.2,

Table 13 – Timber turnout bearer dimensions

The dimensional tolerances shall be in accordance with Table 14.

Parameter	Tolerance
Length	+ 50 mm / - 0 mm
Width	+ 25 mm - 0 mm
Depth	+ 10 mm / - 0 mm

Table 14 – Tolerances on timber bearer dimensions

5.6.3 Usage

5.6.3.1 New timber turnout bearers

Turnout bearers shall be cut from timber species nominated in Groups 1 and 2 of Table 15.

Treated bearers are not approved for use.

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

Table 15 – Approved timber species

5.6.3.2 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..

5.6.4 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.

5.7 Concrete turnout bearers

5.7.1 Selection

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

For existing applications, detailed in OTCS 200, all new concrete turnout bearers shall be designed and manufactured in accordance with the requirements of CRN CP 234.

5.7.2 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 16.

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

Table 16 – Tolerances on concrete bearer dimensions

5.7.3 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

5.8 Steel turnout bearers

Requirements to be determined

5.9 Fastening systems

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

5.9.1 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: On Class 5 lines where angle fishplates are used on rail joints, 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 17.

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

Table 17 – Australian standards for non resilient fastening assemblies

Only approved fastenings and configurations shall be used. Approved non resilient fastenings are detailed in Appendix 1. Approved configurations are detailed in Table 19.

5.9.2 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 18.

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

Table 18 – Australian standards for resilient fastening assemblies

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 5.9.3.

Approved configurations for steel sleepers are detailed in Section 5.9.4

Approved configurations for concrete sleepers are detailed in Section 5.9.5.

5.9.3 Fastenings for timber sleepers and bearers

Standard configurations of fastening assemblies for timber sleepers and turnout bearers are detailed in Table 19. Special arrangements apply for the fastening of chairs to A and B timber bearers in turnouts. These are detailed in Table 22.

Reformed plates are not approved for use in sleeper renewals on the CRN network

Track Class		Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes ^(Note 2) No per Plate
Non Resilient				
Main Lines				
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		2 Dogspikes ^(Note 1)	DF 10	Nil
Sidings				
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
Resilient				
Main Lines				
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 re-installed 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)
Insulated Joints in ALL classes		Low profile clips e1627 (timber)	DF 62	4

Track Class		Fastening Type No. per Plate/ Rail	Sleeper Plates BHP Dwg. No.	Lockspikes ^(Note 2) No per Plate
Sidings				
ALL classes		2 Resilient E2003	DF 62	4
ALL classes	For existing installations ONLY CANNOT be re-installed 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

Table 19 - Timber sleeper fastening configuration

- Note 1 Round shank dogspikes or approved alternative fastenings may be used. Approved alternatives are detailed in Section 5.9.7 and Appendix 1
- 2 Lockspikes (L6) or approved alternative fastenings may be used. . Approved alternatives are detailed in Section 5.9.7 and Appendix 1
- 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.
- 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 $\geq 300\text{m}$ radius, preferably with the two screw spikes on the gauge side of the rail.
- 5 Non resilient fastenings on transoms should be upgraded to resilient fastenings when transoms are renewed

5.9.4 Fastenings for steel sleepers

Standard configurations of fastening assemblies for steel sleepers are detailed in Table 20.

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

Table 20 - Steel sleeper fastening configuration

5.9.5 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 21.

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

Table 21 - Concrete sleeper fastening configuration

5.9.6 Resilient fastenings on welded track (LWR and CWR) on bridges

5.9.6.1 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.

5.9.6.2 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.

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.

5.9.6.3 Steel bridge spans >80m with expansion switches

Not Applicable.

5.9.7 Alternative and special configurations

5.9.7.1 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.

5.9.7.2 Approved alternatives to dogspikes and lockspikes

The Pandrol (AJAX) Dogscrew and Lockscrew are approved alternatives to dogspikes and lockspikes respectively.

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.

5.9.7.3 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 Engineering Specification BCP 237.

5.9.7.4 Holding down bolts for timber bearers

A & B Timber Bearer Fastening Type	
New Installations	
60kg/m steelwork	Screwspikes
Other rail sizes	Holding down bolts or approved equivalent swage fastenings
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
For non-interlocked points	
All rail sizes	Screwspikes

Table 22 – A & B Timber Bearer fastening configuration

5.9.7.5 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 5.9.6. Approved designs are listed in Table 23 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.

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		

Table 23 - Zero Load Restraint assemblies

6 Prohibited configurations

The following configurations are not permitted for permanent works:-

- 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

7 Mixed configurations

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

7.1 Mixing concrete and timber sleepers

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

- must be part of a 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 24. Denser tie patterns may be used to address sleeper fatigue and fastening failure issues.

Track Class	MGT/year	Curvature		
		< 400m Radius	<600m radius	>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	1 in 4	1 in 6	1 in 6
3, 5		1 in 4	1 in 6	1 in 6

Table 24 - Minimum Tie Patterns for steel sleepers in timber sleepere track

- 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.
2. Steel sleepers not recommended. Concrete sleepers preferred as they provide better lateral stability. If steel sleepers are installed, use a denser tie pattern.
3. may be extended to 1 in 6 if sleeper condition permits.

Single sleepers may be installed as required

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

When sleepers with resilient fastenings are interspersed with timber sleepers with non-resilient fastenings in LWR where this would result in them being more frequent than 1 in 3 the following guidelines should be followed.

- 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 should 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 CM 223 – Rail Adjustment for method). This should be done at Rail Neutral Temperature.
- Apply additional controls e.g. extra ballast, additional anchors etc., Reduce other Welded Track Stability issues to a minimum. See CRN CM 211 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 26 to avoid clip breakage:

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

Table 26 - Minimum resilient fastening patterns in backcanted track

Where backcanting is severe, 8 mm or greater, the 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
- 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 5.9.6 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

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 ≤ 25 mm.
- 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 OTCS 240. 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 OTCS 210.

10 Damage limits

To be determined

11 Repair standards

11.1 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.

11.2 Concrete sleepers

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

11.3 Fastenings

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

Appendix 1 Approved sleeper and fastening products

Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
Non Resilient Fastenings			
Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 SRA Dwg CV0046205	
Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 SRA Dwg CV0046205	Imported by Westray Eng.
Dogspike	Spike, track; round shank; 22mm shank dia; 119mm long; forged; steel (dogspike)	AS 1085.8 SRA Dwg CV0046205	Manufactured by Greg Sewell Forgings
Gauge Lockspike	Spike, track, square shank lock type L6, XS1070	AS 1085.13	Pandrol
Lockspike	Spike, track, square shank lock type L1, , XS1070	AS 1085.13	Pandrol
Dogscrew	DogScrew 22mm Shouldered; 9mm Thick Flange; Galvanised	Ajax Fasteners Dwg No SRSG19.135 19/10/04	Ajax / Pandrol
Lockscrew	LockScrew 16mm; Galvanised	Ajax Fasteners Dwg No TL5B16.125 10/11/03	Ajax / Pandrol
Screw spike	Spike, track Screw spike; 27mm dia 165mm long. For timber, galvanized	SRA Dwg 205A-374 (CV 0024139) AS 1085.18	
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	Delkor
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	Delkor
Screw spike	Spike, track Screw spike; 24mm dia		PRE Manufacturer Jinstar Fastener Co Ltd (Tekway)
Washer, lock	25mm ID; 46mm OD; 6mm thick; high tension double helical spring type;fe6; Galvanized to AS 1214	Delkor Dwg DSW - 01	
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	
Resilient Fastenings			
Track-Lok II Clip	Track-Lok II – for use with steel sleepers Part No. B296		Lock in shoulder

Lock in shoulder	k-Lok II – for use with M10 steel sleepers — insulated and non insulated - Part No.2408	Onesteel
	Track-Lok II – for use with M8.5 steel sleepers — insulated - Part No. 2409	Onesteel
		Onesteel

Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
Lock in shoulder	Track-Lok II – for use with M8.5 steel sleepers — non insulated - Part No. 2410		Onesteel
Lock in shoulder	Track-Lok II – for use with M7.5 steel sleepers — non insulated - Part No. 2411		Onesteel
Steel sleeper spacers	Track-Lok spacers for 47, 50kg rail - Part No. 2530		Onesteel
Steel sleeper spacers	Track-Lok spacers for 47, 50kg rail in insulated sleepers in association with insulator 2212 - Part No. 2509		Onesteel
Steel sleeper spacers	Track-Lok spacers for 47, 50kg rail at joints - Part No. 2537		Onesteel
Steel sleeper spacers	Track-Lok spacers for 60B and 60BA rail - Part No. 2554 (gauge side), Part No. 2545 (field side)		Onesteel
Steel sleeper spacers	Track-Lok spacers for 31kg rail - Part No. 2554 (gauge side), Part No. 2553 (field side)		Onesteel
Steel sleeper spacers	Track-Lok spacers for 80A, 80B and 80AA rail - Part No. 2552 (gauge side), Part No. 2551 (field side)		Onesteel
Steel sleeper spacers	Track-Lok spacers for 71½lb rail - Part No. 2556 (gauge side), Part No. 2555 (field side)		Onesteel
Pandrol Clip E series	Rail clip Type e2003; 20 mm dia; 106 mm l; 103 mm w; material XK 9261b; AS 1444;	Pandrol e-21027	Pandrol
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	Pandrol 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	Pandrol 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);	Pandrol e18-20002	Pandrol
Pandrol Clip E series	Rail clip e2079 series; 20mm dia; 106mm l; 102.5 mm w; material XK 9261b; AS 1444	Pandrol 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
Fastclip FC1507	Pandrol fastclip; type FC1507; silico-manganese spring steel XK9261b with plastic toe insulator	Pandrol FC 1507 and Pandrol 8494	Pandrol
Fastclip type FC1509	Pandrol fastclip; type FC1509; silico-manganese spring steel XK9261b with toe insulator 10293 (white) and Sidepost Insulator 10292 (white)	Dwg No 10291	Pandrol

Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
Sliding shoulder head	For concrete guard rail sleepers; e-clip fastening (multilok system); to suit 47-60kg 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	Delkor
Pads and Insulators			
Rail Insulator for steel sleepers	Track-Lok insulators – for use with 53 and 60kg rail in M8.5 and M10 steel sleepers - not adjustable - rail foot width 146mm for use with 41, 47, 50 kg rail in M8.5 steel sleepers – not adjustable rail foot width 127mm Part No. 2213		Onesteel
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	
Insulator, rail, concrete sleeper	Glass reinforced nylon insulator ;for use with concrete sleeper having pandrol e-clip 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;		
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		
Rail pad	Grooved;HDPE plastic;180mm w x 186mm lg x 7.5mm thk; black; for 53/60kg rail/ concrete sleeper;		
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			

Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
Sleeper Plate Screws	Screw spike; clip type; 146mm rail base; 1 in 20 cant; cat no 086s;	Pandrol isp95086	
Sleeper Plate Clip type	Clip type; 4hole; 146mm rail base; 1 in 20 cant; cat no 486;	Pandrol ISP95486	
Sleeper Plate dogspike	Double shoulder type; 127 mm rail base; 1 in 20 cant; Cat no 430;	BHP 2705 127dstb-df10	
Sleeper Plate dogspike	Double shoulder type; 146mm rail base; 1 in 20 cant; cat no 420;	BHP 2706 146dstb-df30	
Sleeper Plate Clip type	Clip type; 6hole; 127mm rail base; 1 in 20 cant;	Pandrol isp-95064	
Sleeper Plate Screws	Screw spike; clip type; 148mm Rail base; 1 in 20 cant; cat no 054	Pandrol ISP95054	
Sleeper Plate Clip type	Screws spike clip type; 148mm rail base; 1 in 20 cant; cat no 098s; bridge type;	Pandrol ISP95098	
Sleeper Plate Clouth alternative 1	Clouth alternative 1; 60kg rail; cast Iron-rubber; 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 Iron-rubber; 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 Iron-rubber; sound damping, double Shouldered 1:20 cant, side holes	Delkor RF 0.29.092 CLA	Delkor
Timber Sleepers			
Timber Sleeper	Sleeper, railway Timber; unbored; 230mm x 130mm x 2440mm ironbark or approved hardwood	AS 3818.2	
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			
M7.5 Non-insulated	Steel – 7.5mm thick 1435mm gauge Non-insulated Track Lok II fastening system – Part No. 7.5SG2072TSS	AS 1085.17 Onesteel Drawing 2072	Onesteel
M8.5 Non-insulated	Steel - – 8.5mm thick 1435mm gauge Non-insulated Track Lok II fastening system – Part No. 8.512142TSS	AS 1085.17 Onesteel Drawing 12142	Onesteel
M8.5 Insulated	Steel - – 8.5mm thick 1435mm gauge Insulated Track Lok II fastening system – Part No. 8.5SG12125	AS 1085.17 Onesteel Drawing 12125	Onesteel

Common Item Nam	Descriptio	Standard/ Drawing	Manufactur
			er/ Supplier
M10 Non-insulated	Steel - – 10mm thick 1435mm gauge Non- insulated Track Lok II fastening system – Part No. 10SG12126	AS 1085.17 Onesteel Drawing 12126	Onesteel
M10 Insulated	Steel - – 10mm thick 1435mm gauge Insulated Track Lok II fastening system – Part No. 10SG12195TSS	AS 1085.17 Onesteel Drawing 12195	Onesteel
Concrete Sleepers			
Concrete Sleeper Medium Duty Fastclip (MDFC), 25T	Concrete; Medium duty low profile 25t axle load; Pandrol Fastclip fastening system; mass 232kg	AS 1085.14	Rocla
Concrete Sleeper Medium Duty E-clip (MDFC), 25T	Concrete; Medium duty low profile 25t axle load; Pandrol e2003 fastening system; mass 232kg	AS 1085.14	Rocla
Concrete Sleeper Heavy Duty E-clip (MDFC), 30T	Concrete; Heavy Duty Type 5 30t axle load ;Pandrol e-clip fastening system; mass 285kg;	AS 1085.14	Rocla
Concrete Sleeper Heavy Duty Fastclip (HDFC), 30T	Concrete; Heavy Duty 30t axle load; Pandrol Fastclip fastening system; mass	AS 1085.14	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	AS 1085.14	Rocla
Concrete Guardrail Sleepers			
Concrete Guardrail Sleeper Heavy Duty E-clip 30T No.1	Concrete, Heavy Duty E-clip Guardrail sleeper, GR1, 30T axle load, Pandrol E- clip fastening system	AS 1085.14	
Concrete Guardrail Sleeper Heavy Duty E-clip 30T No. 2 to No.6	Concrete, Heavy Duty E-clip Guardrail sleeper, GR2 to GR6, 30T axle load, Pandrol E-clip fastening system	AS 1085.14	
Concrete Guardrail Sleeper Medium Duty E-clip 25 T No.	Concrete, Medium Duty E-clip Guardrail sleeper, GR1, 25T axle load, Pandrol E- clip fastening system	AS 1085.14	
Concrete Guardrail Sleeper Medium Duty E-clip 25T No. 2 to No.6	Concrete, Medium Duty E-clip Guardrail sleeper, GR2 to GR6, 25T axle load, Pandrol E-clip fastening system	AS 1085.14	
Concrete Guardrail Sleeper Heavy Duty Fastclip 30 T No.	Concrete, Heavy Duty Fastclip Guardrail sleeper, GR1, 30T axle load, Pandrol E- clip fastening on guardrail and fastclip on running rail	AS 1085.14	

Common Item Name	Description	Standard/ Drawing	Manufacturer/ Supplier
Concrete Guardrail Sleeper Heavy Duty Fastclip 30T No. 2 to No.6	Concrete, Heavy Duty Fastclip Guardrail sleeper, GR2 to GR6, 30T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14	
Concrete Guardrail Sleeper Medium Duty Fastclip 25T No. 1	Concrete, Medium Duty Fastclip Guardrail sleeper, GR1, 25T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14	
Concrete Guardrail Sleeper Medium Duty Fastclip 25T No. 2 to No.6	Concrete, Medium Duty Fastclip Guardrail sleeper, GR2, 25T axle load, Pandrol E-clip fastening on guardrail and fastclip on running rail	AS 1085.14	
Concrete bearer	Concrete bearer, FLAT 1, 30T, 8 ferrules cast in for cant reducing sleeper plates	AS 1085.14 and drawing 785 576	
Concrete Guardrail Bearer	Concrete Guardrail Bearer, Type AGR1 for "Alternative 1" sleeper plates under running rail, „A" clips hold the guardrail Ordinary AGR1 guardrail sleeper and no. 1 in termination set	AS 1085.14 and drawings 785 030 and 785 031	
Concrete Guardrail Bearer	Concrete Guardrail Bearer, Type AGR2 to AGR7 for "Alternative 1" sleeper plates under running rail	AS 1085.14 and drawings 785 030 and 785 031	

Appendix 2 Approved repair processes

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

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
90 'J' 1913		1343	162	
80lb AS 'B' 1928, A, A ^{1,2&3}		1346	152	
71½lb 'D' 1875		1346	146	
60lb AS 1916, AS 'A', AS 'B'		1365		
60lb B 1896 & 'B ^A ' 1907		1366	127	

For cant adzed increase 'A' by 6mm
 'A' dimension based on tapered base sleeper plates except for unplated
 All dimension tolerance are + - 1mm.

