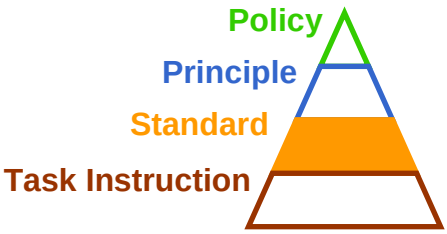

Track Standard

Use of Track Materials

Purpose

This Standard defines the minimum requirements for track material standards for track renewals and major maintenance.

Document Control

Document No.	T-ST-MM-5709	**Issue No.**	Issue 3.0
Date Effective	31/12/2022	**Author**	Andy Pearson
Prepared (P) **Reviewed (R)** **Amended (A)**	Mark Fleet (A)	**Checked and Approved By**	Track Technical Committee
		Authorised for Release By	Professional Head of Track

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1. Revision Procedure and History

This is a 'living' document, that will be up dated every five years or whenever KiwiRail determines that changes to it and processing requirements documented herein are appropriate.
If changes arise from the review this document will be reissued, however, if no changes arise from the review, the current version of this document will remain in force.
Refer to the **Briefing Note(s) for T-ST-MM-5709 Use of Track Materials**
(at the end of this document) for full document changes.

Issue No	Prepared (P) Reviewed (R) Amended (A)	Authorised for Release By	Date Effective
1.0	Andy Pearson (P)	Professional Head of Track	1/07/2016
1.1	Andy Pearson (A)	Professional Head of Track	1/04/2017
2.0	Geoff Hayward(A)	Professional Head of Track	02/02/2018

1.1 Changes in this issue

Issue No	Section	Description	Page(s)
2.0	6	Tables 6.1, 6.2, 6.3 & 6.4 updated	10-11
	6.5	Text updated	12
	6.8	New section	12
	App 1	Text updated	14

1.2 Withdrawn, closed and superseded

Old Reference	Title	Replaced by

2. Associated Documents

Level	Number	Title
3	T-ST-AM-5301	Classification of Secondhand Materials

Table of Contents

List of Tables

Acronyms and Definitions

Acronyms	Definition
CWR	Continuously Welded Rail
EMU	Electric Multiple Unit – type of passenger car
HH	Head Hardenend
HW	Heavy weight rail, shall mean 85, 90, 91 or 100 lb / yard, 50 kg/m
LNI	Local Network Instruction of the RORP
LW	Light weight rail, shall mean 53, 55 or 56 lb / yard
LWR	Long Welded Rail
MHT	Mill Heat Treated
MW	Medium weight rail, shall mean 70, 72 or 75 lb / yard
ROC	Rail Operating Code
RORP	Rail Operating Rules and Procedures
SC	Standard Carbon
SH	Secondhand

3. Scope

To maintain the track asset in a fit for purpose condition it is important that materials used for major maintenance and renewals are appropriate to the track standard required.

This Standard defines the requirements for track materials used in track renewals and major maintenance. It does not preclude the use of 'like for like' replacement for minor maintenance to restore operational efficiency.

1) Minor Maintenance Work

   All materials shall be replaced with identical materials except that A clips shall be replaced by a fastening system with bedplates in A and B Class lines, in conjunction with major maintenance or renewals.

2) Capital Works / Private Sidings

   Track Engineering will from time to time set standards for the installation of materials. Details of approved materials will form part of the annual Capital Track Renewals plan.

3.1 Use in the field

This document has been designed to be used in the field. It is expected that this document will be opened in an iPad via 'Briefcase' and used as reference to complete the task. Note as written on the front cover the controlled version is held on iKon. **Printed copies of this document are uncontrolled**.

4. Line Classification, Speed and Axle Load

The railway system is divided into three classes for the purpose of defining standards for construction, renewals and maintenance.

- Class A: Principal Lines
- Class B: Secondary Lines and Loops
- Class C: Minor lines, Yards and Sidings

1. Speed:

Each line is given a speed category rating, the maximum allowable speeds for each category being defined as:

Table 4.1 Speed category allowable speed – Km/h

Speed Category	Maximum	Comments
SC 1	110	EMU's and Railcars only at maximum
SC 2	70	
SC 3	50	
SC 4	40	Includes loops
SC 5	25	Includes yards, sidings and terminals

The classification and speed category for each line or portion thereof is as shown in Appendix 1 Classification and Speed Category.

Actual line speed may be less than those given above, and is shown in the RORP LNI.

2. Axle Loads:

The maximum or allowable axle loads of rolling stock and locomotives for routes is shown in the ROC.

Either speed and/or axle loads may be reduced to overcome infrastructure deficiencies.

Maximum axle loads for both locomotives and rolling stock on specific line classes are generally as shown in Table 5.2 together with guideline comments on material standards.

Note that Table 5.2 relies on rail, sleepers and the ballast/formation layer being in good condition (condition three or above as per document T-ST-IN-5108). Where track components are of a lesser standard then restrictions on axle loads and linespeed will be required.

Table 4.2 Line classification, speed and axle load

Class	Axle Loads	Comments
A	≥18 metric tonnes	Where Medium Weight (MW) rail still exists on these lines every opportunity must be taken to upgrade rail to Heavy Weight (HW) rail. Speeds of 18 tonne/axle rolling stock and locomotives are reduced when running on MW rail. Speeds of ≥18 tonne/axle (up to 22.5 tonnes) rolling stock and locomotives are to be reduced if 91lb or 50kg CWR is not fitted on concrete sleepers.
B	16.3 metric tonnes	Rolling stock and locomotives may run at express freight speeds when on MW CWR. However, further speed reductions may be imposed due to the general track condition. Where 100% HW rail exists on these lines 18 tonne/axle rolling stock and locomotives may run. When there is a mix of HW and MW rail, speeds of 18 tonne/axle rolling stock and locomotives are reduced when running on MW rail.
C	≤14.3 metric tonnes	All rail is generally MW and other track conditions may determine running rights. Freight train speeds generally apply. Where LW rail still exists on these lines or joints are in short/ medium lengths then speeds of rolling stock and locomotives are reduced.

5. Track Material Standards

The following tables set out the minimum standard for which materials are to be used for track renewals and major maintenance for various line classifications.

The Asset Engineer, Production Manager or Project Manager must comply with these standards for renewals and major maintenance. A departure may be granted by the Professional Head – Track where it is considered appropriate to deviate from these standards.

Any line that requires upgrading may be treated differently to their existing line classification for example the Castlecliff Branch. Such lines may be reclassified when the requirement for upgrading is identified.

5.1 Class A: speed category 1 or 2

Table 5.1 Class A : speed category 1 or 2

Material	Renewal or major maintenance
Rail: new re-rail, relay Rail: closure rail, hi-leg	New 50kg with grade SC, MHT or HH as permitted. CWR must be formed where permitted. First class, SH 91 lb or 50 kg, or new 50 kg rail.
Sleepers	Concrete, new Hardwood, new Composite, first class Hardwood/TPR. Timber/Composite sleepers must not be installed in curves less than 400 m radius. 50% sleeper renewal is permitted.
Ballast	300 mm depth. Clean well graded with formation strength of CBR $\geq$ 30
Turnouts	50 kg NZR or equivalent only. Manganese frog 91lb for replacement of frog only in 91 lb. Bearers shall be concrete.
Fastenings	P (N in some level crossing designs).
Insulated Joints	Six holed GIJ's.
Fishplates	Six holed long fishplates.

5.2 Class B: speed category 1 or 2

Table 5.2 Class B: speed category 1 or 2

Material	Renewal or major maintenance
Rail: new re-rail, relay Rail: closure rail, hi-leg	New 50 kg with grade SC, MHT or HH as permitted. First class SH HW. HW rail is to be formed into CWR and any MW rail shall be formed into at least LWR. Where existing rail is MW then like for like is acceptable although every opportunity to upgrade shall be taken but only as directed. 1st Class SH 91lb or 50kg, SH MW rail.
Sleepers	New Concrete, new Hardwood, new Composite, first class SH Hardwood/TPR/Concrete. Timber or Composite must not be installed in curves less than 400m radius. 50% sleeper renewal is permitted. Renewals percentage less than this may be permitted to bring 50% of sleeper condition to grade two or higher.
Ballast	>200mm depth. A maximum of 20% fouled / rounded with formation strength of CBR $\geq$ 20
Turnouts	50kg NZR or equivalent only, refurbished SH 91lb. Manganese frog 91lb for replacement of frog only in 91lb. Bearers shall concrete or composite.
Fastenings	P, R and N (R & N on curves >400m radius and tangent track only).
Insulated Joints	Six holed GIJ's, six holed bolted IJ's, non-glued or bolted in MW rail.
Fishplates	Six holed long, standard like for like in MW rail.

5.3 Class B: speed category 3, 4 or 5

Table 5.3 Class B: speed category 3, 4 or 5

Material	Renewal or major maintenance
Rail: new re-rail, relay Rail : closure rail, hi-leg	1st class SH HW or SH MW. HW rail is to be formed into CWR and MW rail formed into at least LWR. Where existing rail is MW then like for like is acceptable. Upgrades shall be as directed.
Sleepers	SH 1st or 2nd class Hardwood/TPR, SH Concrete. 1st class Hardwood or new Composite in curves with radius less than 250m for SC3 and SC4 only. 50% renewal. Where there is already 25% in condition two or higher a 25% renewal may be permitted.
Ballast	>200mm depth. A maximum of 20% fouled / rounded with formation strength of CBR $\geq$ 20
Turnouts	50 kg NZR or Equivalent in high traffic areas, refurbished SH 91 lb or 70 lb frogs for like for like. Bearers may composite or SH 1st or 2nd class Hardwood/TPR.
Fastenings	P, R and N (R & N on curves >400m radius and tangent track only).
Insulated Joints	Bolted six hole IJ in HW and four hole in MW. Six hole bolted IJ in busy sidings and loops with 18 tonne / axle running rights.
Fishplates	Four holed long in HW, standard like for like in MW rail.

Note this includes all Loops, Arrival and Departure roads and busy yards on Class A and B lines.

5.4 Class C: all speed categories

Table 5.4 Class C: all speed categories

Material	Renewal or Major Maintenance
Rail: new re-rail, relay Rail: closure rail, hi-leg	2nd class for SC5 & 3rd class for yards/sidings only SH MW formed into LWR. Where existing rail is MW then like for like is acceptable. No upgrading shall be undertaken except where ≤55 lb rail exists. SH MW rail, like for like is acceptable.Upgrades shall be as directed.
Sleepers	Second class Hardwood/TPR. 25% Renewal permitted.
Ballast	$\leq$200mm depth. A maximum of 30% fouled / rounded with formation strength of CBR $\leq$ 15
Turnouts	Refurbished SH 91 lb or 70 lb. Frogs like for like. Bearers may be SH 2nd class Hardwood/TPR.
Fastenings	R, N and A. Only use A on tangent track.
Insulated Joints	Non glued or bolted in medium weight.
Fishplates	Four holed long, standard like for like in MW rail.

Note this includes Loops on Class C lines and all Yards and Sidings not previously identified.

5.5 Head hardened rail

Head hardened rail shall be used on Class A lines on curves of radius 250 m and less, on grades steeper than 1:83 and in specific environment conditions for example tunnels. Seek clarification from Track Engineering in all cases.

KiwiRail currently purchases MHT rail which is an acceptable alternative to HH and SC rail in all cases.

5.6 Use of galvanised fastenings and bedplates/sleepers

Galvanised fastenings systems including bedplates for timber or concrete sleepers are to be used in any areas subject to a high risk of corrosion such as: tunnels, within 150 m of the high water mark in coastal areas and level crossings. Seek clarification from Track Engineering in all cases.

5.7 General

Any variations to these requirements must be authorised by the Professional Head of Track.

Where secondhand material is permitted then the classification must be in compliance with document T-ST-AM-5301 Classification of Secondhand Materials.

5.8 Covering of fastening systems

As resilient fastenings (eg Pandrol) are very susceptible to corrosion induced fatigue, they must not be used where the fastening system is covered by road metal or ballast such as in yards or tarmacked level crossings. Galvanised N type, without spring washers, is the only permitted fastening system in these locations.

Appendix 1 Classification and Speed Category

North Island Lines

Line	Speed Category	From	To
Class A: Principal Lines			
NIMT	1	Wellington	Auckland
ECMT	1 2	Hamilton Te Maunga	Te Maunga Kawerau
Wairarapa Line	1	Wellington	Masterton
PNGL	2	Palmerston North	Napier
NAL	1	Westfield	Swanson
Kinleith Branch	2	Waharoa	Kinleith
Murupara Branch	2	Kawerau	Murupara
Mission Bush Branch	2	Paerata	Mission Bush
MNPL	*2*	Marton	Whareroa
Mt Maunganui Branch	2	Te Maunga	Mt Maunganui
Newmarket Line	2	Newmarket	Auckland
Onehunga Branch	1	Penrose	Onehunga
Manukau Branch	2	Wiri	Manukau
Johnsonville Line	2	Wellington	Johnsonville
Melling Branch	3	Melling Jcn	Melling

North Island Lines, cont.

Line	Speed Category	From	To
Class B: Secondary Lines			
NAL	2 3	Swanson Waitakere	Waitakere Whangarei
MNPL	2	Whareroa	New Plymouth
Wairarapa Line	3	Masterton	Woodville
MNPL	3	New Plymouth	Breakwater
Napier Port Branch	5	Napier Jcn	Napier Port
Wanganui Freight Branch	5	Aramoho	Wanganui
Castlecliff Branch	5	Wanganui	Castlecliff
Class C: Minor Lines			
NAL	4	Whangarei	Otiria
Port Whangarei Industrial Siding	5	Whangarei	Whangarei Port
Hautapu Branch	5	Ruakura	Hautapu
PNGL	4	Napier	Wairio
Waitoa Branch	5	Morrinsville	Waitoa
Gracefield Branch	5	Woburn	Hutt Wshops
Southdown Branch	5	Westfield	Southdown
Rotowaro Branch	5	Huntly	Rotowaro
Kapuni Branch (moth)	4	Te Roti Jcn	Kapuni
Dargaville Branch (moth)	4	Waiotira	Dargaville
SOL (moth)	2	Stratford	68.5 km
PNGL (moth)	2	Wairio	Gisborne
Rotorua Branch (moth)	3	Putaruru	Rotorua
SOL (moth)	3	68.5 km	Okahukura
Waitara Branch (moth)	5	Lepperton Loop	Waitara
Makaraka Branch (moth)	5	Makaraka Jcn	Makaraka

South Island Lines

Line	Speed Category	From	To
Class A: Principal Lines			
MNL	2 1	Addington 8.4 km	8.4 km Picton
MSL	2 1	Lyttelton Middleton	Middleton Invercargill
Midland Line	1	Rolleston	Greymouth
Class B: Secondary Lines			
SNL	2 3	Stillwater Inangahua	Inangahua Ngakawau
Port Chalmers Branch	5	Sawyers Bay	Port Chalmers
Taieri Branch	4	Wingatui	3.5 km
Rapahoe Branch	4	Omoto	Rapahoe
Class C: Minor Lines			
Hornby Branch	5	Hornby Jcn	Hornby
Hokitika Line	4	Greymouth	Hokitika
Westport Industrial	5	Westport Jcn	Westport
Finegand Branch	5	Balclutha	Finegand
Ohai Branch	4	Invercargill	Ohai
Bluff Branch	4	Invercargill	Bluff

Briefing Note(s) for T-ST-MM-5709 Use of Track Materials

Date Effective 31/12/2022 **Issue No.** Issue 3.0

Background

Amendments to section 6 Tables. New Section 6.8 and amendment to Appendix 1

Key changes / compliance

Amendments to line classifications and speed categories.

Implementation

This document should be cascaded down to all field staff impacted by this Task Instruction in the field. All documents will have the Briefing Note inserted to each document during the next review process or next published version iteration, whichever comes first.

Applicability (Select relevant boxes)	**Civil**	**Signals and Telecommunications**	**Structures**	**Track**	**Traction and Electrical**
General	☐	☐	☐	☒	☐
Asset Engineers	☐	☐	☐	☒	☐
Field Asset Engineers	☐	☐	☐	☒	☐
Production Managers	☐	☐	☐	☒	☐
Field Production Managers	☐	☐	☐	☒	☐
Gangers	☐	☐	☐	☒	☐

Document History

Note page numbers relate to the document at the time of amendment and may not match page numbers in current document.

Issue No	Section	Description	Page(s)
1.0		First Publication	
1.1	5	Table 5.2 minor changes	7
1.1		Briefing Note added to document	15
1.2	6.1 – 6.4	Ballast added and Turnouts updated in Tables 6.1 – 6.4	8 – 9
1.2		Document History new	15