

Ref:	NR/L2/TRK/001/mod09
Issue:	6
Date:	01 December 2012
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Loss of rail section

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1 Scope

This module of NR/L2/TRK/001 covers the following (as summarised in Table 1):

- minimum rail depths;
- measurement of sidewear and permitted limits and actions for sidewear;
- gall;
- rail depth (minimum rail strength analysis);
- loss of rail foot;
- inspections for rail corrosion and rail depth in level crossings and RRAPs;
- use of coated rail and premium steel rail;

Table 1 – Summary of checks for loss of rail section				
Rail loss by:	Check	Primary measure	Other factors	TEF
Rail depth	That depth is above minimum permitted	Actual rail depth (mm)	Sidewear	
Sidewear	For lateral head loss (L)	NR4 step reading (S)	Fishplate strike. Sidewear scar on gauge face. Lipping EMGTPA Line speed	TEF3020B (site survey) & TEF3020A
Gall	That underfoot gall is less than maximum permitted	Underfoot gall (mm)	Track category All round corrosion	
Rail depth (minimum strength analysis)	That actual depth is more than calculated minimum permitted	Dynamic axle load [derived from Cant deficiency, static axle load & line speed]	EMGTPA All round corrosion Lateral head loss Gall Actual rail depth	TEF3240
Rail foot	The amount of loss	Foot loss (mm)	Rail fastenings effective	
Rail foot in LC	The amount of loss	Foot loss (mm)	Foot & web corrosion Head corrosion or sidewear [all above used to determine inspection frequency]	TEF3043
Localised head loss	Service stress of the rail	Localised head loss (depth & length)	Rail depth Gall Maximum axle load Line speed Annual tonnage	TEF3047
		Foot loss and thinning of the foot or the web is not included as a factor in the calculation		
	This section included in the table to complete the list of rail assessments to be undertaken for loss of rail section. Process can be found in NR/L2/TRK/9016			

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2 Definitions

See Glossary (NR/L2/TRK/001/mod01).

3 Minimum Rail Depth

3.1 Rail depth

The minimum permitted rail depth, measured outside of any gall, is shown in Table 2 ('no sidewear').

3.2 Rail depth and fishplate strike due to sidewear

To avoid the risk of wheel flanges striking fishplates or rail clamps, the minimum permitted rail depth within 9 metres of any fishplate or rail clamp, measured outside of any gall, is shown in Table 2 ('sideworn').

Table 2 – Minimum rail depths		
Rail section	Minimum depth (no sidewear) mm	Minimum depth (sideworn) mm
CEN60 E1 and E2 flat bottom plain line	158	158 + L
CEN60 E1 and E2 flat bottom S&C	162	162 + L
109 / 110A / CEN56 (113A) flat bottom	145	145 + L
98 flat bottom / 95 and 97.5 bullhead	131	131 + L
85 bullhead	127	127 + L
Note: $L = 9 - 0.5S$ Where L is the lateral head loss and S is the NR4 standard step gauge reading.		

3.3 Action for rail at or below minimum permitted depth

Replace the rail within three years of the minimum depth specified in Table 2 being reached.

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4 Sidewear

4.1 Description

Sidewear is a measurement of lateral rail head loss 14mm below the crown of the rail. The amount of lateral rail head loss is the risk being managed, not the minimum lateral head width remaining. Limiting maximum lateral head loss restricts the depth and angle of contact between the wheel flange and the rail, thus reducing the risk of flange climb.

In addition, if the sidewear scar reaches the bottom of the running or gauge face there is a risk of the wheel flanges striking fishplates.

4.2 Frequency of inspection

Monitor all locations where sidewear is present.

Carry out initial inspections of sideworn rail at not more than 12 month intervals to determine the rate of wear. Use the output of these inspections to determine an appropriate inspection frequency.

Frequency should allow for actions to be planned before the limits on maximum lateral head loss are reached.

Visually examine curves on Section Manager and Track Maintenance Engineer inspections to identify new locations of sidewear.

Incorporate new locations found into the sidewear monitoring regime.

Where new rolling stock is introduced and contributes more than 15% of the total number of axles, carry out additional inspections. Undertake at two monthly intervals for a minimum of six months, until the new rate of sidewear has been determined.

4.3 Measuring sidewear

Measure sidewear:

- manually using the NR4 stepped sidewear gauge; or
- automatically by train based systems approved by the Professional Head [Track].

NOTE The NR4 gauge permits the measurement of all rail head sections with a nominal head width of 70 or 72mm (which includes 85lb RBS Bullhead and CEN 60 sections).

Measure and record sidewear at a minimum of four locations per quarter mile along the curve (nominally 110 yards apart). Take additional measurements where visual examination indicates that the sidewear is more severe.

Permanently mark these measurement locations on site.

Record the inspection measurements on site using TEF3020B.

In addition to the NR4 step reading, record also the position of the sidewear scar, relative to the bottom of the gauge face of the rail.

The working relationship between lateral head loss, L and the NR4 standard gauge step reading S , when considering one side of the rail at a time, is given by;

$$L = 9 - 0.5S, \text{ for all rail sections.}$$