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Switches and crossings (S&C)

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1 Scope

Switches and crossings (S&C) are designed to steer trains safely from one track to another. S&C is more complex than plain line and requires detailed attention in order to manage the risk of derailment and reduce the potential for points failures.

This module of NR/L2/TRK/001 covers:

- a) Inspection by patroller, Section Manager and TME;
- b) Inspection requirements and tolerances for
 - 1) wear,
 - 2) flange back contact,
 - 3) free wheel clearance,
 - 4) false flange damage,
 - 5) gauge,
 - 6) switch position.
- c) inspection and maintenance of S&C components including
 - 1) bearers,
 - 2) slide chairs,
 - 3) baseplates,
 - 4) fastenings,
 - 5) lateral resistance plates.
- d) track geometry through S&C;
- e) replacement of switch sets and crossings;
- f) securing (out of use) and plain lining;
- g) hand operated points;

This module does not cover:

- h) management of joints (see NR/L2/TRK/001/mod04);
- i) visual inspection and ultrasonic testing of rails (see NR/L2/TRK/001/mod06).

2 Definitions

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

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3 S&C Inspection; basic visual, Section Manager and Track Engineer

3.1 Basic visual inspections

Undertake basic visual inspection of S&C is at the frequencies shown in NR/L2/TRK/001/mod02. Carry out inspections in accordance with track patrol diagrams (which show the route to be taken by the patroller through the S&C).

Record inspections on TEF3015. Report defects and items requiring urgent attention.

Video inspection is an alternative process to undertake basic visual inspection of S&C track components.

3.2 Section Manager and Engineer inspections

The Section Manager [Track] (SM [T]) and Track Maintenance Engineer (TME) shall undertake inspection of S&C at the frequencies shown in NR/L2/TRK/001/mod02.

The person undertaking the Section Manager inspection shall be competent in Track Engineering competency Tr7 (053 inspection).

Record SM[T] inspections on TEF3022. Report and action defects and items requiring attention.

Record TME inspections on TEF3017.

3.3 Joint Inspection and maintenance of S&C by Signalling and Track staff

A joint approach to the inspection and maintenance of S&C is effective in delivering S&C that performs well (e.g. by the elimination of track faults that have an effect on point operating equipment - such as wide track gauge or excessive voiding).

Joint inspection and maintenance by track and signalling staff should be carried out in accordance with a plan prepared by the Signal Maintenance Engineer (SME) and agreed with the Track Maintenance Engineer (TME).

Joint inspections and maintenance shall be carried out by persons with the necessary competence to fulfil the requirements of the inspections.

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4 Inspection to assess wear and damage to switch rails and stock rails

During the routine SM [T] inspection a visual inspection, in accordance with NR/L2/TRK/0053 – “Inspection and repair to reduce the risk of derailment at switches”, shall be carried out to determine whether a detailed inspection is required (and if any immediate actions are required).

Pay particular attention to:

- a) the tell tale signs as detailed in NR/L2/TRK/0053;
- b) any pieces broken from the top of the switch rail;
- c) signs of new, changed or aggressive wear patterns;
- d) wear on recently ground switches;
- e) state of lubrication of the switch and stock gauge face.

Where indicated by visual inspection check throughout the affected switch for contact between the P8 wheel profile and switch rail below the 60° line. Check, where required, the switches in both normal and reverse positions.

5 Inspection of premium rail switches

Inspect switches manufactured from AMS, MHT, MHH, HP2 (or any other premium steel with a hardness greater than 260BHN steel) for wear as described in NR/L2/TRK/0053 (hazard 5). The frequency of inspection required is shown in Table 1.

Table 1 – Frequency of inspection for premium steel switches ¹		
Time after installation, weld repair or grinding	Inspection frequency	Maximum interval between inspections
0 – 1 month	Every 7 days	8 days
1 – 6 months	Every 28 days	31 days
6 – 18 months	Every 13 weeks	15 weeks
After 18 months	Every 26 weeks	30 weeks
Note: 1 Includes AMS, MHT, MHH, HP2 and any other steel with a hardness greater than 260BHN.		

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6 False flange damage on stock rails and crossings in S&C

Irregular, and mainly traverse, severe surface damage is called 'false flange damage'. Flattening or hollowing of the rail head will usually occur.

Where false flange damage has occurred, grind and weld repair to remove cracking and to reinstate a suitable rail profile.

A speed restriction is not required unless tongue lipping or an ultrasonically detected defect is present.

Rectify to the timescales shown in Table 2.

Table 2 – Rectification timescales for grinding or weld repair to remove false flange damage	
Track category	Action
1A, 1 & 2	Repair within 13 weeks
3 & 4	Repair within 26 weeks
5 & 6	Repair within 52 weeks

7 Inspection for plain rail sidewear

Checks shall be made for localised sidewear in S&C. Details for sidewear monitoring are in NR/L2/TRK/001/mod9.

8 Management of gauge

8.1 General

Track gauge in S&C is maintained to meet the requirements of NR/L2/TRK/001/mod11 except that at the switch toes and within the movable length of switches.

Track gauge in this length is maintained to tighter tolerances (see section 8.5).

Achieving the correct gauge is important to maintain other critical dimensions (such as free wheel clearance) and reduce the failure rate of components (such as stretcher bar assemblies due to flange back contact).

Look for the early signs of gauge spreading (e.g. wear pattern on top of rail, crushed or displaced ferrules and insulators, bent chair screws, sheared screws in concrete bearers and baseplate shuffle).

When work is carried out which allows the opportunity to regauge the track (e.g. retimbering the switch area or the installation of a new switches), the target for the installed track gauge shall be within +3mm and –2mm of design gauge.

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8.2 Detailed gauge inspections

8.2.1 Frequency of inspections

The SM[T] shall undertake detailed gauge inspections of S&C in running lines at the frequencies shown in Table 3.

Table 3 – Frequency of detailed S&C inspections	
Bearer type	Frequency
Timber	52 weekly
Concrete	104 weekly

Reduce the interval between detailed gauge inspections in areas where:

- a) the component condition is poor, or
- b) there are high rates of wear, or
- c) there is significant deterioration.

8.2.2 Objective of detailed gauge inspections

The objective of the detailed gauge inspection is:

- a) to create a periodic report of gauge and flangeway dimensions;
- b) confirm construction details;
- c) to collect information to drive maintenance activity (e.g. monitor deterioration rates so that maintenance work can be effectively planned).

8.2.3 Detailed gauge inspection reports

Record detailed inspections using the appropriate report form:

- a) TEF3060 – Inside slip,
- b) TEF3061 – switch diamond,
- c) TEF3062 – outside slip,
- d) TEF3068 – standard turnout.

The TME shall review the inspection reports with the SM[T].