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Level 3 Module

Signalling Installation – Track Circuits: Bonding

Endorsement and Authorisation

For endorsement and authorisation, please refer to NR/L3/SIG/11303.

This module is a reformatted version of the previous Signalling Installation Handbook with no change to the content other than correction of terminology.

It represents historic best practice which may no longer be relevant.

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Issue record

Issue	Date	Comments
2	September 2010	Reformatted version of previous document incorporating the text of the installation handbook.
1	August 2000	First issue.

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 4 December 2010.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 4 to continue to comply with the Issue of any relevant Network Rail Standards current when GRIP Stage 4 was reached and not to comply with requirements contained herein, unless the designated Standard Owner has stipulated otherwise in the accompanying Briefing Note.

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Contents

1 Introduction	4
2 Responsibilities For Bonding Installation.....	4
3 Fishplate Or Rail Joint Bonds.....	5
4 Bonding Of Points And Crossings	6
5 Jumper Cables – General	6
6 Jumper Cables - Identification.....	7
7 Track Circuit Interrupters.....	7
8 Track Circuit Bonding On Electrified Lines	8
9 Yellow Bonding	9

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1 Introduction

General information on track circuit bonding may be found in the appropriate part of the Train Detection Handbook.

2 Responsibilities For Bonding Installation

All responsibilities are subject to current contracts with the infrastructure manager, so you should confirm the following details with your supervisor before starting work.

The organisation undertaking signalling installation is responsible for:

- All fishplate bonds in non-traction return rails.
- All fishplate bonds in traction return rails of a.c. only electrified areas.
- The position of all IRJs.
- All jumper cables between separate sections of non-traction rails.
- In a.c. electrified areas (excluding the former Southern Region), all rail to impedance bond connections and connections between impedance bonds on the same track.
- In dual a.c./d.c. and d.c. electrified areas (excluding the former Southern Region), the responsibility for impedance bond connections is subject to special arrangements between the signalling and electric traction organisations.
- On the former Southern Region, impedance bond connections for track circuit only purposes.
- All track circuit rail connections.
- The insulation of all rods connected to the rails and switches (see Module 2S05).

The organisation undertaking electric traction installation is responsible for:

- All fishplate bonds in d.c. or dual a.c./d.c. traction rails.
- All jumpers bonds between separate sections of traction return rails and between the centre connection of impedance bonds in different tracks.
- On the former Southern Region, rail to impedance bond connections for traction purposes.
- All other permanent traction related bonding.

The organisation undertaking permanent way installation is responsible for:

- The insulation of all point soleplates, tiebars and stretcher bars (see Module 2S05).
- The installation of all IRJs.

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3 Fishplate Or Rail Joint Bonds

To provide electrical continuity across rail joints within a track circuit, the rails on each side of the joint need to be bonded together. Fishplate bonds use 4.29mm diameter bare galvanised steel wire secured to the rail by tapered channel pins. Two bonds are fitted across each joint.

Any temporary bonding that may be required across rail joints that are later to be welded up should be to the same standard as permanent bonding.

To install the bonds, drill two holes, 7.2 mm diameter and 76 mm apart, through the rail web in the first sleeper bay each side of the joint. The holes should be 57 mm (± 2 mm) above the base of the rail. (Rail drills should be adjusted to this height. Formerly the standard height was 65 mm, but a lower position has now been adopted to reduce the likelihood of damage by rail-mounted machines). Permitted drilling zones are shown on drawing RE/PW/596.

Where 22 mm holes are required, e.g. for Cembre connectors, these should still be provided at 65 mm to avoid infringing upon the prohibited drilling zone.

Over rail drilling machines are regarded as an obstruction of the line, and when used need to be protected in accordance with Rule Book. Hand drills are usually regarded as being in the same category. An under-rail drilling machine is available which does not require removal from the rail for passing trains. See Module 2P10 of this manual for more information.

To provide a good electrical connection, it is essential that the holes are clean and free from rust before the bond pins are inserted. If the pins are not to be inserted immediately, the holes should be fitted with waxed wooden plugs to protect the surface until they are required for use.

Bond wire is supplied in standard lengths of 1670 mm which is the correct length for standard rail joint bonds. Each bond should be fitted between corresponding holes on each side of the joint (i.e. from the nearer hole on one side of the joint to the far hole on the other side); all bonds are thus the same length. (See Figure 1.)

Bonds should normally be fitted on the inside of the rail, and run close to the base of the rail. They should not be threaded through the fishplates or rail fastenings. In areas prone to vandalism, the bonds may be passed under the rail so that they are less vulnerable; when this is done, one end of each bond is attached to the inside of the rail and the other end to the outside. However, bonds should not be passed to the outside of the rail if there is a conductor rail on that side.

Pass one end of the bond wire through the appropriate hole in the rail from the inside, with 25 mm protruding through the hole on the outside of the rail. Insert the tapered end of the channel pin into the hole from the outside, and check that the bond wire is lying in the channel of the pin. Hammer the pin into the rail. Check that the pin and the bond are both securely held in the rail.

Lay the bond alongside the foot of the rail, bending it gently as necessary to pass round rail fittings. Pass the other end of the bond through the appropriate hole in the rail and secure it with a tapered channel pin as described above.