



AUSTRALIAN RAIL TRACK CORPORATION LTD

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Discipline
Engineering Standard – NSW

Category
Signalling

Title
**Cables for Railway Signalling Applications -
Traction Return Bonding and Track Connection
Cables**

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About This Standard

This Specification describes the general requirements for Traction Bonding and Track Connection Cables, to be manufactured and supplied for Signalling applications on the Australian Rail Track Corporation's system in NSW.

Document History

Primary Source – RIC Standard G 8001 Version 2.0

List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	01/09/2004		Reformatting to ARTC Standard
1.2	14/03/2005	Disclaimer	Minor editorial change Document reformatted
1.3	10/02/2015	5	Type of cable updated for 7/19/0.30mm Galvanised Steel/HD-85-CSP (Orange) (previously 7/19/0.26mm)

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1. Introduction

This Specification describes the general requirements for the cables listed below to be manufactured and supplied for Signalling applications on the Australian Rail Track Corporation's system in NSW. These cables have successfully used in the past, but alternate cables that are equivalent or superior in performances will be considered for specific applications.

- Flexible Copper Conductor, HD-90-CSP Insulated Cable for Track Connection Purposes.
- Flexible Copper Conductor, HD-90-CSP Insulated Cable for Traction Return Bonding Purposes.
- Flexible Aluminium Alloy Conductor, R-90-CSP Insulated Cable for Track Connection Purposes.
- Flexible Aluminium Alloy Conductor, R-90-CSP Insulated Cable for Traction Return Bonding Purposes.
- Flexible Galvanized Steel Conductor, HD-85-CSP Insulated and Sheathed Cable for Track Connection Purposes.
- Flexible stainless Steel Conductor, HD-85-CSP Insulated Cable for Track Connection Purposes.

2. Applicable Documents

2.1 Australian Standards

This Specification refers to the following Australian Standards:

AS 5000-1999	Electric Cables – Polymeric insulated for working voltages up to and including 0.6/1KV
AS3178:	Silicone Rubber Insulated Cables
AS 3569/89:	Steel Wire Ropes
AS 2837-1986	Wrought Alloy Steels – Stainless Steel Bars and Semi-Finished Products

2.2 ARTC Specifications

This Specification refers to the following ARTC Specifications and Standards:

Specification SPS 40:	Cables for Railway Signalling Applications-General Requirements.
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3. Ratings

Cables shall be rated at 0.6/1KV

4. Environmental Conditions

Environmental conditions are as described in Specification SPS 40 “General Requirements” with the addition of:

- Operating Temperature :-10 C to 90 C
- Direct Exposure to UV radiation

5. Types Of Cables

Traction Return Bonding Cables

- 608/0.5mm Copper/HD-90-CSP (Orange)
- 962/0.5mm Copper/HD-90-CSP (Orange)
- 925/0.5mm Aluminium/R-90-CSP (Orange)
- 1525/0.5mm Aluminium/R-90-CSP (Orange) Track Connection Cables
- 84/0.3mm Tinned Copper/HD-85-CSP (Orange)
- 7/19/0.30mm Galvanised Steel/HD-85-CSP (Orange)
- 7/19/0.26mm Stainless Steel/HD-85-CSP (Orange)
- 494/0.50mm Alluminium/HD-90-CPE (yellow)

Track Connection Cables are required for electrical connections between individual rails of railway lines and terminal points clear of the Track and will carry control circuit current for the detection of trains and the consequent operation of the signalling system.

Current passing through the cable will not exceed 15 Amps D.C. or 50Hz AC for the Copper Conductor Track Connection Cables.

Current passing through the cable will not exceed 10 Amps D.C. or AC 50Hz for the Galvanised Steel and Stainless Steel Conductor Track Connection Cables.
Voltage to earth will not exceed 150 Volts.

Traction Return Bonding Cables shall be able to withstand current of more than 2000A for items 1 & 3 and more than 4000A for items 2 & 4, for a continuous period of 20 minutes.

6. Construction

6.1 Length

Length shall be as specified in Specification SPS 40

6.2 Conductor

Some cables have proven suitability in the past for certain applications. Other forms of cables that are suitable for Track connection and traction bonding requirements will be considered for use. Fine stranding of Copper cables are acceptable for Track connections.

6.2.1 Galvanized Steel Track Connection Cables:

Galvanised Steel conductors shall consist of pre-formed 7/19/0.26mm flexible cable manufactured from drawn galvanised grade 1570 steel to AS 3569. The overall diameter of the conductor is critical in respect of the method of attaching to the rails. This incorporates a shaped metal pin which, together with the cable, is driving fit in a 7mm hole drilled in the rail. Minor changes in the wire diameter and changes to the tensile strength will be considered, where these do not detract from the flexibility and fatigue resistance of the cable.

6.2.2 Copper Track Connection cables:

Copper conductors shall be annealed and tinned.

6.2.3 Stainless Steel Track Connection Cable

7/19/0.26 Stainless Steel conductor in accordance with AS 2837-1986, 304 grade, 4mm diameter shall be used.

6.2.4 Copper Traction Return Bonding Cables:

Copper conductors shall be annealed and un-tinned.

Non-metallic material shall not be incorporated in the conductor and the strands shall not be lubricated.

6.2.5 Aluminium Traction return Bonding Cables:

Aluminium alloy conductors shall be 925/0.5 or 1525/0.5.

6.3 Insulation

The type of insulating material shall be in accordance with Australian Standard AS5000. The insulation of all cables covered under this Specification shall be coloured bright orange or Yellow.

The insulation and the conductor shall be separated by a Mylar barrier tape wound on the conductor.

The minimum radial thickness of the insulation shall be not less than 3.5mm. The whole of the insulating material shall be applied in one application so that there are no potential areas of separation.

6.3.1 Galvanized Steel & Stainless Steel Track Connection Cables:

The whole of the insulating material used shall be type HD-85-CSP having mechanical properties as set out in AS 5000 or better. In addition the radial thickness of the insulation shall be as laid down in AS 5000 taking the conductor area as being 4.52 square millimetre.

6.3.2 Copper Track Connection cables:

The whole of the insulating material used shall be type HD-85-CSP having mechanical properties as set out in AS 5000 or better.

6.3.3 Aluminium Track Connection cables for Tuning Units:

Flexolex alternative HD-90-CPE insulation has been proved successful for this application.

6.3.4 Copper Traction Return Bonding Cables.

The whole of the insulating material used shall be type HD-90-CSP having mechanical properties as detailed in AS 5000 or better.

6.3.5 Aluminium Alloy Traction Return Bonding Cables

Insulation material used for these cable shall be R-90-CSP having mechanical properties as detailed in AS 5000 or better.

7. Identification (Marking)

The following information additional to that required by Specification SPS 40 shall be provided.

On Cables

Cable manufacturer's Identity, year and the legend "ARTC - NSW" shall be marked on the cables.

On Reels

The following additional legends are required.

Copper conductor Track Connection Cable:	"COPPER/RUBBER FLEXI"
Galvanised Steel, Track Connection Cable:	"STEEL/RUBBER FLEXI".
Stainless Steel, Track Connection Cable:	"SS/RUBBER FLEXI"
Aluminium Traction Return Cable:	"ALUMINIUM/RUBBER FLEXI"

8. Tests

8.1 Conductor Resistance (Specified values)

Conductor Size	Max. Resistance (Specified values)
7/19/0.26mm	28.0+1.5 Ohm/km
84/0.30mm	3 Ohm/km
494/0.50mm	0.331 Ohm/km
608/0.50mm	0.22 Ohm/km
962/0.50mm	0.16 Ohm/km
925/0.50mm Al	0.205 Ohm/km
1525/0.50mm Al	0.124 Ohm/km

8.2 Insulation Resistance Measurement

Insulation resistance tests are not required.

9. Inspection & Acceptance test Procedure

Inspection and acceptance test procedure shall be as detailed in Specification SPS 40 -General Requirements. The results of the tests shall be recorded in the test report appear in Specification SPS 40