TRANSNET
freight rail

A Division of Transnet Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

SPECIFICATION FOR HARD DRAWN, GROOVED, COPPER CONTACT WIRE, FOR ELECTRICAL TRACTION PURPOSES

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Date: 9 December 2009

Circulation Restricted To:

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1.0 SCOPE

This specification covers Transnet's requirements for the manufacture, testing and supply of 107mm² and/or 161mm² hard drawn, grooved, copper contact wire.

2.0 REFERENCES

2.1 The following specification and drawing are referred to herein:

2.1.1 British Standards Specification:

BS EN 50149 : Railway application – Fixed installation – Electrical traction – Copper and copper alloy grooved contact wires

2.1.2 Transnet Drawing:

CEE-TW-433 : Steel Drum for Contact Wire.

3.0 APPENDICES

The following appendices form an integral part of this specification:

3.1 Appendix 1: Cross-sectional profile of the 107mm² and 161mm² contact wire.

3.2 Appendix 2: Special Marking for Identification Purposes.

(A) specifies chemical composition of the brass insertion
(B) specifies the nature of the imprinting

3.3 Appendix 3: Test Results of 107mm² Grooved Contact Wire.

This appendix specifies the form in which the test results for 107mm² grooved copper will be presented in order to check compliance.

3.4 Appendix 4: Test Results of 161mm² Grooved Contact Wire.

This appendix specifies the form in which the test results for 161mm² grooved copper will be presented in order to check compliance.

4.0 METHOD OF TENDERING

4.1 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance.

4.2 A statement of non-compliance shall be motivated by the tenderer.

4.3 The test results (Appendix 2A, 3 and 4) to this specification, shall be fully completed by Tenderers.

4.4 Failure to comply to clauses 4.1, 4.2 and 4.3 may preclude a tender from further consideration.

5.0 MATERIAL

5.1 The wire shall be made from high conductivity hard drawn copper in accordance with specification BS EN 50149.

5.2 The wire shall comply with all the properties detailed in Appendix 3 and 4 hereof for 107mm² and 161mm² respectively.

6.0 MARKING

6.1 A marking groove shall be in accordance with Appendix 2(C). The groove will also comply with the following requirement.

6.1.1 A brass strip of cross sectional area not greater than 1% and not smaller than 0,5% of total wire area will be embedded into a groove in such a way that the removal of the brass is not possible by hand.

6.2 The wire shall have imprinted on the top of the lobe the words TRANSNET, as indicated in Appendix 2(B).

7.0 SIZE AND LENGTH

7.1 The wire shall have a cross sectional area of 107mm^2 or 161mm^2 and shall have dimensions in accordance with drawings shown in Appendix 2(A).

7.2 The 107mm^2 wire shall be supplied in continuous lengths of 1610m plus 2m minus 0 (zero) and the 161mm^2 wire shall be supplied in continuous lengths of 1830m plus 2m minus 0 (zero).

8.0 DRUMS AND WINDING

8.1 Each drum shall be manufactured in accordance with Transnet's drawing No. CEE-TW-433 and shall have the wire tightly and evenly wound thereon.

8.2 The inner end of each length shall be marked at a distance of 30m from that end in such a manner as to give an observer, 6m away from the drum, an indication of the approaching end of the length when the wire is being reeled off at the rate of 60m per minute.

8.3 The wire shall be wound on the drum with the vertical axis of the wire at right angles to the axis of the drum and in such a manner that the contact surface of the wire shall be to the bottom when the wire is unreeled of the top of the drum. The wire shall be wound in uniform layers with turns tightly together and free from kinks and crossovers.

8.4 Both ends of the wire must be securely fixed to the drum flange.

9.0 MARKING OF DRUMS

9.1 Each drum shall have, clearly marked on the outer surface of one flange, the following information:

- The manufacturer's name
- The size of the wire
- The total length of the wire contained thereon
- The gross mass
- The net mass
- Transnet's stores order number
- A suitable sequence number for identification purposes

9.2 Arrows indicating the direction of un-winding, must appear clearly marked on both flanges of the drum.

10.0 INFORMATION

Tenderers shall submit with their tenders the following information:

* Maximum resistance of the wire to be supplied, (Ω/km at 20 °C)
* Minimum tensile strength of the wire to be supplied (kN)
* Actual number and full details of the type of joints in each length of wire to be supplied
* Chemical composition of brass used in embedded strip

11.0 TESTS

11.1 A sample length of wire from the end of each drum shall be cut off for test purposes. When relevant, one sample length in five shall include a joint. All samples shall be tested to ensure compliance with clauses 5.2, 6.1.1 and 7.1 hereof. Whenever samples cut off in terms of the above, includes a joint, the exact location of this joint shall be clearly and positively marked by means of non destructive chemical etching. This is required to ensure that the wire at the joints can be tested for compliance with the requirements of clause 5.2.

11.1.1 After removal of a sample length of wire from a drum, the actual length of wire remaining thereon, shall not be less than that called for in clause 7.2.

11.2 Since creep of the contact wire has to be taken into account during erection stages and afterwards during normal maintenance, tenderers must give figures indicating the initial and final creep rate that can be expected. The tensile stress for these creep rates should also be indicated.

11.3 Tests to confirm the compliance of the wire with the technical properties laid down in clause 5.2, shall be carried out on the sample lengths by the manufacturer as detailed in specification BS EN 50149.

11.4 Transnet reserves the right to witness all tests.

11.5 Copies of test certificates giving details of all tests results are to be handed, immediately after the tests, to Transnet, to confirm that the wire and drums meet the electrical and mechanical properties required by this specification.

11.5.1 The test certificates to be supplied to Transnet shall be as shown in Appendix 3 and 4.

APPENDIX 1

CROSS-SECTIONAL PROFILES

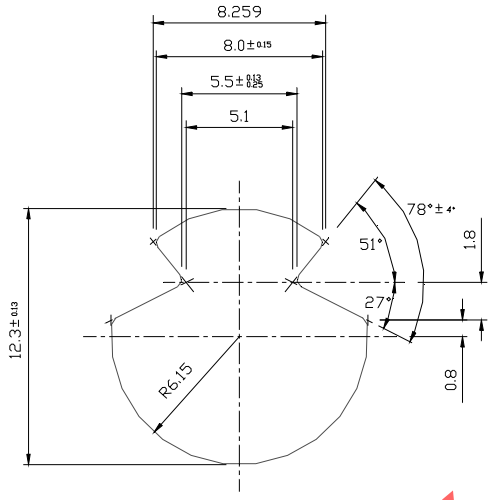


Figure 1: Cross-sectional profile of a 107mm² Contact wire.

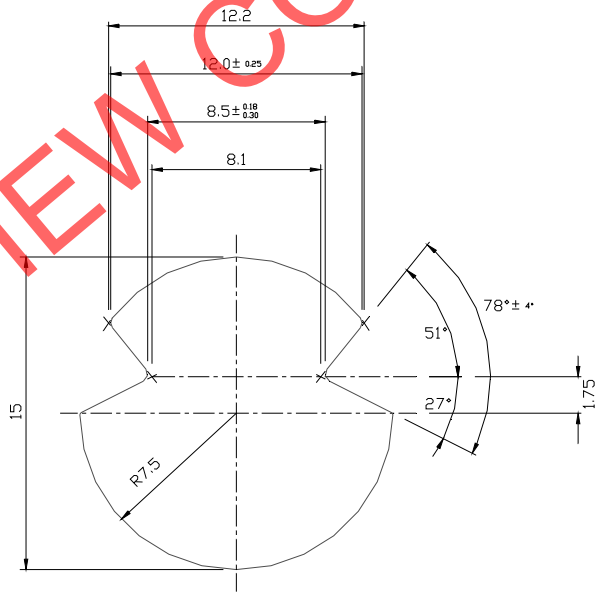


Figure 2: Cross-sectional profile of a 161mm² Contact wire.

APPENDIX 2A

SPECIAL MARKING FOR IDENTIFICATION PURPOSES

(A)

Customer's Name:_____

Customer's Order No.:_____

Drum No.:_____

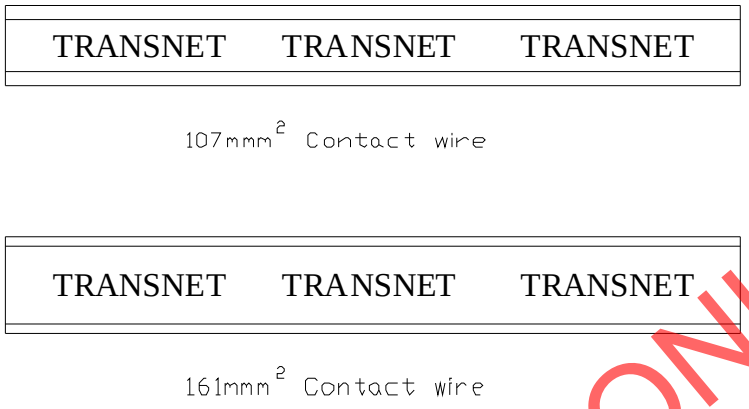
Date: _____

Chemical composition of contaminant insert

Cu	
Sn	
Pb	
Fe	
Al	
Mn	
Ni	
Sb	
As	
Pb	
Si	
Cd	
Zn	
Impurity	

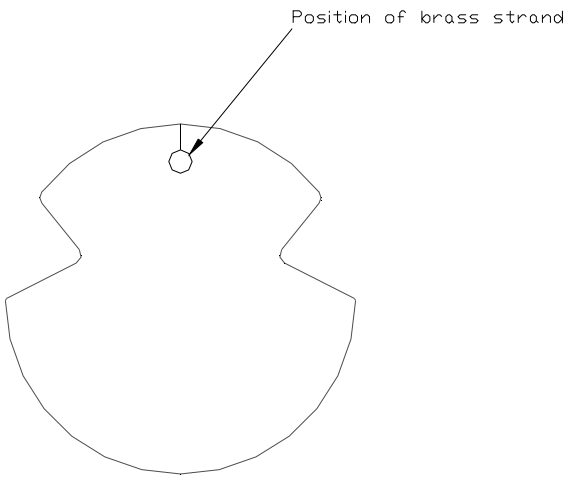
SPECIAL MARKING FOR IDENTIFICATION PURPOSES

(B)



In both cases (107mm² and 161mm² contact wire) the height of the text must be 3.5mm ±0.5

(C)



TEST RESULTS OF 107mm^2 GROOVED CONTACT WIRE

Customer's Name: _____

Customers Order No.: _____

Drum No.	Nominal Mass per km (kg)	Area (mm²)	Resistance per km @ 20°C	Tensile strength (Mpa)	Elongation on 200 mm (%)	Hardness (Brinell or Rockwell)	Twists in 250 mm	Reverse Bends	Notes
	951 ±3%	107	0.1695 max	36 min	3.0 min	96 HB 1/10 or 54 HRB min	5 min	5 min	

Signed: Quality Inspector: _____ Date: _____

Testing Authority: _____ Date: _____

TEST RESULTS OF 161mm^2 GROOVED CONTACT WIRE

Customer's Name: _____

Customers Order No.: _____

Drum No.	Nominal Mass per km (kg)	Area (mm²)	Resistance per km @ 20°C	Tensile strength (Mpa)	Elongation on 200 mm (%)	Hardness (Brinell or Rockwell)	Twists in 250 mm	Reverse Bends	Notes
	1430 ±3%	161	0.1125 max	32.5 min	3.0 min	96 HB 1/10 or 54 HRB min	5 min	5 min	

Signed: Quality Inspector: _____ Date: _____

Testing Authority: _____ Date: _____