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RAIL INFRASTRUCTURE CORPORATION

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Rolling Stock Engineering Standard

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Material Specification

Title
SPECIFICATION FOR CASE HARDENED GEAR WHEELS AND PINIONS

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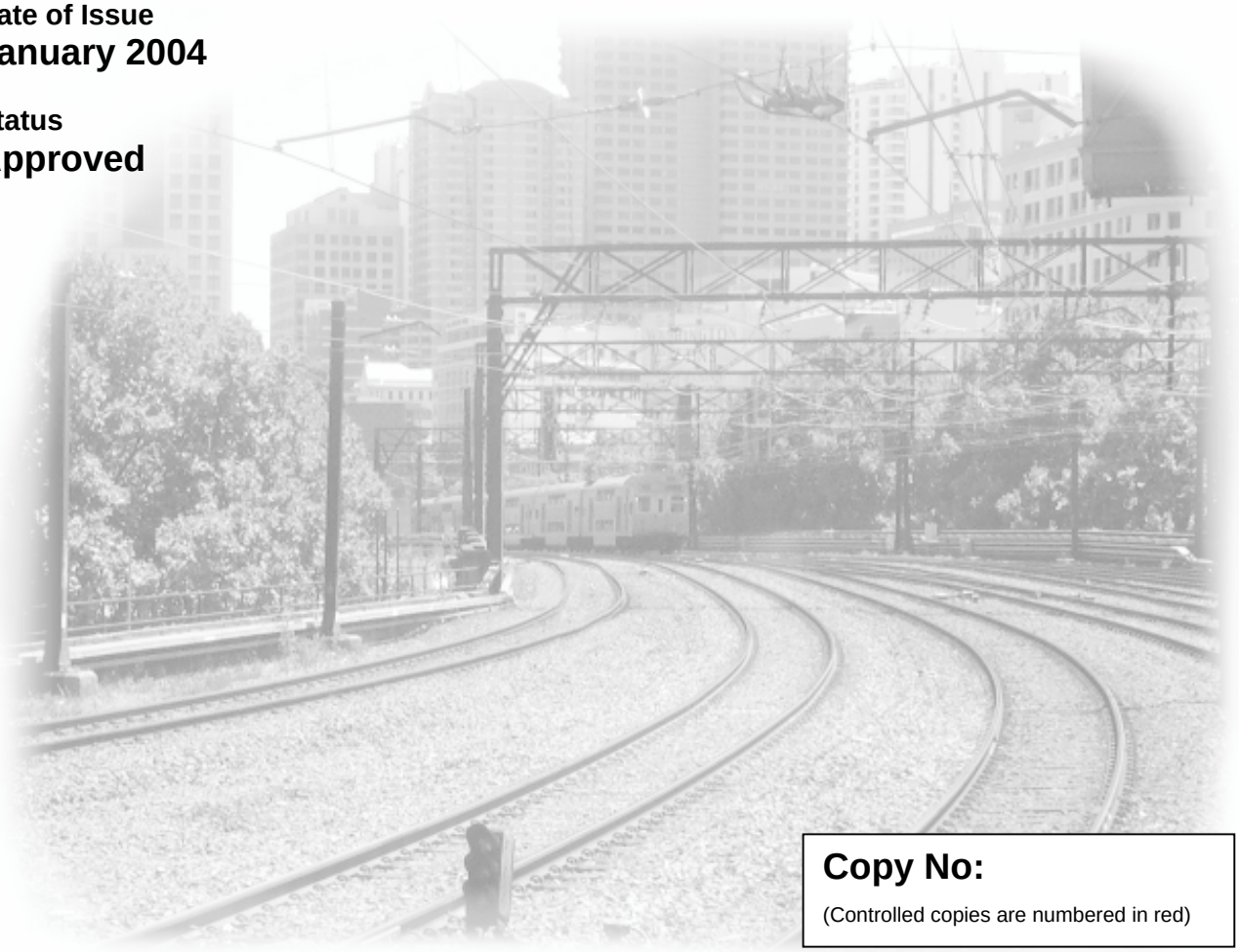

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About This Standard

This specification is based on the TRS 0144

Version History

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Table of Contents

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1 Scope

This specification provides for the manufacture, supply and delivery of case hardened, forged, alloy steel gear wheels and pinions for traction motors used on electric and diesel electric locomotives and electric rolling stock

2 General

The form and dimensions of the work are indicated in this specification and the current drawings that accompany it, and the manufacturer shall not be permitted to depart from any of the conditions contained therein without authority, in writing.

3 Drawings

The drawings for any gear or pinion shall be read in conjunction with, and accepted as a component part of this specification. In the event of any inconsistency between the drawing for any particular gear or pinion and this specification the inconsistency is to be reported.

4 Material

The grade of the steel for gear wheel and pinion forgings shall be to AS 1444 grades X3312 or X9315, or DIN 17210 grade 17CrNiMo6.

The manufacturer shall supply grade certification of the steel used.

The tenderer is free to submit an alternative material which is considered, at least the equivalent of the material specified above provided that he supply with his tender, a complete specification and analysis of the material he proposes to use. The particulars supplied shall include details of the heat treatment recommended, also the resultant physical properties of the core and hardness figures of the hardened surface after final heat treatment.

5 Machining

The gears and pinions shall be free from sharp edges, made to the dimensions shown on the relevant drawings and , where tolerances are given, shall be within these limits.

Particular care must be taken to ensure that the entire surface of the teeth are free from scratches which could cause the failure of the teeth by fatigue.

6 Heat Treatment

After machining, the gear wheel or pinion shall be blanked off at all positions that are not to be carburised. After carburising to the required depth, the gearwheel or pinion shall be core refined, case hardened and tempered. The mechanical properties of gears shall be in accordance with either the equivalent grades in BS 970 Part 1 - Wrought Steels or the DIN specification as is appropriate to the grade of steel used. For example:-

AS1444 Grade X3312BS970 equivalent - grade 655M13

AS1444 Grade X9315BS970 equivalent - grade 835M15

DIN 17210 grade 17CrNiMo6

The hardness and depth of case hardening shall comply with the requirements of BS235, Gears for Electric Traction.

The method of measuring the case depth shall be to the hardness methods of AS1982.

After heat treatment all scale shall be removed from the gear wheels and pinions.

The method of case hardening shall be submitted for approval prior to the commencement of any processing.

7 Dimension Tolerances

The permissible errors and tolerances for gear wheels and pinions shall be as specified in BS235, Gears for Electric Traction.

8 Finish of Bore

Where the gear wheels or pinions are required to be supplied with the bore in the finished condition, the bore shall be ground concentric with the pitch circle of the teeth to the finished dimensions after heat treatment.

9 Tooth Finish

The finish of the gear wheels and pinions shall be such as to provide a correct and quiet running tooth surface.

Where lapping or a profile ground finish is specified it shall be carried out by the approved process.

10 Marking

The finished gear wheels and pinions shall be marked with the manufacturers brand and serial number in accordance with the particulars shown on the relevant drawings.

11 Test for cracks

All finished gear wheels and pinions are to be tested, using an approved method to ensure that they are completely free from cracks and a certificate of test shall be supplied with each gear. Any gear wheel or pinion showing cracks will not be acceptable.

12 Protection of gear wheels and pinions.

Prior to delivery, the gear wheels and pinions shall be given a liberal coating of a rust preventative of the hard drying type such as Valvoline Tectyl 121 B, Applied chemicals 1012, Castrol Rustilo 2509 or Ardrox 3140.

The gears and pinions shall also be packed in such a manner as to ensure against injury during transport.

The outside of the packages shall be clearly labelled to show the drawing and item numbers of the contents.

13 Referenced Documents

13.1 RIC Standards

RSS 0043 Coil Spring Groups

13.2 Australian Standards

AS 1444 Wrought Alloy Steels

AS 1982 Method for Measurement of Case Depth in Steels

13.3 Other Standards

BS 235 Gears for Electric Traction

BS 970 Part 1 Wrought Steel

DIN 17210

