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RAILINFRASTRUCTURE CORPORATION

Discipline

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Maintenance

Title

WELDING RECLAMATION AND REPAIRS OF DRAWGEAR

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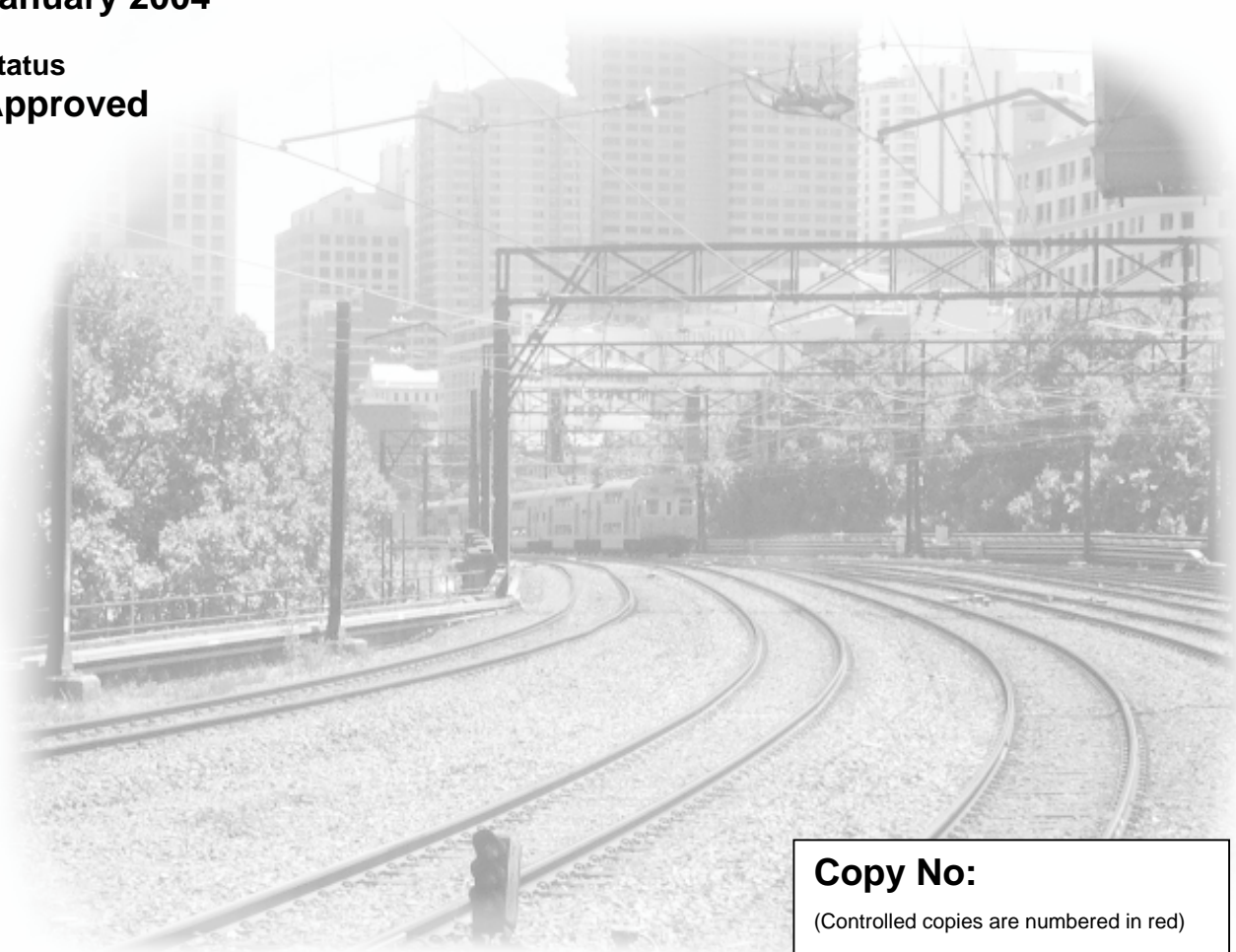
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About This Standard

This standard is based on the following TRS Standard:

TRS 1373 Specification for welding reclamation and repair of drawgear.

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1 Scope

This Standard outlines the requirements that are to be incorporated in the welding procedures to ensure the reliability of the welded product.

Qualified Welding procedures shall be used and comply with the requirements of AS 1988 and AS 1554. All work shall comply with AS 1988 and AS 1554.5 for fracture repair and build up of Auto Coupler Bodies and AS 1988 and AS 1554.1 for Auto Coupler Knuckles and Yokes.

Welding operators shall be qualified to the Qualified Welding Procedures.

2 Reclamation Of Automatic Coupler Knuckles

2.1 Reclamation Requirements

A knuckle shall be removed for reclamation when worn to the edge of the counter sunk recess of the 25mm hole through the knuckle. This will indicate approximately 8mm of metal left. All fractured knuckles shall be scrapped.

NOTE: In some failures which have been examined rods and plate have been placed in the worn area and welded over to assist in the filling up of the worn area. ***UNDER NO CIRCUMSTANCES SHALL THIS PRACTICE BE USED OR ACCEPTED.***

2.2 Material of Knuckles

General specification of knuckles has been to A.A.R. M201 Grade E but current drawings refer to Cast Steel to AS 2074 grade L6B-2 as an alternative.

Carbon: 0.35 max

Manganese: 1.85max

2.3 Preparation Prior to Welding

Thoroughly clean all surfaces to be rebuilt by grinding or wire brushing until all grease, oil and scale have been removed.

The surface to be welded shall be checked for any evidence of flaws. The surface should also be subjected to blows from a hammer to confirm the substrata is solid; any hollow sounding from this test shall be cause to reject the knuckle for further work.

2.4 Preheat Requirements

The knuckle should be heated in an oven/furnace if practicable, for even heating. If an oven is not available the use of the oxy/fuel gas heating equipment is satisfactory. The heating shall be slow and uniform to a temperature of 250 degrees C.

Measurement shall be made by a suitable touch type pyrometer or temperature sensitive crayon.

2.5 Welding Consumables

Welding consumables shall comply to relevant Australian Standard.

Electrodes shall be stored and conditioned as per W.T.I.A. TECH NOTE 3 or as per manufacturer's recommendations.

2.6 Welding

Following cleaning and preheating, welding may commence using the qualified welding procedure. It is recommended that run on and run off tabs be used. This will assist in final dressing as well as eliminating any problems of starts and stops on the knuckle.

Welding should commence at the extremity of the worn area, running the full length of the knuckle, and proceeding by stringer beads in pad formation outwards to cover the extent of the worn area.

Following this initial layer, the contour may be restored in a sequence appropriate to the amount of wear which has taken place as indicated by the template. Frequent use of the template will assist in the location of runs to provide a smooth contour, thus minimising final contour dressing.

Upon completion of the welding in the face area the run on/run off tabs are to be removed by oxy cutting or cutting disc and the ends finished to a satisfactory condition.

The knuckles are then allowed to cool slowly, in still air or preferably under a thermal blanket.

NOTE: Weld Procedure Qualification hardness testing shall be a minimum 240 HVN.

2.7 Inspection and Finish

All surface irregularities shall be finally ground off to Gauge and the deposited weld metal ground at the layer edges to merge smoothly with the knuckle contour.

After grinding to contour, the surface of the weld and adjacent areas shall be visually inspected for any flaws and if necessary magnetic particle tested to verify any problems.

3 Fracture Repair Of Auto Coupler Bodies

3.1 Material of Auto Coupler Bodies

See Section 2.2.

Material of older couplers is lower strength cast steel but for welding purposes all are to be considered the material designated in 2.2.

3.2 Preparation Prior to Welding

Thoroughly clean the surface to be repaired by grinding or wire brushing until all grease, oil and scale have been removed.

3.3 Preparation of Fracture

Fractures are to be removed by air arc gouging or by plasma gouging. The heat affected area (HAZ) shall be removed by grinding. If the fracture goes through coupler body the root gap and root face can be prepared with a cutting disc. The prepared area shall be tested using the magnetic particle method to ensure the fracture has been completely removed.

3.4 Preheat Requirements

Preheat to 250⁰C uniformly using an oven or furnace if practicable; oxy/fuel gas equipment is satisfactory. Leave in still air for five minutes then test coupler body with a digital pyrometer or temperature indicating crayon to ensure the correct preheat has been obtained. Temperature shall not exceed 300⁰C. Inter-run temperature is not to be any lower than 200⁰C and if the temperature does drop preheating shall be recommenced.

3.5 Welding Consumables

See Section 2.5.

3.6 Welding

Following cleaning and preheating, welding may commence using the qualified welding procedure.

It is recommended that run on and run off tabs be used. This will assist in final dressing as well as eliminating any problems of start and stops on the Auto Coupler Body.

Mechanical cleaning shall be carried out between runs.

Peening may be used on intermediate weld runs for control of shrinkage stresses in thick welds to prevent cracking. NO peening shall be done on the root or surface layer of the weld or in the base metal at the edges of the weld.

Care should be taken to prevent overlapping or cracking of the weld or base metal.

Upon completion of welding the run on run off tabs are to be removed by oxy cutting or cutting disc.

The Auto Coupler Body is then allowed to cool slowly in still air or preferably under a thermal blanket.

3.7 Inspection and Finish

The surface of the repair area shall be ground and blend smoothly into the surrounding surface without abrupt changes in contour.

After grinding the surface of the weld and adjacent area shall be visually and magnetic particle tested for any flaws.

4 Build Up Of Areas On Auto Coupler Bodies And Yokes

4.1 Material of Auto Coupler Bodies and Yokes

See Section 2.2.

4.2 Preparation Prior to Welding

See Section 3.2. The area to be built up shall be magnetic particle tested to ensure the surface to be welded is free from flaws.

4.3 Preheat Requirements

See Section 3.4.

4.4 Welding Consumables

See Section 2.5.

4.5 Welding

See Section 3.6.

4.6 Inspection and Finish

See Section 3.7.

5 Non-Destructive Testing

Non-destructive testing shall be in accordance with the procedure as laid down in the relevant application Standard and in accordance with “Methods of Testing Codes”.

6 References

6.1 Australian Standards

AS 1554 Part 1 and 5 Structural Steel Welding Code

AS1796 Certification of Welders and Welding Supervisors

AS 1988 Fusing Welding in the Production Rectification and Repair of Steel Castings

AS 2074 Steel Castings

AS 2214 Certification of Welders and Supervisors – Structural Steel Welding

AS 2980 Qualification of Welders