

Justification:
Safety
(Maintenance)

Private Owner Circular Letter 557 Issue 2

Title

Magnetic Partical
Testing of Instanter
Couplings and
Drawhooks

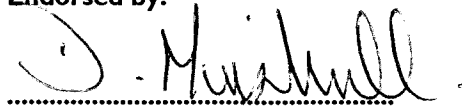
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ENDORSEMENT & AUTHORISATION

Endorsed by:



D. Minshull, Senior Standards Engineer

Authorised by:



K. Stannard, Vehicle Conformance Engineer

I. INTRODUCTION

POCL 557, Issue 2 updates the requirements for Magnetic Particle Testing of Instanter couplings and drawhooks. It also details procedures and limits that may be applied in order to reclaim drawhooks.

2. SCOPE OF TESTING

Commencement of testing

Testing and identification shall commence on all vehicles of the same 'CARKND', working within one particular traffic flow from one point of origin, at the earliest opportunity after **two** incidents of failure within a period of 6 months (drawhook, coupling or both).

Depending on the circumstances it may be necessary to extend the inspections to vehicles of the same 'CARKND' in other traffic flows. The necessity for this shall be determined between Senior Standards Engineer, PWRA Management Group and the Owners/repairers concerned.

If vehicles are transferred out of the operating pool in which the incidents of failure occurred, or their Instanter couplings/drawhooks are re-fitted to vehicles in another pool, then arrangements shall be made for the drawhooks and the Instanter couplings to continue to be tested at the required periodicity.

Records shall be retained for at least two years to demonstrate that testing was carried out.

Cessation of testing

Testing and identification may cease if any of the following applies:

- a) Evidence is provided to the satisfaction of Senior Standards Engineer, PWRA Management Group that failures were due to a faulty batch of components that have all been changed.
- b) No new cases of cracking are detected after regular testing for a period of two years and all 'red' marked items have been changed. (If 'red' marked items are to continue in service, testing shall be confined to them only).
- c) Evidence is provided to the satisfaction of Senior Standards Engineer, PWRA Management Group that the cause of cracking was not due to manufacturing defects or excessive wear and that the problem has been rectified.

3. **MAGNETIC PARTICAL TESTING PROCEDURES**

Magnetic particle testing shall only be carried out by operators and using equipment and in facilities approved in accordance GM/RT2005 'Certification Process for NDT Operatives, Equipment & Facilities Used for Inspecting T&RS'.

Relevant Standards

BS EN ISO 9934-1:2001 'Non Destructive Testing - Magnetic Particle Testing – General Principles'

BS EN ISO 9934-2:2002 'Non Destructive Testing - Magnetic Particle Testing – Detection Media'

BS EN ISO 9934-3:2002 'Non Destructive Testing - Magnetic Particle Testing – Equipment'

BS EN ISO 3059:2001 'Non Destructive Testing – Penetrant Testing and Magnetic Particle Testing – Viewing Conditions'

Equipment to be used

A.C. electromagnets shall conform to BS EN ISO 9934-3:2002 Note: DC electromagnets and permanent magnets may only be used by prior agreement with the Senior Standards Engineer, PWRA Management Group.

Magnets shall be capable of generating an adequate magnetic field and this shall be subject to periodic functional checks in accordance with BS EN ISO 9934-3:2002.

Verification adequate magnetization of the component surface is achieved shall be determined as required by BS EN ISO 9934-1:2001.

Magnetic inks and white contrast aid paints shall conform to BS EN ISO 9934-2:2002 .

Flux indicators shall comply with BS EN ISO 9934-1:2001.

Testing of detection media

In service testing of the detection media shall be carried out (using one of the reference blocks described in BS EN ISO 9934-2:2002 or a test block that exhibits similar discontinuities to those normally found in the component under test) to demonstrate its continued performance.

Ink media

When using ink media it shall be ensured that:

- a). There is good contrast between the detection media and the test surface.

- b). The area under test is evenly illuminated at a level of not less than 500 lux of daylight or artificial light. Strong reflections from the surface shall be avoided.

Fluorescent media

Where suitable black out facilities exist, ultra violet inspection lamps are available and the viewing conditions stipulated in BS EN ISO 3059:2001 are met, then fluorescent examination of the component may be undertaken. This eliminates the need to use white contrast aid paint.

When using fluorescent ink media:

- a). Testing shall be carried out with UV-A radiation wavelength of nominal maximum intensity at 365nm.
- b). The illuminance (ambient light) level in the blackout facility shall not exceed 20 lux.
- c). The UV-A irradiance at the inspection surface shall be greater than 10 W/m² (1000 μW/cm²).
- d). The UV-A lamp output shall be allowed to stabilise for not less than 10 minutes after switching on.
- e). The measurements shall be made under working conditions with the UV-A source turned on and stabilised.

4. INSTANTER COUPLINGS

Testing instanter couplings

Remove instanter coupling from vehicle and clean. Spray each end of each of the three links of the coupling, including the inner surfaces with a thin even layer of white contrast aid paint and allow to dry. Place the magnet across the area under test, ensuring that the pole pieces are correctly bedded down. Prior to testing use the flux indicator to provide a guide to the magnitude and direction of the tangential field as follows:

- a). Place the flux indicator onto the component surface under test and midway between the magnet poles with its long axis perpendicular to a line between the poles.
- b). Energise the electromagnet and the component surface and spray the flux indicator with magnetic ink.

- c). The flux indicator should display three lines of ink on the surface along its long axis.

Note: This guide does not verify that the tangential field strength is acceptable.

Testing shall be carried out on both sides of the coupling, ensuring all areas are tested by magnetising in at least two directions at 90° to each other. The magnetic ink shall be applied by spraying onto the area under test immediately prior to and during the magnetization. The application shall cease before magnetisation is terminated. The magnetic ink shall be allowed to flow onto the test surface under very little pressure so that the particles are allowed to form indication without being washed off. Sufficient time shall be allowed for indications to develop before moving or examining the component. Unless otherwise specified any Instanter coupling showing evidence of cracks shall be dealt with using the acceptance/rejection criteria detailed.

Acceptance/rejection criteria for Instanter couplings

- a). No cracks detected

Where no cracks have been detected the coupling shall continue in service, but shall be subject to a further magnetic particle testing at the next VIBT. The Instanter coupling shall be identified with a yellow paint band approximately 25mm wide around the centre of one long side of the coupling centre link.

- b). Cracks less than 5mm long

Where cracks having a surface length of less than 5mm are found the coupling may continue in service, but subject to a further magnetic particle testing at each PPM/VIBT, maximum period 4 months. The Instanter coupling shall be identified with a red paint band approximately 25mm wide around the centre of one long side of the coupling centre link.

- c). Cracks of 5mm length or greater

Where cracks having a surface length of 5mm or more are detected, the coupling is not suitable for further use and shall be removed and scrapped after examination to establish the Manufacturer and Batch number. These recorded details shall be maintained on file for auditing purposes at the location where vehicle records are retained.

5. DRAWHOOKS

Testing of drawhooks

Remove the coupling from drawhook and the drawhook from vehicle. Clean the items and spray in and around the gedge slot/coupling pin hole and mainhook throat with an even layer of white contrast aid paint and allow to dry. Place the

magnet across the area under test, ensuring that the pole pieces are correctly bedded down.

Prior to testing a flux indicator shall be used as a guide to the magnitude and direction of the magnetic field in the area to be examined. Testing shall be carried out on both sides of the drawhook, ensuring that all areas are tested by magnetising in at least two directions at 90° to each other.

The magnetic ink shall be applied by spraying onto the area under test immediately prior to and during the magnetization. The application shall cease before magnetization is terminated. The magnetic ink shall be allowed to flow onto the test surface under very little pressure so that the particles are allowed to form an indication without being washed off. Sufficient time shall be allowed indications to develop before moving or examining the component. Unless otherwise specified, any drawhook showing evidence of cracks shall be dealt with using the acceptance/rejection criteria detailed as follows:

Acceptance/rejection criteria for drawhooks

a). No cracks detected

Where no cracks have been detected the drawhook shall continue in service, but shall be subject to further magnetic particle testing at the next VIBT. The drawhook shall be identified with a yellow paint band approximately 25mm wide immediately behind the gedge slot/coupling pin hole.

b). Cracks less than 5mm long

Where cracks having a surface length of less than 5mm are found the drawhook may continue in service, but subject to a further magnetic particle testing at each PPM/VIBT (maximum periodicity between magnetic particle testing shall be 4 months). The drawhook shall be identified with a red paint band approximately 25mm wide immediately behind the gedge slot/coupling pin hole. Alternatively cracks may be ground out (see Section 4).

c). Cracks greater than 5mm and less than 10mm long

Where cracks having a surface length between 5mm and 10mm are found, the drawhook is not suitable for further use unless the cracks are ground out to reclaim the drawhook (see Section 4).

d). Cracks greater than 10mm long

Where cracks having a surface length greater than 10mm long are found, the drawhook is not suitable for further use. It shall be removed and scrapped after examination to establish the Manufacturer and Batch number. These recorded details shall be maintained on file for auditing purposes at the site where the vehicle records are retained.

Note: It might prove cost effective to test drawhooks on a periodic basis (e.g. at VIBT) in order to identify crack propagation at an early stage. It may then be possible to grind out small cracks in accordance with the procedures detailed in this document.

Grinding out of cracks in drawhooks

Where grinding is permitted in order to remove defects from drawhooks, all grinding shall be carried out along the direction of stress e.g. along the length of the drawhook using:

- a). Ball or cylindrical ball nose carbide burr (diameter greater than 10mm)
- b). Round nose grindstone point (diameter greater than 10mm)
- c). Abrasive paper flap wheel

Discolouration of metal due to heat generated during grinding is not permitted. If this occurs, it shall be treated as a defect and the discolouration removed accordingly, by further careful grinding.

Note: Under no circumstances shall an angle grinder be used.

Retesting drawhooks to ensure that cracks are completely removed

After grinding, the drawhook shall be inspected using magnetic particle testing techniques to ensure that all cracks have been completely removed.

Gauging of drawhooks to ensure that wear limits are not infringed

Following grinding the normal wear limits shall be checked by measuring the dimensions shown in **Figure 1** or **Figure 2**, dependent on the type of drawhook. The throat thickness (dimension C) shall be measured.

If the measured drawhook dimensions A, B, or C are less than the limiting dimensions quoted, the drawhook shall be scrapped. Similarly, if dimensions D or E are greater than the stated limiting dimensions, the drawhook shall be scrapped.

If the drawhook is acceptable it shall be identified with a blue paint band approximately 25mm wide immediately behind the gedge slot, and may continue in service, but subject to further magnetic particle testing at each VIBT.

6. SCOPE

This instruction applies to all PWRA vehicles that operate on Network Rail Controlled Infrastructure.

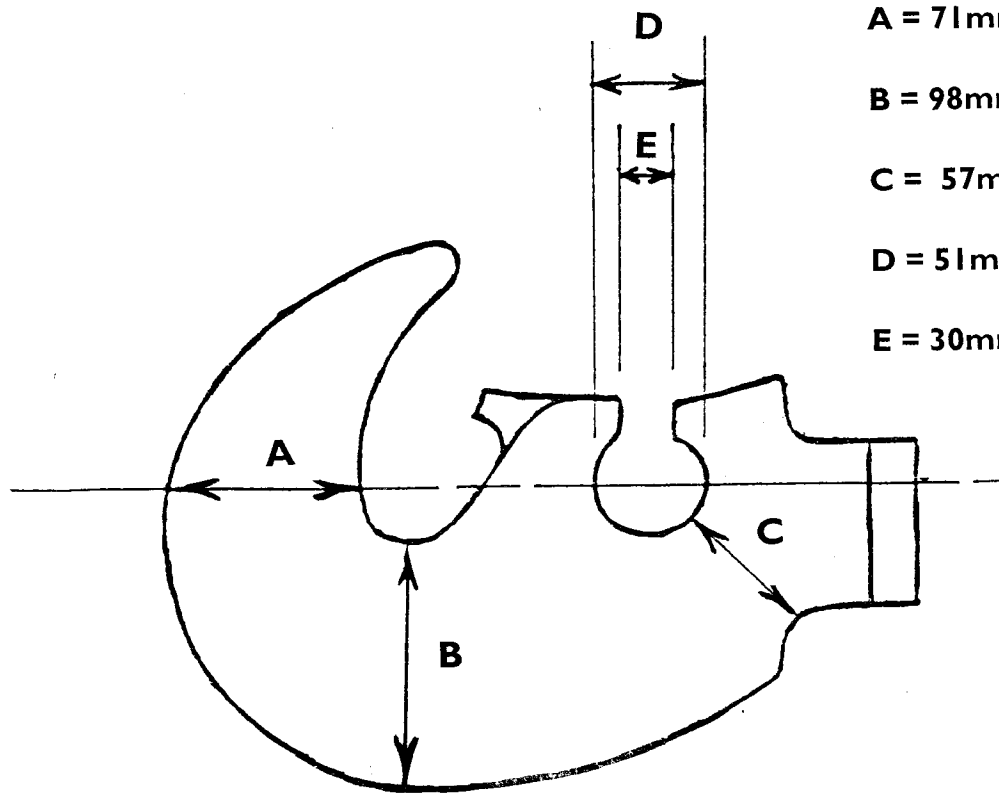
7. IMPLEMENTATION

This document shall be implemented immediately.

In the event of any query arising, or clarification required, please contact:

Senior Standards Engineer
PWRA Management Group
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rtc Business Park
London Road
Derby
DE24 8UP

FIGURE 1 BR TYPE



A = 71mm Minimum

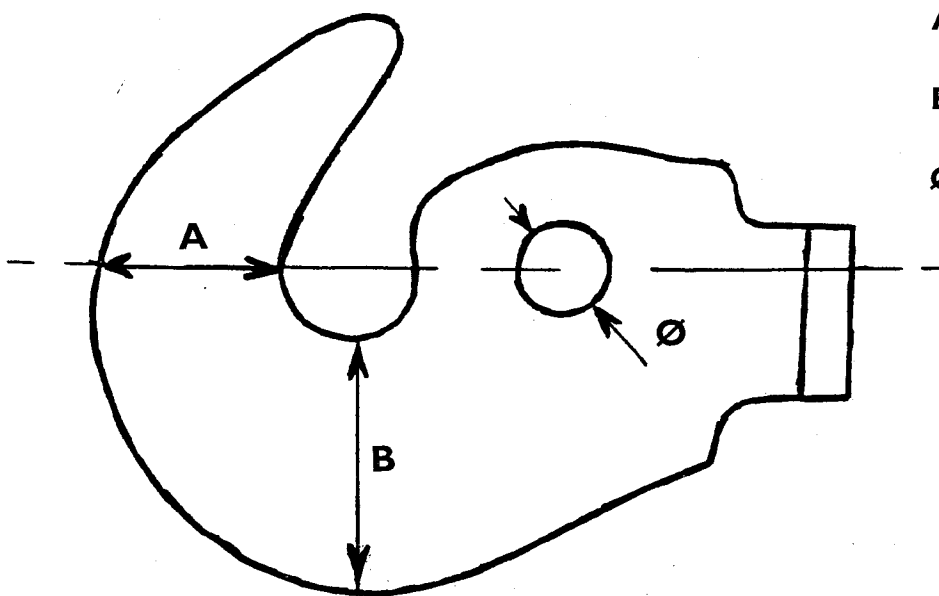
B = 98mm Minimum

C = 57mm Minimum

D = 51mm Maximum

E = 30mm Maximum

FIGURE 2 UIC TYPE



A = 64mm Minimum

B = 106mm Minimum

**\emptyset = 56mm Nominal
(no wear limit determined)**