

Justification:
Instruction

(Maintenance)

**Private Owner
Circular Letter
523 Issue 2**

Title

**Periodic Overhaul
of Air Brake System**

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ENDORSEMENT & AUTHORISATION

Endorsed by:



.....
D. Minshull, Senior Standards Engineer

Authorised by:



.....
K. Stannard, Vehicle Conformance Engineer

1. INTRODUCTION

POCL 523, Issue 2 updates the requirements for the periodic overhaul and testing of air brake systems. It has been extensively re-written to include information from the following POCLs, which are superseded:

POCL 367 Aluminium Labels for Dating Air Brake Hosepipes.

POCL 369 Air Brakes on Rolling Stock.

POCL 412 Vacuum and Air Brake Hoses & Clamps.

POCL 524 Fitting 'Date Fitted' Tags to Brake Equipment.

2. GENERAL NOTES

The overhaul and testing of air brake systems shall only be carried out at registered sites and at a frequency to ensure continued safe operation of vehicles. However, unless previously agreed for specific vehicles by the Senior Standards Engineer, the frequency shall not exceed that shown in Table 1.

All safety precautions relevant to the site and vehicle shall be complied with during overhaul and testing. Before any work is commenced all compressed air shall be exhausted and both the power and parking brakes fully released. It is essential that extreme cleanliness is observed whenever work on air brake equipment is undertaken.

Where items of brake equipment are removed from a vehicle, the exposed pipe ends and connections to the equipment shall be blanked off until the item is refitted or renewed, at which time the blanks shall be removed.

If inspection reveals excessive corrosion (as evidenced by debris within the pipework) then the section of pipework involved shall be blown through from both ends with clean, dry compressed air. All equipment shall firstly be disconnected and suitably protected.

Items shall only be changed on a like for like basis (i.e. components of the same manufacturer shall always be used as replacements where these are fundamental to the design and operation of the brake system, e.g. distributors, variable load equipment, brake cylinders). Refer to all relevant design drawings/instructions.

Definition of terms:

Adjust - Correct to defined limits.

Check - Determine a particular nominated condition before, during or after repair, e.g. completeness, security, position.

- Clean - Remove all dirt and deposits.
- Defective - Any fault or faults in a component or assembly, e.g. structural fractures or weld fractures, which may prevent the component or assembly from fulfilling its designed purpose.
- Dismantle - Take to pieces.
- Examine - Determine general condition before repair, e.g. wear, cracks, splits, leaks, scoring, corrosion, breaks, distortion, looseness.
- Inspect - Determine general condition after repair and attention, i.e. conformity to required standards.
- Overhaul - Do what is necessary to make a component re-useable, i.e. dismantle, strip, clean, examine, fit new parts, repair, re-assemble, test and inspect.
- Re-assemble - Put back together.
- Rectify - To set right.
- Refit - Put back and reconnect.
- Remove - Disconnect and take off.
- Renew - Scrap the original part and provide a new part in its place.
- Repair - Restore an original part to the required condition, e.g. by hand tooling, machining, building up, welding, patching, bending, setting, heat treating, re-securing.
- Test - Prove correct by trial.

3. AIR BRAKE HOSES AND CLAMPS

Air brake hoses shall comply with BS 3682/1, reinforced with nylon braiding with polychloroprene sheath.

Air brake hoses shall be secured to their respective coupling heads and nipples by means of 'Band-It' preformed clamps in No. 201 stainless steel grade. 'Band-It' clamps are supplied formed to specified inside diameters and the following examples are given:

- a). The $\frac{7}{8}$ " bore hose (used for the old design of main reservoir pipe connection) is secured by a 'Band-It' clamp of $1\frac{3}{4}$ " inside diameter and $\frac{5}{8}$ " width.
- b). The $1\frac{1}{8}$ " bore hose (used for the air brake pipe and the new design of main reservoir pipe connections) is secured by the 'Band-It' clamp of 2" inside diameter and $\frac{5}{8}$ " width.

The only permitted lubricants to ease assembly of end fittings to air hoses are either soapy water or MS4 silicone grease applied as necessary to end of fitting and interior $\frac{1}{2}$ " at end of hose.

No protective band or sleeve is required between the 'Band-it' clamp and the flexible hose. The application of 'Band-It' clamps shall only be carried out in accordance with the manufacturer's recommended equipment and instructions. Removal of 'Band-It' clamps may either utilise the manufacturer's specially designed equipment or alternatively as follows:

Cut across the buckle with a hack saw in line with the strap until the buckle is cut right through to the strap. Push aside the two pieces of the buckle with a chisel thus freeing the strap which may then be removed from the hose. If necessary the hose may be cut through with a knife in line with the hose and the hose then pulled off the coupling head or nipple. Care should be taken to avoid damaging or even scratching that part of the coupling head which mates with the hose.

To avoid any possible damage to the coupling head or nipple DO NOT attempt to remove the clamp by sawing through the strap with a hacksaw. Similarly, DO NOT fit a new hose to a damaged coupling head or nipple. All sharp edges on the portion of the coupling head or nipple which mates with the hose must be removed.

4. DATE TAGS

General

All 'date fitted tags' shall indicate the year and month the equipment was fitted to the vehicle (and also the location where the equipment was fitted). This information on the tag shall be stamped or etched. In the case of new or overhauled items, any tag already fitted by a manufacturer or overhauler shall be supplemented by a 'date fitted tag' at the time of installation on the wagon. Tags shall not interfere with or restrict the operation of any equipment.

Note: If a robust computer based system is available that records the information required by tags and is approved by the Senior Standards Engineer, PWRA Management Group it may be used in place of 'date fitted tags'.

Date tags fitted to brake equipment

All wagons are subject to a VIBT at least annually and 'date fitted' tags shall be securely attached to all new and overhauled equipment. The location on brake equipment where tags shall be attached is shown on Drawing No. BI-AO-8601292, whilst BI-A2-8601293 gives dimensions for the tags.

Date tags fitted to air brake hoses

Air brake hose shall be fitted with a tag as shown on Drawing Number F-A3-1033, stamped or etched with the fitting date (month and year). Tags shall be affixed to each hose at the top end of the rubber portion and in such a position that the details are visible from the front.

Date tags at maintenance

At maintenance all 'date fitted' tags listed below shall be checked to determine whether they are within the relevant periodicity. All hoses outside of periodicity shall be replaced with new, equivalent items. All brake equipment outside of periodicity shall be replaced with either new or overhauled equivalent items.

- a. Distributors
- b. Air Reservoirs
- c. Empty/Load, Variable Load Equipment
- d. Slack Adjusters/Regulators
- e. Brake Cylinders, Combined Brake Cylinders & Regulators
- f. Auto Drain Valves
- g. Strainer Check Valve and Choke

Examine all equipment bearing date tags. If obviously damaged or defective (or if date tag indicates that component overhaul is due before the next maintenance event) remove such equipment for overhaul, refitting or renewal as appropriate. Any equipment fitted with date tags but not required to be removed for overhaul or renewal, shall have condensate drained as required.

Where a tag is either missing or illegible and the 'date fitted' cannot be determined by any other means the item shall be taken as being outside of its periodicity.

5. **OVERHAUL**

Overhaul of 'Date Fitted' tagged equipment

The date tagged equipment detailed in **Table I** shall be subject to removal, renewal or overhaul and test at the periodicities indicated. To facilitate this, the system of date tagging for the equipment specified shall be adhered to.

Where possible items of equipment used for renewal shall be new or overhauled items. In the event of these not being available it is permissible to fit used and tested items whose date tags indicate a minimum remaining life of 4 months or

more; in this case the original 'Date Fitted' tag shall remain attached to the equipment.

Equipment	Action required by an approved maintainer	Periodicity
E/L Equipment, VLV Equipment, Slack Adjusters, Brake Cylinders, Combined Brake Cylinders & Regulators, Auto Drain Valves, Strainer Check Valves, Chokes,	Remove, dismantle, clean, inspect, renew or repair components as appropriate and where necessary then re-assemble and bench test in accordance with the Owner's maintenance plan.	14 years
Distributor	Remove existing and fit either a new or overhauled item.	14 years
Air Reservoir	Remove, examine, clean and test in accordance with Appendix A. All incidents of defective unserviceable air reservoirs shall be reported to the Senior Standards Engineer, PWRA Management Group. The foregoing does not replace, rescind or remove from the Owner any obligation defined under statutory legislation.	14 years (Mild steel and Stainless steel) 4 years (Aluminium)
Coupling Hoses	Hoses shall be examined for signs of deterioration or damage and replaced where necessary. Life expired hoses shall be replaced. The maximum storage life is 5 years provided they have been stored in a <u>cool and dark environment</u> .	7 years

Table I Overhaul periodicity for date tag fitted equipment

Overhaul of non-date tagged components

All non-dated tagged components shall be removed, dismantled, cleaned and inspected. Renew or overhaul in accordance with (and at the periodicities

indicated) in the Owner’s Maintenance Plan. Any components not due to be removed for overhaul or renewal shall still be examined and replaced if found damaged or defective.

Equipment	Periodicity
Goods/passenger equipment, end cocks, isolating cocks, ICR, ICD	14 years
Brake rigging including: Parking brake equipment shafts, levers, hangers, caliper assemblies, fasteners, springs, and bushes.	As required by Owner’s Maintenance Plan

Table 2 Overhaul periodicity for non- date tag fitted equipment

Examine all air brake equipment not removed for overhaul or renewal (including brackets, coupling hoses and rests) for damage or defects. Ensure that these are secure, and that pipes have no excessive corrosion or wear due to movement and chafing. Check for free operation and locking devices of all isolating cocks (which are still required for operation).

All distributor and pipe bracket filters/strainers are to be cleaned or renewed as applicable.

Examine and gauge as applicable hose coupling heads for damage, defects and renew if necessary. Renew the sealing washers. Coupling heads with valves are to be dismantled to facilitate examination of the component parts, which shall be renewed if defective (it is not necessary to remove the coupling head from the hose for examination).

Clean, and examine test point check valve for function. If redundant pipework remains fitted to the vehicle it shall be examined for structural integrity and security.

Brake equipment, rigging and components

Refit all brake equipment, rigging and associated components, and replace all items previously missing.

Where practical all bolts securing brakework shall be fitted with nuts and washers towards the outside of the vehicle and provided with split pins placed sufficiently close to prevent nuts running back on the bolt.

Where required renew brakeblocks/pads, using new retaining items where applicable.

Check that brake equipment is correctly adjusted, e.g. slack adjuster 'A' dimension and VTA valve stop clearance.

In order to establish correct operation of the automatic brake slack adjusters/regulators, including slack adjusters incorporated in 'brake units':

- a). Manually adjust the brake block/pad clearances to a dimension slightly in excess of the design figure.
- b). During brake applications (made during the brake test) observe that the gap adjusts to the design clearance.

Note: Brake block/pad clearances shall not be adjusted to altering the 'A' gap setting.

For vehicles not fitted with automatic brake slack adjusters/regulators the required brake block/pad clearance shall be achieved by manual adjustment.

Examine distributor release cord/linkage for damage and defects. Renew defective release cords. Renew or rectify defective release linkage rods.

After re-assembly of brake rigging all safety loops shall be correctly positioned, free of distortion and defects, and securely fastened using the correct locking mechanism.

Lubricate all components that the design requires.

Note: All defective items shall be rectified or renewed and equipment correctly adjusted prior to brake test.

Brake discs

Examine brake discs for damage, defects/loose or missing security components and all wearing pads/surfaces for damage or defects (see POCL 553).

6. BRAKE TEST

Refer to the relevant Maintenance Plan for details of mandatory brake tests, noting that any portable brake test equipment used shall have sufficient capacity to fully charge the wagon's air system.

7. COLOUR IDENTIFICATION OF AIR BRAKE EQUIPMENT

Visibility and cleanliness

Coupling cocks, heads and fittings, distributor and auxiliary reservoir pipe isolating cocks shall be painted and kept clean to ensure that the colour is clearly visible at all times.

Ensure that any identification plates or painted marking on vehicles that show the location of release cords or air brake isolating cocks are kept clean.

Preparation and painting

Degrease all hose coupling end cocks, hose coupling heads, isolating cocks and handles. When dry remove all traces of rust and loose particles by wire brushing.

Ensure that no damage occurs to the sealing washers or valve seating and no particles of scale or rust are allowed to remain in the hoses and fittings.

Immediately after cleaning, equipment with one coat of the appropriately coloured paint in accordance with **Table 3** or **Table 4** as appropriate.

Fully fitted vehicles	
Equipment	Colour
Air brake pipe end cock including its handle	Red
Air brake coupling head.	Red
Distributor isolating cock handle.	Red
Main reservoir pipe end cock including its handle.	Yellow
Main reservoir pipe coupling head.	Yellow
Main reservoir pipe isolating cock handle.	Yellow

Table 3 Colour coding for fully fitted vehicles

Piped through only vehicles	
Equipment	Colour
Air brake coupling head	Red
Air brake pipe end cock including its handle	White
Main reservoir pipe end cock including its handle	Yellow
Main reservoir pipe coupling head	Yellow
Main reservoir pipe isolating cock handle	Yellow

Table 4 Colour coding for piped through only vehicles

At points where train or reservoir pipes enter distributors, bar couplers, coupling cocks, etc paint a band of the appropriate colour around the pipe for identification purposes.

The correct RAL Colour Codes for the colour coding of brake equipment is shown in **Table 5**.

Colour	RAL Colour Code	Description
Red	30012	Signal Red
White	9010	Pure White
Yellow	1003	Signal Yellow

Table 5 Colour coding for piped through only vehicles

Ensure that:

- Coupling head sealing washers and valve seatings are all free from paint
- Parking brake hand wheels or the end of parking brake levers are painted white and that parking brake 'ON/OFF' indicators are clearly defined and legible.

8. SCOPE

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

9. 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
Room 225 Derwent House
rtc Business Park
London Road
Derby
DE24 8UP

APPENDIX A EXAMINATION OF AIR RESERVOIRS

a). General

This procedure outlines the examination, internal and external treatment, testing and marking of air reservoirs, together with notes on the corrosion criteria to be used.

An air reservoir is defined as a vessel (other than a pipe, coil or ancillary fitting and part of the compressor) for containing compressed air connected to an air compressor.

All air reservoirs shall be removed from the vehicle at the periodicity stipulated in the Maintenance Plan. This period shall never exceed that shown in **Table I**.

Air reservoirs of aluminium construction shall be removed at periods not exceeding 4 years.

Air reservoirs of stainless steel construction are not to be internally treated, cleaned or painted in accordance with this instruction, unless approved by the Senior Standards Engineer, PWRA Management Group.

Due to the quantity and variety of reservoirs, in service, there is difficulty in presenting definite rejection limits in tabular form for all sizes and types of reservoir. Because of this, extensive experience and judgement is required in the interpretation of types of corrosion.

b). Examination

Visually examine the exterior (and in particular the interior) of the air reservoir for corrosion or defects.

The visual examination of the interior will be dictated by the size and quantity of the available openings. More detailed examination may be obtained by using specialist equipment or if the internal condition gives rise to uncertainty by removal of a dished endplate from the reservoir.

If no corrosion or defects are present (and the interior painted surface is intact) the reservoir shall be tested, painted externally and marked in accordance with this instruction.

c). Types of corrosion and rejection criteria

The pattern of corrosion generally experienced in air reservoirs may be classified as follows.

1). General corrosion

Causes a reduction in wall thickness, over an area greater than 20% of the interior surface. Reject if the depth of penetration exceeds 20% of the original wall thickness or if the original metal surface is not recognizable.

2). Area corrosion

Causes a reduction in wall thickness over an area not exceeding 20% of the interior surface. It excludes other types of corrosion described. Reject if the depth of penetration exceeds 25% of the original wall thickness or if the original metal surface is not recognizable.

3). Chain pitting and line corrosion

May occur along all or part of the length of the reservoir interior or around the wall circumference of vertically mounted reservoirs. It appears as a series of pits (corroded cavities) in the wall thickness and is generally of limited width. Reject if the total length of corrosion in any direction equals the circumference of the reservoir, or if the depth of penetration exceeds 25% of the original wall thickness.

4). Channel corrosion

Is a more concentrated form of line corrosion or appear as a channel formation in the metal. Reject as per chain pitting and line corrosion.

5). Isolated pits

Are pits that occur individually (less than 1 per 500mm² of the surface area). Reject discreet pits if they are deeper than 1 mm and exceed 5mm diameter. Pits less than 5mm diameter shall be assessed as far as practicable to ensure that the remaining wall thickness is adequate.

In determining the limiting depth of corrosion for all reservoirs (and noting the material ultimate tensile strength employed) an arbitrary depth of 1mm for isolated pits is advised for simplicity of interpretation.

d). Dismantling and Assembly

If removal of a dished endplate from the reservoir is required then any endplate removed shall be free of flame cuts and notches.

The dished endplate, when replaced back on the reservoir shall be in accordance with the original design dimensions, construction and welding requirements.

All threaded openings into the air reservoir shall be examined and cleaned up as required.

e). Cleaning

Unless the reservoir is unsuitable for further service, the internal surfaces shall be cleaned of corrosion debris and dirt prior to carrying out a secondary visual examination as follows:

- 1). If the interior of the reservoir is coated with oil or emulsified oil it shall be removed by steam cleaning. When large quantities of thick or emulsified oil are present it may be necessary to use steam cleaning in conjunction with an appropriate chemical degreasing process.
- 2). If corrosion is negligible and comprises only surface rust then the reservoir may be cleaned by acid washing, taking appropriate safety precautions. When corrosion is more severe and the reservoir is still considered suitable for further service it shall be cleaned by blast cleaning.

f). Acid Washing Process

Blank off openings as required and in the recommended amount of a proprietary rust remover. The actual quantity will be a function of reservoir volume and the actual rust remover used.

Allow the air reservoir to stand with rust remover in contact with the internally corroded surface for the recommended time period. It may be necessary to rotate the reservoir at appropriate time periods to ensure all surfaces are treated.

Pour out rust remover and flush the air reservoir out with copious supplies of clean water. Dry out thoroughly, using warm air and check for cleanliness.

g). Blast Cleaning Process

If considered practical by using the openings provided and using a suitable extension, blast clean the interior using either metallic grit or shot, or a mixture of both. Note : As a guide an acceptable standard is SA2.

Alternatively (and only when necessary) remove one dished endplate and then blast clean.

After blast cleaning pour out the shot/grit, vacuumed out and remove any metallic residue with a bar magnet. On completion inspect to ensure that the air reservoir is thoroughly clean.

h). Testing

The reservoir, complete with the test label (if fitted) and all welded attachments shall be hydraulically tested, for a period of not less than 15 minutes at 1½ times

the design pressure, after which the pressure shall be reduced to the design pressure and all welded seams examined.

The design pressure of the reservoir is that stated on the test label or stencilled on the reservoir. If either marking is illegible the design pressure shall be confirmed by scrutiny of the reservoir design data.

If any rectification is necessary the reservoir shall be re-tested after satisfactory completion of any work

Following hydraulic pressure testing air reservoirs shall be emptied and dried out thoroughly prior to interior and exterior painting.

i). Interior Painting

Apply a suitable paint for air reservoir interiors using either of the following methods:

1). Conventional spraying

Using a multi jet extension.

2). Flood Coating

Pour paint into the reservoir (in a quantity relevant to the size of the reservoir. Blank off all openings and revolve the reservoir through one revolution horizontally and one revolution vertically. Upon completion, drain out any surplus paint.

With either method dry, clean air blown through the reservoir will aid drying.

j). Exterior painting and marking

The reservoir shall be painted externally in accordance with the vehicles painting diagram.

The date of the test shall be stamped on the reservoir test label or in the absence of a test label, stencilled onto the air reservoir. In either case the test date shall be in a position that is visible when the air reservoir is fitted to the vehicle.

Air reservoirs shall also retain all the original stampings, which shall still be legible.