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## Overview

This standard identifies the competencies you need to carry out corrective maintenance activities on fluid power equipment within a traction and rolling stock system, in accordance with approved procedures. You will be required to maintain a range of equipment, such as pumps, valves, actuators, sensors, compressors and other fluid power equipment, which are working in an integrated system involving two of the following interactive technologies: mechanical, electrical, or process controller. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machines (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

You will be expected to isolate and disconnect items and components of the interactive technologies in order to gain access to and remove the fluid power units and components that require replacing or repair. This will involve dismantling and reassembling a variety of different types of assemblies and sub-assemblies which, in some instances, may need to be dismantled to the component level.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying fluid power maintenance procedures within a traction and rolling stock system. You will also know about the integrated technology assemblies and sub-assemblies, their properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the dismantling and reassembly process safely and effectively. You will understand the maintenance methods and procedures used, and their application within a traction and rolling stock system, in sufficient depth to enable you to carry out the maintenance activities, correct faults, and ensure that the maintained equipment functions to specification and remains compliant with all standards and regulations. You will also know about the interaction of the other associated integrated technologies and have sufficient knowledge to carry out the maintenance and testing safely and effectively.

You will be required to demonstrate safe working practices throughout.

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## Performance criteria

### *You must be able to:*

P1 maintain safe working practices and comply with all relevant health and safety regulations, directives, and guidelines

P2 follow the relevant maintenance schedules to carry out the required work

P3 carry out the maintenance activities within the limits of your personal authority

P4 carry out the maintenance activities in the specified sequence and in an agreed timescale

P5 report any instances where the maintenance activities cannot be met or where there are identified defects outside the planned schedule

P6 complete relevant maintenance records and pass them on to the appropriate person

P7 dispose of waste materials in accordance with safe working practices and approved procedures

## Knowledge and understanding

### *You need to know and understand:*

K1 the relevant health and safety regulations, directives, guidelines, and safe working practices and procedures defined by your organisation, as appropriate to the activity and your working area

K2 the isolation and lock-off procedure or permit-to-work procedure that applies to the system being worked on (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

K3 the specific health and safety precautions to be taken during the maintenance activities, and their effects on others

K4 the classification of different voltage levels and the authority requirements for working on them

K5 what constitutes a hazardous voltage/current and how to recognise victims of electric shock

K6 how to reduce the risks of an electric shock (such as insulated tools, rubber matting and isolating transformers)

K7 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities, and where to obtain it

K8 the hazards associated with carrying out maintenance activities on an integrated system (such as handling fluids, stored pressure/force, electrical supplies, electrical/electronic interfaces, using damaged or ill-maintained tools and equipment, not following laid-down maintenance procedures), and how to minimise these and reduce any risks

K9 regulations and codes of practice that apply to working with fluid power equipment

K10 how to obtain and interpret drawings, charts, circuit and physical layouts, specifications, manufacturers' manuals, history/maintenance reports, symbols used in fluid power, and other documents needed for the maintenance activities

K11 the principles of operation of the equipment to be maintained and how it interacts with other systems such as ETCS, AWS or TPWS and Wheel Slip/Slide Protection circuits

K12 principles and theories associated with fluid power equipment (such as cascading and truth tables, logic/ladder diagrams, sequential charts/tables or functional diagrams)

K13 dry and lubricated systems and their application

K14 selection, types and characteristics of fluids for the system

K15 the effects of pressure and flow on the performance of the system

- K16 the identification of different compressors (such as screw, piston, rotary vane)
- K17 the identification of different hydraulic motors (such as piston, gear, vane)
- K18 the importance of following the correct preventative contamination procedures
- K19 the effects, and potential symptoms, of contamination in the system
- K20 the different types of pipework, fittings and manifolds, and their application
- K21 the identification, application, function and operation of different types of valves (such as poppet, spool, piston, disc and slide)
- K22 the identification, application function and operation of different types of sensors and actuators (such as rotary, linear, mechanical, electrical)
- K23 the identification, application function and operation of different types of actuators/cylinders (such as single acting, double acting and telescopic)
- K24 the identification and application of different types of pumps (positive, gear vane and piston)
- K25 the steps to be followed to vent or de-pressurise the areas to be worked on
- K26 the application and fitting of static and dynamic seals
- K27 company policy on repair/replacement of components, and the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance activities
- K28 the sequence to be adopted for the dismantling and reassembling of the equipment, to both sub-assembly and individual component level
- K29 the techniques used to dismantle/re-assemble integrated equipment (release of pressures/force, proofmarking to aid assembly, plugging exposed pipe/component openings, dealing with soldered joints, screwed, clamped and crimped connections)
- K30 methods of attaching identification marks/labels to removed components or cables, to assist with re-assembly
- K31 methods of checking that components are fit for purpose, and the need to replace 'lived' items (such as seals, gaskets, filters, pistons, spools and bearings)
- K32 the maintenance requirements for lived, consumable and on condition components
- K33 the torque loading and locking devices requirements for the maintained fluid power components and appropriate torque marking of fixings
- K34 how to make adjustments to components/assemblies
- K35 how to check tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured for the intended purpose
- K36 the importance of making integrity checks before applying full pressure
- K37 the generation of maintenance documentation and/or reports on completion of the maintenance activity

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K38 the manufacturer's equipment operating and control procedures to be applied during the maintenance activity

K39 how to use lifting and handling equipment in the maintenance activity

K40 the problems that can occur during the maintenance activity, and how they can be overcome

K41 the organisational procedure to be adopted for the safe disposal of waste of all types of materials

K42 the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

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### Scope/range related to performance criteria

1.

During the maintenance activity, individuals will:

2.

Appropriate dismantling and re-assembly techniques may be used to deal with the following:

3.

Types of fluid power equipment could include:

4.

Maintenance activities, as applicable to the equipment being maintained, will include:

5.

Types of fluid power components, on which maintenance activities are carried out to component level, could include:

6.

Types of fluid power components replaced/refitted could include the following:

7.

Maintenance activities may need to comply with the following:

8.

Types of paperwork/records that need to be completed and passed to the appropriate people could include:

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Maintain fluid power equipment within a traction and rolling stock system



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