LANLEO24

Service and repair hydraulic systems on land-based equipment

Overview

This standard covers the service and repair of hydraulic systems on land-based equipment. It includes the diagnosis, removal, service/repair and reinstatement of hydraulic circuits, systems and their components to the manufacturers' specifications, (e.g. high and low pressure hydraulic circuits including combined high/low pressure circuits, fixed and variable displacement circuits, open and closed centre circuits, load-sensing circuits or auxiliary systems) and the methods used to control implement working depth and height (e.g. draft or position control).

When working with machinery or equipment you should be trained and hold current certification, where required, in accordance with the relevant legislation.

When working on high voltage (hazardous voltage/HaV) electric vehicles, de-energising must be done by a person who has been trained in accordance with the manufacturer’s procedures.

This standard is for those who work in land-based engineering using their initiative in a customer-facing role. It may include mentoring a junior colleague to assist in aspects of service and repair.

Performance criteria

You must be able to:

1. be aware of hazards and assess the risks associated with the activity and the location where it is to be carried out
2. be aware of the potential environmental impact associated with the activity and the ways in which this can be controlled
3. select and wear suitable clothing and personal protective equipment (PPE)
4. select, prepare, use, maintain and store the tools and equipment required to carry out the activity in accordance with the relevant legal requirements, manufacturer's instructions and company practices
5. check that the land-based equipment requiring service and repair is safe, prepared and isolated from power sources, where required
6. take the necessary precautions to prevent the escape of chemicals, gases and other substances and minimise dangers from contamination and hazards, where required
7. use a variety of methods to collect diagnostic information to identify defects and faults
8. determine the requirements for service and repair
9. identify and establish the availability of replacement components required for the activity
10. identify, remove and replace hydraulic system components on land-based equipment
11. safely release stored energy in hydraulic systems and circuits
12. remove and replace worn and damaged components in accordance with instructions and specifications
13. remove contamination from hydraulic circuits
14. assemble or repair pipes and hoses used within hydraulic systems
15. dismantle, service/repair and reinstate hydraulic systems and components in line with the manufacturer’s specifications and factory settings
16. prepare the hydraulic system to be tested and carry out the tests
17. use suitable testing methods to assess the performance of the reassembled system on completion of the activity and confirm that it performs to operating specifications prior to returning the equipment to the customer
18. recycle or sustainably dispose of the different types of waste, including hazardous and non-hazardous, caused by the activity, in accordance with the

relevant legal and environmental requirements and company policies

19. complete records as required by the relevant legislation, warranty requirements and company procedures

Knowledge and understanding

You need to know and understand:

1. how to identify hazards and assess risks when preparing to service and repair land-based equipment
2. the type of clothing and personal protective equipment (PPE) suitable for the activity
3. the tools and equipment required to carry out the activity and how to select, prepare, use, maintain and store these safely and correctly, in accordance with the manufacturer's instructions and company practices
4. the relevant legal requirements for the preparation and use of work equipment
5. how land-based equipment should be prepared for service and repair
6. the dangers created by stored energy and how to respond to these during the preparation stage
7. the hazardous chemicals, gases and other substances that may be present and how they should be dealt with
8. the applications of hydraulic systems on land-based engineering equipment
9. the different methods that can be used for the assessment of defects and faults with hydraulic systems on land-based equipment and for the identification of the root cause
10. the primary causes of hydraulic failures and their symptoms
11. the types of hydraulic circuits and their uses
12. the theory of operation for a load-sensing hydraulic system and how to diagnose faults
13. the factors that determine whether it is worthwhile carrying out the service and repair, such as cost, estimated working life or urgent need for the equipment
14. the components required for the service and repair and the company procedures for obtaining replacements
15. the common symbols used in hydraulic circuit diagrams
16. how to read and interpret hydraulic circuit diagrams, including open centre, closed centre and load-sensing
17. how to remove and replace hydraulic components
18. how to remove contamination from hydraulic circuits
19. how to dismantle, service/repair and reinstate hydraulic systems and components in line with the manufacturer’s specifications and standards
20. how to seal hydraulic systems and components

21. the construction, types and function of hydraulic system components and how hydraulic components influence one another
22. the causes and effects of heat and how it is dissipated in hydraulic systems
23. how to identify hydraulic pipe and hose types and their relevant fittings
24. how to assemble and repair hydraulic hoses and pipes
25. how to route and secure hydraulic hoses and pipes
26. how to carry out diagnostic tests and adjust hydraulic components and systems in line with the manufacturer's specifications and factory settings
27. how to use the principles of leverage to gain maximum mechanical advantage
28. the methods of testing equipment on completion of the activity to confirm that it performs to the operating specifications prior to returning it to the customer
29. how to recycle or sustainably dispose of the different types of waste, including hazardous and non-hazardous, caused by the activity, in accordance with the relevant legal and environmental requirements and company policies
30. the potential impact that the activity could have on the environment and the ways in which this can be controlled
31. the information that needs to be recorded, the company procedure for maintaining records and the requirements of data protection legislation

Glossary

Hazardous chemicals and substances could include:

- fuels
- oils
- fluids
- gases
- dust
- compressed air

Hydraulic failures and their symptoms e.g. low oil level, inappropriate oil, contamination, cavitation, overload

Hydraulic system components e.g.

- hydraulic pumps and motors, e.g. fixed and variable displacement
- hydraulic pressure maintaining valves, relief valves, shock valves
- hydraulic control valves, e.g. distributors, solenoid valves, proportional valves, pressure-differential valves, pilot-operated valves
- hydraulic rams, single-acting, double-acting
- hydraulic direction flow valves, flow dividers, orbital valves, priority valves, restrictors
- reservoirs
- accumulators

Hydraulic system diagnostic tools e.g. high and low pressure gauges, pressure differential gauges and flow meters

Instructions and specifications:

- drawings/plans
- schedules
- method statements
- Standard Operating Procedures (SOPs)

- manufacturer's instructions
- customer requirements
- verbal instructions

Manufacturers' specifications e.g. pressure and flow, adjust pressure limiting and relief valves, set draft and position control valves, check/adjust load-sensing pressures

Methods of diagnosis:

- visual inspections
- functional and operational tests
- diagnostic equipment
- remote electronic control and monitoring systems
- reviewing technical data

Stored energy:

- springs
- belt tension
- hydraulic pressure
- electrical discharge
- accumulator discharge

Links to other NOS

Basic testing and diagnostics is covered in LANLEO30 Inspect and test land-based equipment

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Developed by	Lantra
Version Number	3
Date Approved	31 Jan 2022
Indicative Review Date	31 Jan 2027
Validity	Current
Status	Original
Originating Organisation	Lantra
Original URN	LANLEO24
Relevant Occupations	Land-based Engineering
Suite	Land-based Engineering Operations
Keywords	land-based; equipment; machinery; hydraulic