LANLEO15

Service and repair wheeled and tracked steering systems on land-based equipment

Overview

This standard covers the service and repair of wheeled and tracked steering systems on land-based equipment. It includes understanding the types, construction, function and operation of wheeled and tracked steering systems and their component parts found in the land-based sector, including mechanical, power-assisted and hydrostatic.

Steering systems refer to the control of a vehicle or machine's path of travel (e.g. single steering axle, pivot, crab, slew, skid steer or zero turn). Identification and rectification of problems associated with steering is important in this standard (e.g. steering pull, wheel wobble/shake, lazy/heavy steering, loss of self-centering effect, excessive steering wheel play, incorrect tyre pressure or size, equipment balance/loading/application or steering wheel migration, migration/constant correction [hydrostatic systems]).

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 working in land-based engineering under supervision.

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 the cause of steering system faults on wheeled and tracked steering systems on land-based equipment
8. determine the requirements for service and repair
9. identify and establish the availability of replacement components required for the activity
10. remove and replace wheeled and tracked steering systems and their related components
11. dismantle and reassemble wheeled and tracked steering systems and their components in line with the manufacturer’s specifications and standards
12. service and repair wheeled and tracked steering systems in line with the manufacturer’s specifications and standards
13. remove and replace worn and damaged components in accordance with instructions and specifications
14. set steering components to the manufacturer’s specifications
15. check and adjust steering geometry
16. 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
17. recycle or sustainably dispose of the different types of waste, including

hazardous and non-hazardous, caused by the activity, in accordance with instructions and the relevant legal and environmental requirements

18. 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 different methods that can be used for the assessment of defects and faults with steering systems on land-based equipment and for the identification of the root cause
9. the symptoms, characteristics and causes of common steering system faults
10. the factors that determine whether it is worthwhile carrying out the service and repair, such as cost, estimated working life or the immediate need for the equipment
11. the components required for the service and repair and the company procedures for obtaining replacements
12. the working principles of mechanical, power-assisted and hydrostatic steering systems and their application
13. how equipment balance, loading and application can influence steering performance
14. the basic operating principles of auto steer and guidance systems used in land-based equipment
15. the types, construction and function of steering system components on wheeled and tracked steering systems
16. the principles and geometry of steering systems to include: Ackermann, caster and camber angles, king pin inclination, toe in and toe out (2wd/4wd)
17. how to remove, dismantle, re-assemble and replace wheeled and tracked

steering systems and their components in line with the manufacturers' specifications and standards

18. the methods of checking and adjusting steering geometry

19. the methods of testing steering systems on completion of the activity to confirm that it performs to operating specifications prior to returning the equipment to the customer

20. how to recycle or sustainably dispose of the different types of waste, including hazardous and non-hazardous, caused by the activity, in accordance with instructions and the relevant legal and environmental requirements

21. the potential impact that the activity could have on the environment and the ways in which this can be controlled

22. the information that needs to be recorded, the company procedure for maintaining records and the requirements of data protection legislation

Glossary

Components e.g.

- steering boxes
- rack and pinion
- steering linkages
- steering hub pivot bearings
- king pin end-float
- power assisted steering actuation
- steering axle components
- steering system brake units (independent, tracked and zero turn)
- hydraulic steering control unit (Orbitrol)
- electro-hydraulic steering unit (Autosteer)

Hazardous chemicals and substances could include:

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

Instructions and specifications:

- drawings/plans
- schedules
- method statements
- Standard Operating Procedures (SOPs)
- manufacturer's instructions

- customer requirements
- verbal instructions

Methods of diagnosis:

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

Steering geometry e.g. steering lock, toe out on turns, toe in, track rod and drag link length

Steering systems e.g. front and/or rear axle steering, crab, pivot, slew, skid steer and zero turn

Steering system faults e.g. steering pull, wheel wobble/shake, lazy/sluggish steering, heavy steering, steering wheel free play, incorrect tyre pressure and sizes

Stored energy:

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

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