LANLEO10

Apply core land-based engineering principles: cooling and lubrication

Overview

This standard covers the application of core land-based engineering principles, specifically cooling and lubrication. It requires an understanding of the generation and dissipation of heat and the purpose of cooling mediums, including fuel, oil, water, air and convection, friction and insulation materials, their types, uses and properties, as well as the effect of heat.

It also covers lubrication, the purpose, types, characteristics, properties and additives in oils and greases. The types of lubrication systems and their ventilation, e.g. wet and dry sump, forced, drip, splash and self-lubricated.

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 under supervision.

Note: in accordance with current regulations, mains electricity work must be carried out by a competent person, usually an electrician.

Performance criteria

You must be able to:

1. be aware of the hazards and 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. apply core land-based engineering principles to test, maintain, monitor and adjust cooling and lubrication systems, their circuits and components
6. select coolants and lubricants in line with the required specifications
7. test cooling and lubricant samples, interpret findings and take the relevant action
8. apply insulation to heating or cooling elements
9. leave the workplace in a safe condition following completion of the activity
10. deal with 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
11. complete records as required in accordance with company instructions

Knowledge and understanding

You need to know and understand:

1. the hazards and risks associated with land-based engineering
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 reasons for controlling temperature in land-based engineering applications
5. the methods and types of heat control and dissipation used in land-based engineering applications
6. the symptoms of a lack of cooling and lubrication
7. the construction, purpose and function of components used in typical cooling systems including air and liquid cooled systems
8. the causes of impaired cooling efficiency
9. how to test and maintain cooling systems and their components
10. the reasons for the use of lubrication
11. the operating principles of lubrication systems and their components
12. the properties of the different types of friction materials and their lubrication requirements
13. the different types, characteristics, properties and application of lubricants, oils, greases, additives, antifreeze and coolants, particulate suspension and sealing
14. how to collect cooling and lubricant samples in a way that maintains the integrity of the sample
15. the methods of testing cooling and lubricant samples
16. the importance of leaving the workplace in a safe condition following completion of the activity
17. how to deal with 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. the potential impact that the activity could have on the environment and the ways in which this can be controlled
19. the records that need to be completed and the company procedure for these

Glossary

- causes of impaired cooling efficiency e.g. obstructions, poor circulation, air locks, ambient temperature, system pressures, overload
- methods and types of heat control and dissipation e.g. liquid, forced air, convection/conduction, radiation, heat sinks and insulation materials
- lubrication systems and their components e.g. wet/dry sump, drip, splash, gravity, self-lubricating, force fed, automatic greasing
- reasons for the control of temperature e.g. expansion, vaporisation, efficiency, combustion, longevity, oil viscosity
- reasons for lubrication e.g. reduce friction, reduce wear, cooling
- symptoms of the lack of cooling and lubrication e.g. distortion, glazing, wear, expansion, seizure, heat spots, friction welding, scoring, vaporisation, combustion
- test and maintain cooling systems and their components e.g. levels, weights, ratios and volumes, thermostats, fan speeds, input and output temperatures, pressure tests, draining, flushing and bleeding procedures

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