LANLEO10 - SQA Unit Code F9EG 04

Core land-based engineering principles – cooling and lubrication

Overview

The cooling standard provides an understanding of the generation and dissipation of heat, cooling mediums, e.g. fuel, oil, water, air and convection. Friction and insulation materials, their types, uses and properties, the effect of heat on, e.g. liquids, materials, components and lubricants, e.g. expansion, vaporisation, combustion, distortion, glazing and wear.

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.

This standard relates to the following application or context:

1. Cooling systems:
    - 1.1. Liquid cooled
    - 1.2. Air cooled

2. Lubrication systems:
    - 2.1. Splash, drip and sump
    - 2.2. Force fed systems

Anyone undertaking mains electrical work must comply with current regulations.

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Performance criteria

You must be able to:

- P1 select coolants and lubricants against required specifications for stated applications
- P2 collect lubricant samples for analysis, carry out sensory tests and interpret laboratory results
- P3 test, maintain, monitor and adjust cooling and lubrication systems, their circuits and components, e.g. levels, weights, ratios and volumes, draining and flushing
- P4 apply insulation to heating or cooling elements

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Knowledge and understanding

You need to know and understand:

K1 the reasons for the control of temperature in land-based engineering applications, e.g. expansion, vaporisation, efficiency, combustion, longevity, oil viscosity

K2 the methods and types of heat control and dissipation, e.g. liquid, forced air, convection/conduction, radiation, heat sinks and insulation materials

K3 the symptoms of lack of cooling and lubrication, e.g. distortion, glazing, wear, seizure, heat spots, friction welding, scoring

K4 the construction, purpose and function of components used in typical cooling systems to include air and liquid cooled systems

K5 the causes for impaired cooling efficiency, e.g. obstructions, poor circulation, air locks, ambient temperature, system pressures, overload

K6 how to test and maintain cooling systems and their components, e.g. thermostats, fan speeds, input and output temperatures, pressure tests, flushing and bleeding procedures

K7 the reasons for lubrication, e.g. reduce friction, reduce wear, cooling

K8 the properties of friction materials and their lubrication requirements

K9 the types, characteristics, properties and application of lubricants, oils, particulate suspension, sealing, greases, additives, antifreeze and coolants

K10 the fundamental operating principles of lubrication systems and their components, wet/dry sump, drip, splash, gravity, self-lubricating, force fed, automatic greasing

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