

LANLEO4 - SQA Unit Code F9EA 04

Core land-based engineering principles – Mechanical principles



Overview

This standard provides the underpinning knowledge relating to the characteristics and properties of bearings, bushes, seals and plugs, their location and retention. The setting of components, e.g. tension, preload, end-float, backlash, protrusion, clearance, interference fit.

The principles of centrifugal force, torque and speed, centre of gravity, dynamic and static balance, stability, ground pressure, fulcrum points and leverage.

This standard relates to the following application or context:

- 1 The principles of transmitting drive through:
 - 1.1 Gears
 - 1.2 Belts and chains
 - 1.3 Reciprocal and direction movement

- 2 The characteristics and properties and setting principles of:
 - 2.1 Bearings
 - 2.2 Bushes
 - 2.3 Seals
 - 2.4 Torque limiting devices

Anyone undertaking mains electrical work must comply with current regulations.

Performance criteria

You must be able to:

- P1 remove and refit components using recognised mechanical principles and techniques, e.g. leverage, pressure, impact, shock loading, expansion and contraction
- P2 set bearings, torque limiting devices, and components to suit application and manufacturers' specification, e.g. preload, end-float, protrusion, recess, meshing, slipping torque
- P3 test and verify component settings, e.g. rolling resistance, torque settings, positioning, clamp pressure, tension
- P4 remove and refit components secured by interference fit, taper fit, shrink fit, chemical bonding
- P5 check components and machines for static and dynamic balance and stability, e.g. rotary blades, wheels, combine and forage harvester cylinders
- P6 set linkages and select components to gain maximum mechanical advantage, e.g. hydraulic and pneumatic ram sizes, lift linkages

Knowledge and understanding

You need to know and understand:

- K1 bearing and bush types, their construction, application and characteristics, e.g. needle, roller, taper roller bearings, ball bearings, floating, self-aligning, sealed, self-lubricating, plain bushes, shell bearings, thrust bearings and washers
- K2 the reason for setting up bearings and the effect of incorrect settings
- K3 the methods of setting up bearings and components, e.g. shimming, calculation, applied tension and pressure
- K4 the methods of checking bearing and component settings, e.g. torque wrenches, feeler gauges, rolling resistance, measurement, lead wire, engineers blue
- K5 the construction, characteristics and fitting methods of oil, grease, pressure, dust and water seals
- K6 the types of gear tooth profile and their application, characteristics and meshing patterns, e.g. straight spur helical, hypoid
- K7 how direction rotation, reciprocating movement and balance is achieved
- K8 the principles of transmitting drive through shafts, pulleys, sprockets, belts and chains, their construction, types, characteristics and applications, e.g. universal joints, cv joints, identification of belt types and their sections, matched belts, chains and their limits of serviceability

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