
Overview

This standard covers the application of core land-based engineering principles: mechanical principles. It focuses on the characteristics and properties of bearings, bushes, seals and plugs, their location and retention, as well as the setting of components, e.g. tension, preload, end-float, backlash, protrusion, clearance, interference fit.

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

This standard is for those who work in land-based engineering and is appropriate for persons working under supervision.

Note: due to current regulations an approved electrician should be involved when working with mains electricity.

Performance criteria

You must be able to:

1. remove and refit components applying core land-based engineering mechanical **principles** and techniques
2. set bearings and bushes, torque limiting devices, and components to suit application and manufacturers' **specifications**
3. **test** and verify component settings
4. remove and refit **components** secured by interference fit, taper fit, shrink fit or chemical bonding
5. check components and machines for static and dynamic balance and stability
6. set **linkages** and select components to gain maximum mechanical advantage

Apply core land-based engineering principles: mechanical principles

Knowledge and understanding

You need to know and understand:

1. **bearing and bush types**, their construction, application and characteristics
2. the reason for setting up bearings and the effect of incorrect settings
3. the **methods of setting up** bearings and components
4. the **methods of checking** bearing and component settings
5. the construction, characteristics and fitting methods of oil, grease, pressure, dust and water seals
6. the **types of gear tooth profile** and their application, characteristics and meshing patterns
7. how directional rotation, reciprocating movement and balance is achieved
8. the **principles of transmitting drive** through shafts, pulleys, sprockets, belts and chains, their construction, types, characteristics and applications

Glossary

bearing and bush types - e.g. needle, roller, taper roller bearings, ball bearings, floating, self-aligning, sealed, self-lubricating, plain bushes, shell bearings, thrust bearings and washers

check **components** and machines - e.g. rotary blades, wheels, combine and forage harvester cylinders

set **linkages** - e.g. hydraulic and pneumatic ram sizes, lift linkages

methods of checking bearing and component settings - e.g. torque wrenches, feeler gauges, rolling resistance, measurement, lead wire, engineers blue

methods of setting up bearings and components - e.g. shimming, calculation, applied tension and pressure

mechanical **principles** and techniques - e.g. leverage, pressure, impact, shock loading, expansion and contraction

principles of transmitting drive - e.g. universal joints, CV joints, identification of belt types and their sections, matched belts, chains and their limits of serviceability

application and manufacturers' **specifications** - e.g. preload, end-float, protrusion, recess, meshing, slipping torque

test and verify component settings - e.g. rolling resistance, torque settings, positioning, clamp pressure, tension

types of gear tooth profile - e.g. straight spur, helical, hypoid

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