



Australian Government

Department of Education, Employment and Workplace Relations

RIIDES301 Inspect, test and maintain diesel engine systems and their ancillary systems

Release: 1

RIIDES301 Inspect, test and maintain diesel engine systems and their ancillary systems

Modification History

Not applicable.

Unit Descriptor

This unit covers the inspection, testing and maintenance of diesel engines systems and their ancillary systems for underground coal mines to provide the means of confirming the effectiveness of their explosion and fire protection and emission control. It includes: planning, preparing for and carrying out diesel engine and their ancillary systems inspection, testing, maintenance and overhaul tasks; and the completion of post work activity requirements

Application of the Unit

This unit is appropriate for those undertaking the inspection, testing and maintenance of diesel engine systems for underground coal mines.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Pre-qualification:

Metal, mechanical, electrical or automotive trades or mechanical or electrical engineering

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
---	--

Elements and Performance Criteria

1. Plan for inspection, testing and/or maintenance tasks	1.1 Access, interpret and apply <i>compliance and other documentation</i> relevant to the <i>inspection, testing and maintenance</i> of the <i>ancillary systems</i> of <i>diesel engine systems</i> 1.2 Obtain, interpret and clarify <i>work requirements</i> for the satisfactory completion of tasks 1.3 Resolve coordination requirements with <i>others</i> at the site prior to commencing and during work activities
2. Prepare for inspection, testing and/or maintenance tasks	2.1 <i>Inspect and prepare work area</i> in <i>coordination with others</i> 2.2 Identify and obtain <i>items</i> and <i>tools</i> required for the safe, effective and efficient completion of the tasks 2.3 Identify and arrange <i>support</i> required for completion of tasks 2.4 <i>Select and use personal protection equipment appropriate to the task</i> 2.5 Carry out required equipment <i>pre-start procedures</i> 2.6 Carry out required isolation and lock-out of all equipment necessary for the safe execution of tasks 2.7 Recognise and respond to <i>hazardous and emergency situations</i>
3. Carry out inspection of diesel engines and their ancillary systems	3.1 Inspect diesel engine systems and their ancillary systems 3.2 Report outcomes of inspection to appropriate person

4. Carry out testing of diesel engines and their ancillary systems	4.1 Select and operate testing equipment and methods 4.2 Carry out safe effective and efficient testing and fault finding of diesel engine systems 4.3 Carry out testing and fault finding of ancillary systems on diesel engine systems 4.4 Diagnose and record existing or identified faults
5. Carry out routine maintenance of diesel engines and their ancillary systems	5.1 Select and use maintenance items, tools and equipment 5.2 Rectify diagnosed and identified faults 5.3 Carry out routine maintenance of diesel engine systems and their ancillary systems in accordance with the work requirements 5.4 Carry out maintenance of diesel engine ancillary systems in accordance with the work requirements
6. Carry out the overhaul of diesel engines and their ancillary systems	6.1 Select and use overhaul items, tools and equipment 6.2 Carry out overhaul of diesel engine systems in accordance with the work requirements and Australian Standards 6.3 Carry out overhaul of ancillary systems on diesel engine systems in accordance with work requirements and Australian Standards
7. Complete post-work activity requirements	7.1 Tidy up work area 7.2 Dispose of used oil, lubricant and other waste 7.3 Return and secure all tools and re-usable items 7.4 Report outcomes of inspection, testing, maintenance and overhaul tasks to appropriate person 7.5 Complete and maintain inspection, testing and maintenance records

Required Skills and Knowledge

Required skills

Specific skills are required to achieve the performance criteria in this unit, particularly for the application in the various circumstances in which this unit may be applied.

This includes the ability to carry out the following to inspect, test and maintain diesel engine systems and their ancillary systems:

- apply legislative, organisation and site requirements and procedures
- apply site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures
- apply site and manufacturer's requirements and procedures
- apply surface and underground worksite hazard identification and risk management requirements and procedures
- apply task hazard identification and risk management requirements and procedures
- apply technical literacy
- interpret and apply technical and scientific/industry terminology
- communicate with those providing support
- apply work area and equipment inspection procedures
- apply work area safeguarding options and requirements
- apply isolation and lock-out requirements and procedures
- apply hazard and emergency procedures
- apply site service and maintenance reporting requirements and procedures
- work wearing appropriate personal protective equipment
- apply mechanical trade/engineering skills and experience
- use tools for inspection, testing and maintenance

Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used.

This includes knowledge of the following, to inspect, test and maintain diesel engine systems and their ancillary systems:

- site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures
- limitations on allowable maintenance including work in hazardous environments
- limitations on allowable modifications and the required controls and procedures
- site and manufacturer's requirements and procedures
- the relative characteristics, performance and suitability for the underground use of common diesel engine types including;
- two stroke or four stroke,
- directly injected or indirectly injected (pre-combustion),
- naturally aspirated or charge boosted (turbocharged or super-charged) intake systems
- basic type of mechanical fuel delivery systems including;

- distributor type pumps (VE)
- jerk type pumps
- pressure/time type pumps (PT)
- hydraulic injectors (internal pintle)
- basic type of electrical/electronic fuel delivery and engine management systems including;
- unit injectors [HEUI (hydraulic electric unit injectors), MEUI (mechanical electric unit injectors and piezo]
- the effect of increased injection pressure on performance and emissions
- the controls, sensors and management systems integrated into ECMs
- characteristics of materials used in the diesel engine system,
- items required to be used in performance of inspection, testing and maintenance tasks
- tools required for the performance of inspection, testing and maintenance tasks
- provisions of AS/NZS3584.1, 2 and 3 relating to fasteners and joints
- recognise the requirements and performance of various types of fasteners, including bolts, studs, threads and washers
- site inspection, testing and maintenance support requirements and availability
- site work area inspection requirements
- site work area safeguarding options and requirements
- site isolation and lock-out requirements and procedures
- site hazard and emergency procedures
- site inspection, testing and maintenance reporting requirements and procedures
- site inspection, testing and maintenance record procedures
- site requirements and procedures for working in isolation
- site requirements for the use of personal protective equipment

Evidence Guide

Critical aspects for assessment and evidence required to demonstrate competency in this unit	• The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the performance criteria, required skills and knowledge and the range statement of this unit and include evidence of the following: • Knowledge of the requirements, procedures and instructions for the inspection, testing and maintenance of diesel engine systems and their ancillary systems • Implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the inspection, testing and maintenance of diesel engine systems and their
---	--

	ancillary systems • Working with others to undertake and complete the inspection, testing and maintenance of diesel engine systems and their ancillary systems that meets all of the required outcomes. • Consistent timely completion of the inspection, testing and maintenance of diesel engine systems and their ancillary systems that safely, effectively and efficiently meets the required outcomes.
--	---

Context of and specific resources for assessment	• This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills. • The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job. • Customisation of assessment and delivery environment to sensitively accommodate cultural diversity. • Aboriginal people and other people from a non English speaking background may have second language issues. • Assessment of this competency requires typical resources normally used in a resources and infrastructure sector environment. Selection and use of resources for particular worksites may differ due to the site circumstances. • Where applicable, physical resources should include equipment modified for people with disabilities. • Access must be provided to appropriate learning and/or assessment support when required.
Method of assessment	• This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods: • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistently achieving the required outcomes • first hand testimonial evidence of the candidate:

	• working with others to undertake and complete the inspection, testing and maintenance of diesel engine systems and their ancillary systems
Guidance information for assessment	• Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

Range Statement

Compliance documentation and other documentation may include	• certification documentation • approval documentation • legislative, organisation and site requirements and procedures • manufacturer's specifications and guidelines • Australian Standards, including: AS/NZS3584 and AS 4291 • codes of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Inspection may include:	• checking the marking of parts/components • checking that the diesel engine system and engine compartment is free of loose materials, including coal dust • checking that there are no diesel fuel leaks or leaks of any other flammable liquids • checking that the engine oil level is correct • checking that guards are in place and secure. (e.g. radiator and pulley guards) • checking that the V belts are in place and undamaged • checking that the V belts are correctly tensioned • confirming that the vee belts are fire-resistant and anti-static (FRAS) • check that the vee-belt pulleys are lubricated (if required) • confirming that the engine mountings are secure • inspecting the throttle linkages to ensure that they are in good condition and fully operative • inspecting the fuel injector lines (including common rail, high pressure, lines) to ensure that they are in good condition, properly restrained, protected from abrasion and not showing any signs of wear cracks or leaks • inspecting (visual) that the compressor delivery line is in a good condition, if a flexible hose is used, confirm that it is PTFE/steel wire braid hose • removing hoses from air compressor and inspecting ports, fittings and hoses and ensuring that there is no significant build-up of carbon • checking that the engine sump is secure and undamaged and there is no evidence of oil leaks • checking that the engine crankcase breather is clean

	and not blocked • confirming that the starter motor is securely mounted
--	--

Testing may include:	conduct surface temperature test and confirm that the location and temperature are within a reasonable tolerance of the information provided on the drawings
Maintenance is:	the combination of actions carried out to retain a diesel engine system in, or to restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required function
Maintenance may include:	- service - adjust - replace - repair - overhaul - modify
Diesel engine ancillary equipment may include:	air compressors
Diesel engine systems are:	diesel engines for underground coal mines and their: - inlet systems - exhaust systems - cooling systems - starting systems - shut-down and protection systems - electrical or electronic devices
Work requirements may come from briefings, handovers, and work orders and may include:	- nature and scope of tasks - procedures to be applied - quality standards to be applied - available resources - achievement targets - operational conditions - site layout - out-of-bounds areas - designated safe areas - explosion-risk zones - hazardous areas - other hazards and potential hazards - obtaining permits required - worksite inspection requirements - lighting conditions - plant or equipment defects - coordination requirements or issues

Others may include:	• other maintenance personnel • support providers • contractors • under-ground production personnel • mobile or fixed plant operators
Inspect and prepare work area may include:	• determining if the proposed work area is a designated safe area • identification of explosion-risk zones • identification of hazardous areas • identification of hazards, including: • workshop work area hazard • underground work area hazards, and • work activity hazards • fire • explosion • emissions • selection and implementation of control measures for the hazards identified • safeguarding site and non-site personnel by: • erection of barricades and posting of signs • selection of appropriate equipment to ensure personnel safety and protection
Items may include:	• authorised replacement parts • fasteners as specified in manufacturer's drawings, which may include: • tensile strength • head and nut configuration • thread form and engagement • corrosion resistance (materials) • coatings (materials and application) • tolerances for fits and threads • tolerances for mating surfaces • dimensions of clearance holes • fixing torques • lubricants and anti-seize compounds used • packing materials
Tools may include:	• hand tools • power tools • special tools • testing equipment
Support may include:	• other site personnel • contractors

	• cranes • other lifting equipment
--	--

Personal protection equipment may include:	• hard hats • eye protection • hearing protection • breathing apparatus • gas/fume masks • prescribed footwear
Pre-start procedures include checking:	• cleanliness, particularly coal dust • diesel and other flammable liquid leaks • coolant leaks in radiator or radiator hoses • coolant level • that guards are in place and secure • engine oil level is correct
Hazardous and emergency situations may include:	• working alone • personal injury • fire • explosions • emissions • electrical • noise • dust • noxious gases • environmental • chemical
Diagnose faults may include:	• root cause analysis • troubleshooting techniques
Routine maintenance is to include:	• servicing, including: • cleaning • checking and filling lubricants, fuel and water • draining the fuel/water separator • draining all air receivers and water separators • emptying filters fitted to the pneumatic system • filling the pneumatic system lubricator • adjusting • changing (replacing), including • fuel filters • engine-oil and filter • pneumatic air filters
Overhaul may include:	• removal • dismantling • cleaning • inspecting

	• replacing, eg: • gaskets • fasteners • testing, including: • flatness • measuring dimensions • hydrostatic • reassembly • reinstallation
Records may include:	• inspection and test results • defect identified • defect rectification carried out • item consumed • hazard/risk management reports

Unit Sector(s)

Coal Mining (Diesel Engine Systems Maintenance)