



Australian Government

Department of Education, Employment and Workplace Relations

RIIDES306 Inspect, test and maintain safety shutdown systems on diesel engine systems

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit covers the inspection, testing and maintenance of safety shutdown systems of diesel engine systems for underground coal mines to provide a means of confirming their effectiveness.

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

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.
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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 for the <i>inspection, testing and maintenance of safety shutdown systems on 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 and tools</i> required for the safe, effective and efficient conduct of the tasks. 2.3 Identify and arrange <i>support</i> required for completion of tasks 2.4 Select and use <i>personal protection equipment</i> appropriate to the task 2.5 Carry out required equipment <i>pre-start and inspection 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 safety shutdown systems	3.1 Carry out inspection of engine safety shutdown systems (fuel shutdown systems) 3.2 Carry out inspection of emergency safety shutdown systems 3.3 Carry out inspection of manual fuel shut-off valves 3.4 Carry out inspection of safety shutdown systems sensing devices 3.5 Carry out inspection of hoses, tubes cables and connectors associated with safety shutdown systems 3.6 <i>Diagnose</i> and record existing or identified faults
4. Carry out testing of safety shutdown systems	4.1 Select and operate testing equipment and methods 4.2 Carry out testing and fault finding of engine safety shutdown systems (fuel shutdown systems) 4.3 Carry out testing and fault finding of emergency safety shutdown systems 4.4 Carry out testing and fault finding of manual fuel shut-off

	valves 4.5 Carry out testing and fault finding of safety shutdown systems sensing devices 4.6 Diagnose, record and rectify existing identified faults
5. Carry out routine maintenance of safety shutdown 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 engine safety shutdown systems (fuel shutdown systems) 5.4 Carry out routine maintenance of emergency safety shutdown systems 5.5 Carry out routine maintenance of manual fuel shut-off valves 5.6 Carry out routine maintenance of safety shutdown systems sensing devices
6. Carry out the overhaul of safety shutdown systems	6.1 Select and use overhaul items, tools and equipment 6.2 Carry out overhaul of safety shutdown systems in accordance with work requirements and Australian Standards
7. Complete post-work activity requirements	7.1 Tidy up the 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 as required to safely, effectively and efficiently inspect, test and maintain safety shutdown systems on diesel engine systems:

- apply legislative, organisation and site 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 hazard and emergency procedures
- apply site health and safety requirements and procedures
- apply site environmental requirements and procedures
- apply site quality requirements and procedures
- read, explain and apply:
 - technical information including scheduled drawings
 - site/legislative requirements
 - records and reports
- apply registration/certification information and implement conditions and recommendations
- apply feedback procedures
- apply technical and routine reporting requirements and procedures
- apply investigation procedures
- apply technical literacy, including reading and interpreting fluidic and logic schematic drawings
- interpret and apply technical and scientific/industry terminology
- analyse the function of the devices within an integrated system
- operate manual fuel shutoff valve
- apply site communication requirements and procedures
- apply manufacturer's requirements and procedures
- 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 site service and maintenance reporting requirements and procedures
- apply inspection requirements and procedures
- apply testing requirements and procedures
- apply fault finding techniques
- apply maintenance requirements and procedures
- work wearing appropriate personal protective equipment
- use tools for inspection, testing and maintenance
- use calibrated/verified instruments

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, as required to safely, effectively and efficiently inspect, test and maintain safety shutdown systems on diesel engine systems:

- site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures
- site and manufacturer's requirements and procedures
- legislative requirements and procedures
- site and legislative safety inspection requirements
- provisions of relevant Standards and guidelines
- potential hazards in the use of diesel engine systems in underground coal mines, including:
 - explosions
 - fire, and
 - emissions
- limitations on allowable maintenance, including:
 - service
 - adjust
 - replace
 - repair
 - overhaul
- work in hazardous environments
- limitations on allowable modifications and their required controls and procedures
- engine system shut-down devices required by AS/NZS3584.1&2
- water-bath level monitoring devices, including the methods employed to determine minimum safe shut-down levels and the testing methods and procedures required to confirm compliance
- functionality and performance of the various type of 'automatic safety shutdown systems, including:
 - pneumatically operated
 - engine oil (pressure) operated
 - a mix of pneumatic and engine oil (pressure) operated
 - electrically or electronically operated
- failure modes of safety shutdown systems, including
 - contamination
 - incorrect adjustment
 - unauthorised adjustment
- testing procedures required to detect failures
- recommended maintenance procedures required to reduce the probability of failures
- features, function and performance of electrical / electronic safety shutdown system and sufficient knowledge of the Group I explosion protection techniques used for devices to identify a component failure by inspection (only) and to seek expert competent advice, such

- as;
- Ex.d – flameproof
- Ex.i a-b – intrinsic safety
- Ex.m a-b – dncapsulation
- Ex.e – increased safety
- Ex.o – oil immersion
- Ex.s – special protection
- requirements for cables and connections used for electrical / electronic safety shutdown system, including those nominated in AS/NZS4871.6
- features, function, performance of the various type of ‘emergency stop systems, including;
- strangler valves in the air intake system
- inert gas injection
- decompression
- operation of the manual fuel shut off valve
- 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 safety shutdown systems on diesel engine systems • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the inspection, testing and maintenance of safety shutdown systems on diesel engine systems • working with others to undertake and complete the inspection, testing and maintenance of safety shutdown systems on diesel engine systems that meets all of the required outcomes • consistent timely completion of the inspection, testing and maintenance of safety shutdown systems on diesel engine 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.
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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 safety shutdown systems on diesel engine systems
Guidance information for assessment	Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

Range Statement

Compliance and other documentation 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 - inspecting the fuel shutdown linkages to ensure they are in good condition and fully operative
Testing may include:	- conducting exhaust conditioner/flametrapp, low-water, shutdown tests (both low water test systems are tested separately) - checking that all gauges and indicators are operating correctly and are clearly visible

	• checking the proper operation and function of; • low oil engine pressure detection sensor • coolant loss protection sensor • coolant over temperature protection sensor • confirming that the manual fuel valve operates correctly to stop the diesel within the time determined by the original type testing including a reasonable margin • test that the air receiver safety (pressure relief) valves are in place, not blocked/seized and operating correctly • checking the engine system shuts down at, or higher than, the minimum shutdown water level, (record the water levels after shut-down) • testing the emergency safety shutdown system to ensure that the engine stops under the operation of the emergency safety shutdown system working in isolation of other engine safety shutdown systems, record the time taken for the engine to stop with the engine running at high idle, (Note: The diesel engine system manufacturer may provide test instructions to minimise the risk of engine damage during testing (see AS/NZS 3584.2) • checking the proper operation and function of the low oil engine pressure detection sensor, and recording the engine oil pressure at the time of shutdown • checking the proper operation and function of the coolant loss detection sensor, and recording the time taken to cause the engine to shut down • checking the proper operation and function of the coolant over-temperature sensor, and recording the coolant temperature at which the engine shut down, (Note: Testing this sensor by defeating other sensors and overheating the diesel engine system may be hazardous or cause damage to the diesel engine system. It is recommended that the sensor be removed from the engine and tested in heated water while remaining connected to the engine shutdown system) • checking the proper operation and function of the exhaust gas over-temperature sensor, and recording the exhaust temperature at which the engine shut down • confirming that all of the engine shutdown system fault indicators properly indicate each of the faults simulated in the foregoing tests
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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 authorised:	- service - adjusting - replacing - repair - overhaul - modification
Safety shutdown systems may include:	- engine safety shutdown system (fuel shutdown system), including: - manual actuation system - fault indication system - emergency safety shutdown system, may be: - a strangler valve - inert gas injection - decompression - manually actuated - automatically operated - manual fuel shut-off valve - sensing devices, including: - engine cooling system - engine oil pressure - water-based flametraps - exhaust cooling - particulate filter
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
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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
Others may include:	• other maintenance personnel • support providers • contractors • underground production personnel • mobile or fixed plant operators
Items may include:	• authorised replacement parts • fasteners as specified in manufacturer's drawings • packing materials
Tools may include:	• hand tools • power tools • special tools
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 and inspection procedures include:	• checking: • cleanliness, particularly coal dust • diesel and other flammable liquid leaks

	• coolant leaks in radiator or radiator hoses • coolant level • guards are in place and secure • engine oil level is correct • conduct exhaust conditioner/flametrapp, low-water, shutdown tests
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 • adjusting • replacing
Overhaul may include:	• removal • dismantling • cleaning • inspecting • replacing, eg: • valves sensors exhaust gas recirculation • particulate filters • replacement element-type filter testing, including: • individual devices system operation and function 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)

Custom Content Section

Not applicable.