



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **RIIDES302 Inspect, test and maintain joints on diesel engine systems**

**Release: 1**

## **RIIDES302 Inspect, test and maintain joints on diesel engine systems**

### **Modification History**

Not applicable.

### **Unit Descriptor**

This unit covers the inspection, testing and maintenance of joints on diesel engine 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 and preparing for and inspection, testing, routine maintenance and overhaul tasks on joints; and the completion of post-work 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**

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

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| 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

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| 1. Plan for inspection, testing and/or maintenance tasks    | <p>1.1 Access, interpret and apply <b><i>compliance and other documentation</i></b> relevant to the <b><i>inspection, testing and maintenance of joints on diesel engine systems</i></b></p> <p>1.2 Obtain, interpret and clarify <b><i>work requirements</i></b> for the satisfactory completion of tasks</p> <p>1.3 Resolve coordination requirements with <b><i>others</i></b> at the site prior to commencing and during work activities</p>                                                                                                                                                                                                                                 |
| 2. Prepare for inspection, testing and/or maintenance tasks | <p>2.1 <b><i>Inspect and prepare work area in coordination with others</i></b></p> <p>2.2 Identify and obtain <b><i>items and tools</i></b> required for the safe, effective and efficient conduct of the tasks.</p> <p>2.3 Identify and arrange <b><i>support</i></b> required completion of the tasks</p> <p>2.4 <b><i>Select and use personal protection equipment appropriate to the task</i></b></p> <p>2.5 Carry out equipment <b><i>pre-start procedures</i></b></p> <p>2.6 Carry out required isolation and lock-out of all equipment necessary for the safe execution of tasks</p> <p>2.7 Recognise and respond to <b><i>hazardous and emergency situations</i></b></p> |
| 3. Carry out inspection of diesel engine system joints      | <p>3.1 Carry out inspection and fault finding of joints on fixed connections for the effectiveness of their explosion and fire protection</p> <p>3.2 Carry out inspection and fault finding of open joints for the effectiveness of their explosion and fire protection</p> <p>3.3 <b><i>Diagnose</i></b> and record existing or identified faults</p>                                                                                                                                                                                                                                                                                                                           |
| 4. Carry out testing of diesel engine system joints         | <p>4.1 Select and operate testing equipment and methods</p> <p>4.2 Carry out testing of joints on fixed connections for effectiveness of explosion and fire protection</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

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|                                                                 | <p>4.3 Carry out testing of open joints for the effectiveness of explosion and fire protection</p> <p>4.4 Identify and record existing or potential faults</p>                                                                                                                                                                                                                         |
| 5. Carry out routine maintenance of diesel engine system joints | <p>5.1 Select and use maintenance items, tools and equipment<br/>Rectify diagnosed and identified faults</p> <p>5.2 Carry out <b><i>routine maintenance</i></b> of joints on fixed connections to ensure effectiveness of their explosion and fire protection</p> <p>5.3 Carry out routine maintenance of open joints for the effectiveness of their explosion and fire protection</p> |
| 6. Carry out the overhaul of diesel engine systems joints       | <p>6.1 Select and use <b><i>overhaul</i></b> items, tools and equipment</p> <p>6.2 Carry out overhaul of joints on diesel engine systems in accordance with the work requirements and Australian Standards</p> <p>6.3 Recognise and respond to <b><i>hazardous and emergency situations</i></b></p>                                                                                    |
| 7. Complete post-work activity requirements                     | <p>7.1 Tidy up the work area</p> <p>7.2 Dispose of used oil, lubricant and other waste</p> <p>7.3 Return and secure all tools and re-usable items</p> <p>7.4 Report outcomes of inspection, testing, maintenance and overhaul tasks to appropriate person</p> <p>7.5 Complete and maintain inspection, testing and maintenance <b><i>records</i></b></p>                               |

## 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 joints on diesel engine systems:

- apply legislative 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
- apply site communication requirements and procedures
- apply manufacturer's 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 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 measuring 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 joints on diesel engine systems:

- site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures
- site and manufacturer's requirements and procedures
- potential hazards in the use of diesel engine systems
- including:
  - explosions
  - fire
  - 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
- tools and measuring instruments required for the performance of inspection, testing and maintenance tasks
- the types of and functionality of joints that may be integral to the design and maintenance of

a diesel engine system, including;

- fixed connection
- open joints
- the requirements for interposed gaskets and seals in joints, including
- materials
- dimensions
- form and shape
- 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

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## 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 joints on diesel engine systems
- implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the inspection, testing and maintenance of joints on diesel engine systems
- working with others to undertake and complete the inspection, testing and maintenance of joints on diesel engine systems that meets all of the required outcomes
- consistent timely completion of the inspection, testing and maintenance of joints on diesel engine systems that safely, effectively and efficiently meets the required outcomes

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| Context of and specific resources for assessment | <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Customisation of assessment and delivery environment to sensitively accommodate cultural diversity.</li> <li>• Aboriginal people and other people from a non English speaking background may have second language issues.</li> <li>• 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.</li> <li>• Where applicable, physical resources should include equipment modified for people with disabilities.</li> <li>• Access must be provided to appropriate learning and/or assessment support when required.</li> </ul> |
| Method of assessment                             | <p>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:</p> <ul style="list-style-type: none"> <li>• written and/or oral assessment of the candidate's required knowledge</li> <li>• observed, documented and/or first hand testimonial evidence of the candidate's:</li> <li>• implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes</li> <li>• consistently achieving the required outcomes</li> <li>• first hand testimonial evidence of the candidate:</li> <li>• working with others to undertake and complete the inspection, testing and maintenance of joints on diesel engine systems</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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| Guidance information for assessment | <ul style="list-style-type: none"> <li>Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.</li> </ul> |
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## Range Statement

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| <b>Compliance and other documentation may include:</b> | <ul style="list-style-type: none"> <li>certification documentation</li> <li>approval documentation</li> <li>legislative, organisation and site requirements and procedures</li> <li>manufacturer's specifications and guidelines</li> <li>Australian Standards, including: AS/NZS3584 and AS 4291</li> <li>codes of practice</li> <li>Employment and Workplace Relations legislation</li> <li>Equal Employment Opportunity and Disability Discrimination legislation</li> </ul>                                                             |
| <b>Inspection may include:</b>                         | <ul style="list-style-type: none"> <li>checking the marking of parts/components</li> <li>visually check that the fasteners securing explosion-protected joints are in place and correctly located, including: <ul style="list-style-type: none"> <li>nuts</li> <li>bolts</li> <li>studs</li> </ul> </li> <li>confirmation of the dimensional, flatness and surface finish conformance of all joint mating parts</li> <li>confirmation of the conformance of all threaded holes and fasteners to drawings and specifications</li> </ul>      |
| <b>Testing may include:</b>                            | <ul style="list-style-type: none"> <li>testing the accessible external open joints (flamepaths) for compliance with the manufacturer's specification and the drawings for maximum gap</li> <li>testing accessible external fixed connections for gas tightness in a manner recommended by the manufacturer</li> <li>correct tightening torque of all fasteners.</li> <li>conducting gas tightness tests for all joints within the exhaust system</li> <li>conducting gas tightness tests for all joints within the intake system</li> </ul> |
| <b>Maintenance is:</b>                                 | <ul style="list-style-type: none"> <li>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</li> </ul>                                                                                                                                                                                                                                                                                                                           |

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|                                                                                               | relevant specification and perform its required function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Maintenance</b> may include authorised:                                                    | <ul style="list-style-type: none"> <li>• service</li> <li>• adjusting</li> <li>• replacing</li> <li>• repair</li> <li>• overhaul</li> <li>• modification</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Joints may include:</b>                                                                    | <ul style="list-style-type: none"> <li>• fixed connections, including:</li> <li>• metallic and/or flameproof gaskets</li> <li>• o-rings on fuel systems</li> <li>• open joints, including:</li> <li>• valve stems and valve guides</li> <li>• intake and exhaust flametraps</li> <li>• water injection nozzles</li> <li>• turbo-charger and/or supercharger, where flame trap is fitted to inlet side</li> <li>• fuel injectors</li> </ul>                                                                                                                                                                           |
| <b>Diesel engine systems are:</b>                                                             | <p>diesel engines for underground coal mines and their:</p> <ul style="list-style-type: none"> <li>• inlet systems</li> <li>• exhaust systems</li> <li>• cooling systems</li> <li>• starting systems</li> <li>• shut-down and protection systems</li> <li>• electrical or electronic devices</li> </ul>                                                                                                                                                                                                                                                                                                              |
| <b>Work requirements</b> may come from briefings, handovers, and work orders and may include: | <ul style="list-style-type: none"> <li>• nature and scope of tasks</li> <li>• procedures to be applied</li> <li>• quality standards to be applied</li> <li>• available resources</li> <li>• achievement targets</li> <li>• operational conditions</li> <li>• site layout</li> <li>• out-of-bounds areas</li> <li>• designated safe areas</li> <li>• explosion-risk zones</li> <li>• hazardous areas</li> <li>• other hazards and potential hazards</li> <li>• obtaining permits required</li> <li>• worksite inspection requirements</li> <li>• lighting conditions</li> <li>• plant or equipment defects</li> </ul> |

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|                                                   | <ul style="list-style-type: none"> <li>• coordination requirements or issues</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Others</b> may include:                        | <ul style="list-style-type: none"> <li>• other maintenance personnel</li> <li>• support providers</li> <li>• contractors</li> <li>• under-ground production personnel</li> <li>• mobile or fixed plant operators</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Inspect and prepare work area</b> may include: | <ul style="list-style-type: none"> <li>• determining if the proposed work area is a designated safe area</li> <li>• identification of explosion-risk zones</li> <li>• identification of hazardous areas</li> <li>• identification of hazards, including: <ul style="list-style-type: none"> <li>• workshop work area hazard</li> <li>• underground work area hazards, and</li> <li>• work activity hazards</li> </ul> </li> <li>• fire</li> <li>• explosion</li> <li>• emissions</li> <li>• selection and implementation of control measures for the hazards identified</li> <li>• safeguarding site and non-site personnel by: <ul style="list-style-type: none"> <li>• erection of barricades and posting of signs</li> </ul> </li> <li>• selection of appropriate equipment to ensure personnel safety and protection</li> </ul> |
| <b>Items</b> may include:                         | <ul style="list-style-type: none"> <li>• authorised replacement parts</li> <li>• fasteners as specified in manufacturer's drawings, including: <ul style="list-style-type: none"> <li>• tensile strength</li> <li>• head and nut configuration</li> <li>• thread form and engagement</li> <li>• corrosion resistance (materials)</li> <li>• coatings (materials and application)</li> <li>• tolerances for fits and threads</li> <li>• tolerances for mating surfaces</li> <li>• dimensions of clearance holes</li> <li>• fixing torques</li> </ul> </li> <li>• lubricants and anti-seize compounds used</li> <li>• packing materials</li> </ul>                                                                                                                                                                                    |
| <b>Tools</b> may include:                         | <ul style="list-style-type: none"> <li>• hand tools</li> <li>• power tools</li> <li>• special tools</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Support</b> may include:                       | <ul style="list-style-type: none"> <li>• other site personnel</li> <li>• contractors</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

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|                                                        | <ul style="list-style-type: none"> <li>• cranes</li> <li>• other lifting equipment</li> </ul>                                                                                                                                                                                                                                                                                                                      |
| <b>Personal protection equipment may include:</b>      | <ul style="list-style-type: none"> <li>• hard hats</li> <li>• eye protection</li> <li>• hearing protection</li> <li>• breathing apparatus</li> <li>• gas/fume masks</li> <li>• prescribed footwear</li> </ul>                                                                                                                                                                                                      |
| <b>Pre-start procedures</b> include:                   | <ul style="list-style-type: none"> <li>• checking:</li> <li>• cleanliness, particularly coal dust</li> <li>• diesel and other flammable liquid leaks</li> <li>• coolant leaks in radiator or radiator hoses</li> <li>• coolant level</li> <li>• that guards are in place and secure</li> <li>• engine oil level is correct</li> <li>• conduct exhaust conditioner/flametrapp, low-water, shutdown tests</li> </ul> |
| <b>Hazardous and emergency situations</b> may include: | <ul style="list-style-type: none"> <li>• working alone</li> <li>• personal injury</li> <li>• fire</li> <li>• explosions</li> <li>• emissions</li> <li>• electrical</li> <li>• noise</li> <li>• dust</li> <li>• noxious gases</li> <li>• environmental</li> <li>• chemical</li> </ul>                                                                                                                               |
| <b>Diagnose</b> faults may include:                    | <ul style="list-style-type: none"> <li>• root cause analysis</li> <li>• troubleshooting techniques</li> </ul>                                                                                                                                                                                                                                                                                                      |
| <b>Routine maintenance</b> is to include:              | <ul style="list-style-type: none"> <li>• servicing, including cleaning</li> <li>• adjusting</li> <li>• replacing</li> </ul>                                                                                                                                                                                                                                                                                        |
| <b>Overhaul</b> may include:                           | <ul style="list-style-type: none"> <li>• removal</li> <li>• dismantling</li> <li>• cleaning</li> <li>• inspecting</li> <li>• replacing, eg:</li> <li>• gaskets</li> <li>• fasteners</li> <li>• testing, including:</li> </ul>                                                                                                                                                                                      |

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|                             | <ul style="list-style-type: none"><li>• flatness</li><li>• measuring dimensions</li><li>• hydrostatic</li><li>• reassembly</li><li>• reinstallation</li></ul>                                                         |
| <b>Records</b> may include: | <ul style="list-style-type: none"><li>• inspection and test results</li><li>• defect identified</li><li>• defect rectification carried out</li><li>• item consumed</li><li>• hazard/risk management reports</li></ul> |

## Unit Sector(s)

Coal Mining (Diesel Engine Systems Maintenance)

## Custom Content Section

Not applicable.