



Australian Government

Department of Education, Employment and Workplace Relations

TLIW0036A Apply electric welding process to rail

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit involves the skills and knowledge required to weld rails, crossings and switches using an electric welding process in accordance with approved standards, safeworking and regulatory requirements and workplace procedures. It includes using non-destructive testing to locate defects; preparing rails, crossings or switches for welding; gouging or grinding; setting up welding equipment; performing the welding operation; checking weld conformance; and completing required documentation. These processes are used to repair rail surface defects and restore rail profile to plain rail, crossings and switches.

Licensing or certification requirements are not applicable to this unit. Persons achieving competence in this unit will need to fulfil legislated rail safety requirements, including acts and regulations from each applicable state and territory, together with any nationally approved compliance codes and/or guidelines.

Application of the Unit

Work is performed under some supervision, generally in a team environment. It involves the application of routine operational principles and procedures to the welding of rail using an electric welding process as part of workplace activities across a variety of operational contexts within the Australian rail system.

Operators of mechanised equipment must have undertaken training and, where appropriate, hold the relevant licence, permit or certificate and be recognised as competent for the class of machinery being used.

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

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 required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare rails, crossings or switches for welding	<p>1.1 Weld repair area is identified and assessed in accordance with standards and procedures</p> <p>1.2 Welding equipment and consumables are prepared and checked for serviceability</p> <p>1.3 Weld repair area is prepared for welding in accordance with workplace standards and procedures</p> <p>1.4 Track components are assembled or aligned to specification where required</p>
2 Use non-destructive testing	<p>2.1 Appropriate non-destructive testing method is selected and used to identify and locate defects in accordance with organisational standards and procedures</p>
3 Assemble and set up welding equipment	<p>3.1 Welding equipment is set up and adjusted to meet welding process requirements</p> <p>3.2 Accessories and consumables are selected for use</p>
4 Assemble and set up gouging and grinding equipment	<p>4.1 Gouging and grinding equipment is assembled and set up</p> <p>4.2 Equipment settings are adjusted to meet process requirements</p> <p>4.3 Accessories and consumables are selected for use</p>
5 Remove defects	<p>5.1 Appropriate method to be used to remove defect is identified in accordance with organisational standards and procedures</p> <p>5.2 Defect is removed using identified method in accordance with organisational standards and procedures</p>
6 Perform welding operation	<p>6.1 Weld metal is applied to repair area to meet specification in accordance with standards and procedures</p> <p>6.2 Welded area is cleaned in preparation for grinding</p> <p>6.3 Welded area is ground in accordance with organisational standards and procedures</p>
7 Check weld conformance	<p>7.1 Finished ground weld area is visually inspected for surface finish and defects</p> <p>7.2 Finished ground weld area is checked for conformance to rail, crossing or switch profile acceptance standards</p>

8 Complete post-operative checks and documentation

- 8.1 Equipment is checked for serviceability
- 8.2 Defective equipment is replaced and reported for servicing or repair in accordance with organisational policies and procedures
- 8.3 Documentation on work undertaken is completed in accordance with organisational requirements

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant safety, OH&S and environmental procedures and regulations
- Workplace procedures for the non-destructive (liquid penetrant or magnetic particle) testing of rail
- Workplace procedures for the removal of defects by gouging, grinding and welding of rail using an electric welding process
- Problems that may occur when welding rail using an electric welding process, and action that can be taken to report or resolve them
- Hazards that may exist when welding rail using an electric welding process, and ways of controlling the risks involved
- Fundamentals of track and components
- Track standards for rail, crossing and switch condition and surface profile
- Acceptance standards for weld repairs on rail
- Relevant communication systems and procedures
- Authorisation/approval processes and procedures
- Documentation and record-keeping requirements

Required skills:

- Communicate effectively with others when welding rail using an electric welding process
- Correct use of non-destructive (liquid penetrant or magnetic particle) testing equipment, gouging equipment and hand grinding equipment
- Read and interpret technical data, drawings, instructions and manuals relating to welding rail using an electric welding process
- Interpret and follow operational instructions and prioritise work when welding rail using an electric welding process
- Complete documentation relating to welding rail using an electric welding process
- Operate communication equipment to required protocol
- Work collaboratively with others when welding rail using an electric welding process
- Report and rectify within limits of own role problems, faults and malfunctions that may occur when welding rail using an electric welding process in accordance with regulatory requirements and organisational procedures
- Implement contingency plans for unexpected events when welding rail using an electric welding process
- Monitor work activities in terms of planned schedule

- Modify activities depending on differing operational contingencies, risk situations and environments
- Work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- Operate and adapt to differences in equipment in accordance with standard operating procedures
- Select and use required personal protective equipment (PPE)
- Select and use hand tools, power tools and equipment

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

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 and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement
- Assessment must include exercises that demonstrate competency in the following in a range of situations:
 - preparing items for welding according to workplace requirements
 - assembling and setting up welding, gouging and grinding equipment and preparing consumables
 - performing welding, grinding, gouging and testing operations on rails, crossings and switches
 - ensuring weld conformance to organisational requirements
 - completing documentation in accordance with organisational requirements

Context of and specific resources for assessment

- Performance must be demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:
 - a range of relevant exercises, case studies and/or other simulated practical and knowledge assessment, and/or
 - access to an appropriate range of relevant operational situations in the workplace or
 - simulated environment using actual components, tools and equipment
- In both real and simulated environments, access is required to:
 - relevant and appropriate materials and equipment, and
 - applicable documentation, including workplace procedures, regulations, codes of practice and operation manuals

Method of assessment

- As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests

- Practical assessment must occur:
 - through activities in an appropriately simulated environment, and/or
 - in an appropriate range of situations in the workplace

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

- Work may involve exposure to:**
- chemicals
 - dangerous or hazardous substances
 - movement of equipment, goods and vehicles
- Types of weld repairs may vary according to:**
- welding process location
 - rail mass or type
 - crossing and switch type
 - rail, switch and crossing material
- Welding process may include:**
- flux core arc welding
 - manual metal arc welding
- Welding equipment may include:**
- electric welders
 - generators
 - wirefeed welding unit
 - electrode holder
 - robotic welders
- Equipment may include:**
- mechanical handling and lifting equipment
 - hand tools, including impact wrenches, tie tampers, gauges, track jacks, spiking hammers and bars
 - oxy-LPG gouging equipment
 - manual or mechanical grinder
 - magnetic particle testing kit
 - liquid penetrant testing kit
 - wire brushes
 - rail thermometers
 - ‘thermomelt’ crayons
 - cutting and boring equipment
 - fastening equipment
 - fume extraction equipment
 - on-line respirator
- Materials may include:**
- flux core wire
 - welding electrodes
 - grinding discs
- Liaison may include:**
- internal or external personnel from other work areas, such as train controllers and signal technicians
- Depending on the type of**
- company procedures

organisation concerned and the local terminology used, organisational procedures may be known as:

- enterprise procedures
- workplace procedures
- established procedures

Communication equipment may include:

- two-way radios
- telephones, including mobile phones
- agreed audible or hand signals

Depending on the work context, safety and PPE may include:

- high visibility clothing
- long pants and shirts
- hearing protection
- long gloves
- spats
- sunscreen
- sunglasses
- welding helmet
- safety glasses
- insect repellent
- safety headwear
- safety footwear
- portable radios and mobile phones
- hand lamps
- flags
- safety devices
- special PPE

Information and documents may include:

- operational instructions
- information provided by other workplace personnel
- rail inspections reports
- work orders
- technical instructions
- manufacturer or workplace equipment instructions and operation manuals
- emergency procedure manuals
- two-way radio or mobile telephone operation procedures
- conditions of service, legislation and industrial agreements, including workplace agreements and awards

Applicable procedures and codes may include:

- legislated rail safety requirements, including acts and regulations from each applicable state and territory, together with any nationally approved compliance codes and/or guidelines
- organisational policies and procedures

- local authority regulations and procedures relevant
- relevant state and territory legislation relating to:
 - environmental protection
 - OH&S

Unit Sector(s)

Not applicable.

Competency Field

W – Equipment and Systems Operations