



Australian Government

DEFDV017B Employ thermal cutting and welding tools (non-load bearing) in an underwater environment

Release: 2

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Modification History

Release	TP Version	Comments
2	DEF12 V2	Layout adjusted. No changes to content.
1	DEF12 V1	Primary release.

Unit Descriptor

This unit covers the competency required to employ thermal cutting and welding tools in an underwater environment. This includes the operation (from the surface) of the generator.

The unit also includes selecting the appropriate tools for the work task and inspecting them for serviceability. The diver must ensure the tools are secured on own body throughout the dive, and correctly operate the tools with particular attention to safety.

Competence will need to be demonstrated in the surface operation of the electrical generator or gas cylinders supplying the tools.

The diver will be responsible for the recovery of any waste arising from the work task to ensure the preservation of the environment. Finally, the tools, generator and gas cylinders must be de-serviced and stored appropriately for ongoing use.

Note: This Unit of Competency relates, in part, to the existing standards of the Australian Diver Accreditation Scheme (ADAS). All information was correct at the time of development of this Unit of Competency; however, any diver seeking ADAS accreditation should consult ADAS and not rely on the information contained in this unit.

Application of the Unit

As agreed in the creation of this Training Package, applications for units transferred from the PUA00 Public Safety Training Package will be developed as part of continuous improvement plans, and taking into account the change in Unit of Competency format as detailed in templates for Streamlined Training Packages.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

DEFDV001B Dive using self contained underwater breathing apparatus in open water to 30 metres.

DEFDV008B Employ hand tools in an underwater environment.

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. Where ***bold italicised*** text is used, further information is detailed in the Range Statement. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1. Prepare for cutting and welding underwater</p>	<p>1.1 <i>Work task, worksite data</i> and <i>work object</i> (including <i>composition</i> and condition) are determined and analysed to determine the specific requirements for <i>thermal cutting and welding tools</i>.</p> <p>1.2 Work plan is developed consistent with the dive plan.</p> <p>1.3 <i>Thermal cutting and welding tools</i>, and <i>protective equipment</i> appropriate to the task are <i>selected, inspected and prepared</i>.</p> <p>1.4 Electrical <i>generator</i> and associated leads are <i>selected, inspected and prepared</i>.</p> <p>1.5 <i>Oxy-acetylene gas cylinders</i> and associated hoses are <i>selected, inspected and prepared</i>.</p> <p>1.6 Thermal cutting and welding tools, the generator, oxy-acetylene gas cylinders, and associated leads and hoses are secured safely to/from the dive site.</p> <p>1.7 Access obstructions and other <i>hazards</i> are assessed and <i>action is taken to remove/reduce risk</i>.</p>
<p>2. Operate thermal cutting and welding tools underwater</p>	<p>2.1 Thermal cutting and welding tools are secured on self during the dive for ease of accessibility and lack of interference with mobility and dive equipment.</p> <p>2.2 Safe routes for leads and hoses to the worksite are established.</p> <p>2.3 Work-safe area is established and location and safety of divers is confirmed prior to commencing work tasks.</p> <p>2.4 Surface of the work object is prepared for the cut or weld.</p> <p>2.5 Voltage and amperage of arc-welding equipment is controlled.</p> <p>2.6 Gas supplies are turned on and ratios of oxygen and acetylene are set and adjusted.</p> <p>2.7 Pressure of oxy-acetylene torch is controlled.</p> <p>2.8 Cuts and welds are made ensuring minimal distortion to the object.</p> <p>2.9 Employment hazards of cutting and welding tools are managed.</p> <p>2.10 Thermal cutting and welding tools are temporarily disconnected and rendered safe to evaluate the work task.</p>

	2.11 Cuts and welds are inspected and cleaned.
3. Operate the generator	<p>3.1 Pre-start checks are performed and leads are connected.</p> <p>3.2 Power is developed gradually without surging and generator is stabilised and trimmed to required work output.</p> <p>3.3 <i>Routine operational checks</i> are conducted and <i>warning signs</i> are diagnosed and addressed.</p> <p>3.4 Generator is shut down.</p> <p>3.5 Emergency shut-down drills are conducted..</p>
4. Conclude underwater cutting and welding operations	<p>4.1 <i>Environmental impact</i> arising from use of thermal cutting and welding tools is minimised and waste products are recovered.</p> <p>4.2 Thermal cutting and welding tools, the generator, gas cylinders and associated leads and hoses, and protective equipment are <i>de-serviced</i> after use.</p>

Required Skills and Knowledge

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

Required Skills

- ability to dive
- cut steel plates
- diagnose equipment faults
- operate a generator
- take remedial actions
- undertake general operator maintenance
- weld

Required Knowledge

- control of output
- dangers of trapped gas and its avoidance
- dive equipment
- dive physics
- equipment (generator, thermal cutting and welding, tools, hoses and leads)
- general occupational/diving safety awareness
- methods of resolving problems
- oceanography
- physics of operation
- principles of operation
- relevant references and Australian Standards
- thermal cutting and welding on land
- work hazards

Evidence Guide

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment must confirm the ability to:

- cut a 12 mm steel plate using a thermal arc or oxy arc cutting torch
- weld together two pieces of approximately 12 mm steel plate underwater using electric welding equipment to produce a fillet weld
- attend to personal and collective safety
- consider the environmental impact as part of the dive plan.

Consistency in performance

Competency should be demonstrated during a number of work tasks where:

- the depth is between 5 metres and 20 metres
- at least one night work task is undertaken.

Context of and specific resources for assessment

Context of assessment

Competency should be assessed in the ocean.

When practicable, assessment should relate to the diver's vocational focus.

Specific resources for assessment

Access to a dive location, and thermal cutting and welding equipment.

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. ***Bold italicised*** wording in the Performance Criteria is detailed below.

<i>Work tasks</i> may include:	<ul style="list-style-type: none"> • cutting • gouging • heating • welding
<i>Worksite data</i> may include:	<ul style="list-style-type: none"> • current • depth • gradient • hazards • obstacles
<i>Work object</i> may include:	<ul style="list-style-type: none"> • anchorage • pipe • sheet (hull) • support/strut
<i>Composition</i> may include:	<ul style="list-style-type: none"> • aluminium • high and low alloy steels • high and low carbon steels • mild steel • stainless steel
<i>Thermal cutting and welding tools</i> may include:	<ul style="list-style-type: none"> • oxy-torch • arc-welder
<i>Protective equipment</i> may include:	<ul style="list-style-type: none"> • boots • eye protection • gloves • hood/helmet
<i>Selecting, inspecting and preparing thermal cutting and welding tools</i> may include:	<ul style="list-style-type: none"> • inspection of stick • neck/mouth of oxy-torch • regulation of amperage and voltage • security of earth (bull-dog) lead
<i>Selecting, inspecting and preparing the generator</i> may include:	<ul style="list-style-type: none"> • checking fluids • fuelling • pre-start checks
<i>Selecting, inspecting and preparing the oxy-acetylene gas cylinders</i> may include:	<ul style="list-style-type: none"> • checking gas lines • checking gas pressures and mixing ratios • physical security of bottles
<i>Hazards</i> may include:	<ul style="list-style-type: none"> • danger zone of objects being worked on • impact on dive equipment (e.g. hoses, gauges,

	<p>communications)</p> <ul style="list-style-type: none"> • release of fuels and associated chemical contaminants resident at the worksite • retinal damage • shock and burn • trapped air explosions
Action to remove/reduce the risk may include:	<ul style="list-style-type: none"> • erecting signage • using patrol/sentry craft
Routine operational checks may include:	<ul style="list-style-type: none"> • fuel • fluids • pressure • temperature
Warning signs may include:	<ul style="list-style-type: none"> • feed variations • rise/fall in temperature • smoke • surging (rise/fall in power) • unusual noise • unusual smell (e.g. oil)
Environmental impact includes:	<ul style="list-style-type: none"> • contamination of surrounding water (e.g. leaking oil) • physical damage to reef and associated floor eco-systems (e.g. coral) • visual pollution of waste material (e.g. concrete and metal parts)
De-servicing may include:	<ul style="list-style-type: none"> • drying • logging work details into equipment logs • oiling/greasing • refilling • re-fuelling • washing in fresh water

Unit Sector(s)

Not applicable.