



Australian Government

DEFEO604C Perform explosive tests, measurements and analyses

Release: 2

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Modification History

Release	TP version	Comments
2	DEF12 V2	Layout adjusted.
1	DEF12 V1	First release.

Unit Descriptor

This unit covers the competency required to conduct explosive material tests and/or experiments in an explosive ordnance research environment.

This unit covers the application of procedures to conduct explosive material tests, planning the tests or analyses, carrying out tests and measurements, performing quantitative and qualitative analysis, documenting and evaluating new procedures, and recording and validating the test results.

Application of the Unit

This competency normally applies to the individual who is required to conduct explosive material tests and/or experiments in an explosive ordnance research environment.

This unit encompasses the requirements for planning the tests or analyses, carrying out tests and measurements, performing quantitative and qualitative analysis, documenting and evaluating new procedures, and recording and validating the test results.

Licensing/Regulatory Information

Not applicable.

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. 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
1. Plan tests or analyses	1.1 <i>Explosive</i> sample and required <i>test or analysis</i> are identified and recorded 1.2 <i>Appropriate methods</i> are selected and the required testing <i>apparatus</i> is assembled, set up and calibrated 1.3 Routine <i>standardisation</i> procedures are performed prior to the analysis and results are recorded in accordance with laboratory procedures 1.4 Work health and safety (WHS) requirements including those specific to the nature of the tests or analyses are identified and applied throughout the operation
2. Develop specialised tests or analyses	2.1 Relevant technical information is located, discussed and confirmed with other staff 2.2 Experimental design is developed in liaison with other staff and checked to ensure it meets WHS regulations and standards 2.3 Arrangements are made for necessary equipment to be either built or purchased given project constraints and available skills and materials 2.4 New procedures are trialed, documented and evaluated under supervision
3. Perform qualitative analysis	3.1 <i>Qualitative tests</i> to observe explosive properties are performed in accordance with established laboratory and/or range procedures 3.2 Data is compared with standards, charts, tables, and spectra in order to identify known or unknown materials and their properties 3.3 Tests or analyses are performed efficiently and completed within the required timeframe
4. Perform quantitative analysis	4.1 Quantitative tests to measure explosive properties are performed in accordance with established laboratory and/or range procedures 4.2 Available computer technology is used to control instruments or acquire/translate/convert data to optimise test accuracy 4.3 Samples and analyses are checked in accordance with laboratory procedures when non-standard results are obtained 4.4 Tests or analyses are completed within the required timeframe
5. Record and validate	5.1 Data is recorded in accordance with procedures using

ELEMENT	PERFORMANCE CRITERIA
results	appropriate worksheets and/or information management systems 5.2 Data is analysed for anomalies and 'out of control' conditions and either accepted or rejected 5.3 Data is assessed for validity against quantity and compatibility information, known standards and reference materials 5.4 Test procedures are modified, if necessary, under supervision and according to laboratory procedures

Required Skills and Knowledge

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

Required Skills

- access, interpret and apply technical information
- apply explosive testing processes and techniques
- apply WHS requirements
- apply quantitative and qualitative analysis
- develop explosive testing processes and techniques
- maintain documentation and records
- use laboratory and testing equipment

Required Knowledge

- calibration procedures and their basis
- characteristics, technical capabilities and limitations of laboratory equipment
- characteristics, technical capabilities and limitations of testing equipment
- chemical processes
- chemistry involved in testing
- documentation and records requirements
- planning
- properties and characteristics of relevant explosives
- quantitative and qualitative analysis processes and techniques
- relevant WHS requirements
- validation processes

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

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

Assessment must confirm the ability to:

- adhere to relevant OH&S requirements
- plan tests or analyses
- carry out tests and measurements
- perform quantitative and qualitative analysis
- trial, document and evaluate new procedures
- record and validate results

Consistency in performance

Competency should be demonstrated in a range of actual or simulated explosive analysis contexts over time

Context of and specific resources for assessment

Context of assessment

Competency should be assessed in the workplace or under conditions which accurately simulate a realistic workplace.

Evidence should be gathered through observation of a range of basic tests supported by targeted questioning to assess underpinning knowledge.

Evidence could also include examples of records and workplace documentation, and analysis of results.

Specific resources for assessment

Access is required to:

- facilities and resources used in the research, development and proof of explosive ordnance; it may require access to a licensed explosive site and appropriate firing/test range

Method of assessment

This unit may be assessed with the following unit:

- DEFEO101D Work safely with explosive ordnance

In a public safety environment assessment is usually conducted via direct observation in a training environment or in the workplace via subject matter supervision and/or mentoring, which is typically recorded in a competency workbook.

Assessment is completed using appropriately qualified assessors who select the most appropriate method of

assessment.

Assessment may occur in an operational environment or in an industry-approved simulated work environment.

Forms of assessment that are typically used include:

- direct observation
- interviewing the candidate
- journals and workplace documentation
- third party reports from supervisors
- written or oral questions

Range Statement

<p>The Range Statement relates to the Unit of Competency as a whole. It allows for different work environments and situations that may affect performance. <i>Bold italicised</i> wording in the Performance Criteria is detailed below.</p>	
<p><i>Explosives</i> may include:</p>	<ul style="list-style-type: none"> • Explosives of unknown origin • Propellants • Pyrotechnics
<p><i>Testing or analysis requirements</i> may include:</p>	<ul style="list-style-type: none"> • Determining explosive composition • Determining explosive properties • Sentencing • Explosives of unknown origin
<p><i>Appropriate methods</i> may include:</p>	<ul style="list-style-type: none"> • Wet chemistry techniques, including: <ul style="list-style-type: none"> • atomic absorption spectrophotometry • moisture analysis • gravimetry, volumetric analysis • Separation techniques, including: <ul style="list-style-type: none"> • gas chromatography (GLC, HPLC) • gel electrophoresis • solid phase extraction • super critical fluid extraction • Optical techniques, including: <ul style="list-style-type: none"> • spectrophotometry (UV, VIS) • infra red spectrophotometry • nuclear magnetic resonance spectrophotometry • metrology • Thermal techniques, including: <ul style="list-style-type: none"> • differential scanning calorimetry • thermal gravimetric analysis • differential thermal analysis • dynamic mechanical thermal analysis • Physical techniques, including: <ul style="list-style-type: none"> • particle sizing • absolute density • Mechanical techniques, including: <ul style="list-style-type: none"> • instron tensile/compression • fracture/impact
<p><i>Test apparatus</i> may include:</p>	<ul style="list-style-type: none"> • Cameras (both film and digital) • Chromatographs • Electromagnetic actuators

	<ul style="list-style-type: none"> • Electron scanning microscope • Function generators • Infrared sensing/imaging systems • Micro-calorimeters • Optical microscopes • Oscilloscopes • Particle counters • Piezo-electric actuators/sensors • Spectrometers
<i>Standardisation</i> may include:	<ul style="list-style-type: none"> • Australian Standards • DEFAUST Standards and Instructions • DSTO Information • NATO Standards
<i>Qualitative tests</i> may include:	<ul style="list-style-type: none"> • Requirements for high and low pressure strand burning and closed vessel bomb

Unit Sector(s)

Not applicable.