

## UTE NES058 A

### Identify affects of energy on machinery/materials in an Electrotech environment

**Descriptor:** Affects of energy on machinery and/or materials used in an Electrotechnology environment are identified and completed in an agreed time, to a quality standard and using appropriate technology mediums, where required.

Elements	Performance criteria
058.1 Prepare to identify affects of energy on machinery and materials	<p>058.1.1 Instructions for the preparation to identify affects of energy on machinery or materials are communicated and confirmed to ensure clear understanding</p> <p>058.1.2 <i>OH&amp;S policies and procedures</i> are communicated and confirmed to ensure they are understood as to be applied in the carrying out of the work</p> <p>058.1.3 Tools, <i>equipment</i> and personnel protective equipment needed to do the work are identified, scheduled and checked, where appropriate, to ensure they work correctly as intended and are safe to use in accordance with <i>established procedures</i></p> <p>058.1.4 <i>Appropriate personnel</i> are consulted to ensure affects of energy on machinery or materials are identified and coordinated effectively with others involved</p> <p>058.1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with <i>established procedures</i></p> <p>058.1.6 Schedule for identifying affects of energy on machinery or materials including practices for working safely are confirmed as in accordance with instructions and <i>requirements</i></p>
058.2 Identify affects of energy on machinery and materials	<p>058.2.1 <i>OH&amp;S policies and procedures</i> and safe work practices are followed to eliminate or minimise incidents</p> <p>058.2.2 Schedule for identifying affects of energy on machinery or materials work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste</p>

Elements	Performance criteria
	058.2.3 Further instructions are sought from <i>appropriate personnel</i> in the event of unplanned events or conditions occurring
	058.2.4 On going checks of quality of the work are undertaken in accordance with instructions and <i>requirements</i>
058.3 Check results of the affects of energy on machinery and materials	058.3.1 Final checks are made to ensure the affects of energy on machinery or materials as identified conforms with instructions and to <i>requirements</i>
	058.3.2 <i>Appropriate personnel</i> are notified of completion of the affects of energy on machinery or materials
	058.3.3 Tools, <i>equipment</i> and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with <i>established procedures</i>
	058.3.4 Work area is cleaned up and made safe and <i>sustainable energy practices</i> are followed
	058.3.5 Appropriate records are updated in accordance with instructions and <i>established procedures</i>

## Range statement

### General

Generic items in this unit are shown in *italics*, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Electrotechnology environment includes one or more the following *category* or allied industry areas:

*Computer Systems*

*Data Communications*

*Electronics*

*Electrical*

*Instrumentation*

*Refrigeration and Air conditioning*

## Currency in unit of competence

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

## Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

## Critical aspects of evidence

### Achieving competence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge and Skills'.

### Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator's requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

### Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

### Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in one or more of the following category areas: *Computer Systems; Data Communications; Electronics; Electrical; Instrumentation; Refrigeration and Air conditioning and/or* allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the

Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

### **Interdependent assessment of units**

Assessment in this unit should include related underpinning specified knowledge and skills associated with other units within the respective endorsed qualification structure, where appropriate.

Additionally, this unit should be assessed in conjunction with or after competency has been demonstrated in UTE NES060 Carry out routine work activities in an Electrotech environment, UTE NES050 Identify & select components/ accessories/ materials for Electrotech work activities and UTE NES051 Use of routine equipment/ plant/ technologies in an Electrotech Environment.

## **Underpinning knowledge and skills**

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

**Note:** The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to the topic of *Electrotechnology Systems, Materials and Accessories* detailed below. Appropriate measures for this topic must be put in place to ensure a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any voltages that exceed extra low voltage. Extra low voltage is defined in Standards Australia publications, eg. SA/NZ 3000:2001. However, the use of such equipment does not negate the duty of care in treating electricity other than as a hazard.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

**Underpinning knowledge and skills topics pertaining to this unit** – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

**Topics:**

- **Projects for Electrotech Vocations**
- **Drawing Interpretation and Sketching**
- **Electrotechnology Systems, Materials and Accessories**
- **Workshop Practices**
- **Applied Physics Concepts 1**
- **Applied Physics Concepts 2**
- **Identify affects of energy on machinery/materials in an Electrotech environment – Work performance**

## Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

### Projects for Electrotech Vocations

Project Planning: research; aims and objectives of the project; application of project in the Electrotechnology industry

Reporting/Documentation: written; drawings/sketches

Project Building: material requirement; assembly; final testing

Presentation: overview of project; aims/objectives; operating principles; conclusion

### Drawing Interpretation and Sketching

Technical drawing standards appropriate to the industry sector, conventions and specifications to AS 1100, with strong emphasis on interpretation: sheet types, title block information, materials parts list, revision table, grid referencing scales, line types – visible outlines, hidden outlines, dimensioning lines, centre lines; orthogonal projection of views – 3rd angle (detail and assembly drawings); mechanical conventions; fabrication conventions; three dimensional view drawings – axonometric, isometric, oblique; sectioning standards and conventions – whole, part; engineering drawing symbols, components and equipment – mechanical, electrical, electronic, computer, instrument, refrigeration; dimensioning – orthogonal, isometric; layout and plans; geometric tolerance interpretation (straightness, flatness, squareness, parallelism and concentricity only); engineering abbreviations; drawing interpretation techniques – detail drawings, orthogonal projection (3<sup>rd</sup> angle only) and three dimensional, assembly drawings and three dimensions exploded (e.g. as in equipment manuals)

Equipment and service manuals: flow charts; assembly/disassembly diagrams; schematic diagrams; block diagrams; trouble shooting guides

Freehand drawing skills appropriate to the industry sector: 3<sup>rd</sup> angle orthogonal projections; isometric; interpretation of drawing symbols; practical exercises

### Electrotechnology Systems, Materials and Accessories

Overview of Electrical Power System: generation system – fossil fuel and renewable sources, co-generation and typical power station equipment; transmission system – types and equipment; distribution system – equipment; grid system

Overview of Telecommunication System: customer access network (CAN); customer premises equipment (CPE)

Statutory requirements and standards: scope of work permitted by various licences; legislated requirements; purpose of technical standards; role of standards bodies; use of technical standards

Cables: types – power, signal, communication; terms; colour coding; structure; identification; cable applications

Wiring systems: types; wiring looms; enclosures and supports

Terminating power, signal and communication cables: requirements; plugs/sockets and connectors types and applications; assembly/disassembly plugs/sockets and connectors

Accessories and fixings appropriate to industry sector: types of accessories and applications; fixing devices and methods

### **Workshop Practices**

Identification and application of tools for: marking out a measuring; cutting; shaping; drilling; threading; tapping; finishing; dismantling/assembling

Tool use: hazards; safety procedures; techniques

Fabrication: materials, types, applications; techniques, marking out, cutting, bending, drilling/punching, soldering, cutting mitres

Assembly/disassembly techniques

### **Applied Physics Concepts 1**

Motion in two dimensions: projectile motion - vertical and horizontal components of velocity, determination of the vertical component of velocity, resolution of velocity into components, time of flight, range, effect of air resistance, *-application: projectiles in sport*; uniform circular motion – centripetal acceleration, force causing the centripetal acceleration, *-application: the banking of road curves*; gravitation and satellites – Newton’s law of universal gravitation, satellites in circular orbits, *-application: weather and communication satellites*; momentum in two dimensions – vector form of Newton’s second law of motion, Newton’s second law of motion in terms of momentum, law of conservation of momentum, *-application: rockets*

Electricity and magnetism: electric fields – Coulomb’s law, principle of superposition, electric field, pictorial representation of electric fields, superposition of electric fields, electric field due to one or two charged plates, electric fields and conductors, electric field inside a hollow conductor, electric fields near sharp points, *-application: photocopiers and laser printers*; the motion of charges particles in electric fields – electric potential difference, acceleration in a constant electric field, motion of a charged particle in a constant electric field, *-application: the use of electric fields in cyclotrons*; magnetic fields – magnetic fields and their pictorial representation, magnetic force on a current-carrying conductor, *-application: the moving-coil loudspeaker*; the motion of charges particles in magnetic fields – force on

a charged particle in a magnetic field, motion of a charged particle at right angles to a magnetic field, *-application: the use of magnetic fields in cyclotrons*

Or Year 12 High School Physics 1 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER) or equivalent

### **Applied Physics Concepts 2**

Light and matter: electromagnetic waves – characteristics of electromagnetic waves, speed/ frequency/ and wavelength, *-application: laser airborne depth sounder (LADS)*; the interference of light – coherent wave sources, interference, two-source interference, diffraction, two-slit interference, transmission diffraction gratings, speckle, *-application: compact discs*; photons – photons, the photoelectric effect, x-rays, *-application: the use of x-rays in medicine*; wave behaviour of particles – wave behaviour of particles, experimental evidence for wave behaviour of particles, *-application: electron microscopes*

Atoms and nuclei: the structure of the atom – line emission spectrum, energy levels in atoms, spectrum of atomic hydrogen, ionisation energy, continuous spectrum, line absorption spectrum, fluorescence, stimulated emission, *-application: lasers*; the structure of the nucleus – composition of nuclei, the nucleon force, isotopes, mass defect and binding energy, conservation laws in nuclear reactions, *-application: the production of radioisotopes*; radioactivity – stable and unstable nuclei, types of decay of unstable nuclei, alpha decay, beta minus decay, beta plus decay, half-life and activity, *-application: radioactive dating*, some properties of radioactive emissions, the effects of ionising radiation on living matter; nuclear fission and fusion – spontaneous and induced nuclear fission, chain reaction, *-application: fission nuclear power*, nuclear fusion

Skills: experimental skills – purpose and variables, procedure, observation, presentation, interpretation; investigation design skills – designing and investigation, evaluating and investigation; information skills – planning an information search, searching for information, evaluating information; communication skills – oral communication, written communication, evaluation of oral and written communications

Or Year 12 High School Physics 2 that meets respective University Admittance Index (UAI) or Tertiary Entrance Rank (TER) or equivalent

### **Identify affects of energy on machinery/materials in an Electrotech environment – Work performance**

Identify affects of energy on machinery/materials in an Electrotech environment in any one or more of the above *categories* across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment