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| **Title** | **Demonstrate knowledge of, and convert, units of measure used in engineering** | | |
| **Level** | **2** | **Credits** | **2** |

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| **Purpose** | People credited with this unit standard are able to demonstrate knowledge of SI base and derived units of measure used in engineering; and convert units of measure used in engineering. |

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| **Classification** | Mechanical Engineering > Engineering - Measurement |

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| **Available grade** | Achieved |

**Guidance Information**

1 Reference
*The International System of Units (SI), 8th edition* (France: Bureau International des Poids et Mesures, 2006). Available at: http://www.bipm.org.

2 Definitions
*Imperial units* – the units of measure that were historically used in the British Commonwealth countries. Examples are: length (inch, foot, yard, chain, furlong, mile), area (rood, acre), volume (fluid once, pint, quart, gallon), mass (ounce, pound, stone, hundredweight, ton).
*SI units* – a convention for writing units of measure. It includes standard units of measure such as metre, and prefixes and abbreviations for multiples of units of measure. This metric system of units of measure is devised around seven SI base units or quantities and the convenience of number 10.
*SI Base units* – seven base units each representing by convention, different kinds of physical quantities. These are length (metre), mass (kilogram), time (second), electric current (ampere), temperature (kelvin), luminous intensity (candela), amount of substance (mole).
*SI Derived units* – derived quantities are formed from multiplication and division of the seven base units i.e. products of powers of base units. Examples of derived units are: area (square metre), volume (cubic metre), speed/velocity (metre per second), force (newton), pressure (pascal), Celsius temperature (degree Celsius), moment of force (newton metre), surface tension (newton per metre).

3 Assessment information
This unit standard covers basic knowledge of SI base units, and SI derived units of measure used in engineering; and conversion between metric and imperial units of measure. Formulae for conversion from metric to imperial units and vice versa will be supplied for assessments.

## Outcomes and performance criteria

### Outcome 1

Demonstrate knowledge of SI base units of measure used in engineering.

Range length, mass, temperature, time.

**Performance criteria**

1.1 The purpose of the international system of units is identified.

1.2 Base units are matched to their corresponding symbol.

1.3 Base units are matched to their corresponding measurement category.

1.4 Symbols for units and categories are written in accordance with SI convention.

### Outcome 2

Demonstrate knowledge of SI derived units of measure used in engineering.

Range plane angle, force, pressure, volume, area.

**Performance criteria**

2.1 Derived units are matched to their corresponding symbol.

2.2 Derived units are matched to their corresponding measurement category.

2.3 Symbols for units and categories are written in accordance with SI convention.

### Outcome 3

Convert units of measure used in engineering.

**Performance criteria**

3.1 Base and derived unit quantities are re-stated as multiples and fractions using metric prefixes.

Range for instance – metres to millimetres, pascals to kilopascals, grams to kilograms;
evidence is required for a minimum of three re-statements using different units.

3.2 Conversions between metric and imperial units are calculated.

Range imperial to metric, metric to imperial;
for instance – feet to metres, pounds to kilograms, Celsius to degrees Fahrenheit, pascals to pounds per square inch;
evidence is required for a minimum of four conversions.

3.3 Symbols for units, categories, and prefixes are written in accordance with SI convention.

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| **Planned review date** | 31 December 2022 |

**Status information and last date for assessment for superseded versions**

| Process | Version | Date | Last Date for Assessment |
|---|---|---|---|
| Registration | 1 | 23 May 1995 | 31 December 2011 |
| Revision | 2 | 14 April 1997 | 31 December 2011 |
| Revision | 3 | 5 January 1999 | 31 December 2011 |
| Revision | 4 | 23 May 2001 | 31 December 2011 |
| Review | 5 | 21 February 2005 | 31 December 2014 |
| Review | 6 | 17 June 2011 | 31 December 2022 |
| Revision | 7 | 17 November 2011 | 31 December 2022 |
| Review | 8 | 17 August 2017 | N/A |

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| **Consent and Moderation Requirements (CMR) reference** | 0013 |

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

**Comments on this unit standard**

Please contact Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.