

Training Package	Metal and Engineering (MEM05)			HSC Requirements and Advice
Title	Perform engineering measurements			
Unit code	Competency field	Band	Unit weight	HSC Indicative Hours
MEM12023A	Measurement	A	5	15

Unit descriptor	This unit covers performing measurement skills requiring straightforward use of mechanical measuring devices and associated calculations.
Prerequisites	Nil
Application of the competency	<p>This unit covers straightforward measurement using devices which incorporate visual indications representing units of measurement. It applies to the use of measuring devices in a range of manufacturing, engineering and related environments. It includes, where required, adjustment of measuring devices through simple means and typically includes zeroing or scale adjustment.</p> <p>Measurements may be expressed in metric or imperial units. All measurements are undertaken to standard operating procedures. Electrical/electronic devices used are those not requiring the connection or disconnection of circuitry.</p> <p>Work is undertaken autonomously or part of team environment, in the field, work station or workshops.</p>
Related units	For straightforward use of comparison or pre-set measuring devices, Unit MEM12001B (Use comparison and basic measuring devices) should be accessed.

Evidence Guide

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	Context of assessment	Interdependent assessment	Method of assessment
A person who demonstrates competency in this unit must be able to perform engineering measurements.	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with performing engineering measurements or other units requiring the exercise of the skills and knowledge covered by this unit.	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Evidence Guide cont/d			HSC Requirements and Advice
Consistency of performance	Required skills	Required knowledge	Key Terms and Concepts
Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.	<p>Look for evidence that confirms skills in:</p> <ul style="list-style-type: none"> • selecting the appropriate measuring device for given measuring tasks • using appropriate measuring technique • reading all measurements taken accurately to the finest graduation of the selected measuring device • handling and storing measuring devices in accordance with manufacturers' specifications or standard operating procedures • verifying all measuring devices before use • making, where appropriate, routine adjustments to measuring devices • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations • checking and clarifying task related information • checking for conformance to specifications • undertaking numerical operations involving addition, subtraction, multiplication, division, fractions and decimals within the scope of this unit • preparing drawings as required. 	<p>Look for evidence that confirms knowledge of:</p> <ul style="list-style-type: none"> • correct application of a range of measuring devices • correct and appropriate measuring technique for a range of measuring devices • addition, subtraction, multiplication, division, fractions, decimals to the scope required by this unit • procedures for handling and storing a range of measuring devices • procedures for adjusting and zeroing a range of measuring devices • methods of communicating measurements by drawings, as required • safe work practices and procedures. 	<ul style="list-style-type: none"> • basic calculations • care and storage of measuring devices/equipment • checking and recording measurements and calculations • conventions • dimensions • freehand sketch • imperial • measurement requirements • measurements • measuring devices/equipment • measuring techniques • metric • readings • routine adjustments/validation • safe work practices and procedures • selection of measuring devices/equipment • specifications • work instructions and procedures • workplace documentation.

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
1 Select appropriate device or equipment	1.1 Measurement requirements are determined from <i>specifications</i> .	<p>The range statement provides information about the context in which the unit of competency is carried out. The variables [in bold] and scope [dot points] cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.</p> <p>The following variables may be present and <i>may include</i>, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.</p> <p>Specifications</p> <ul style="list-style-type: none"> drawings, sketches, job instructions, schematics, diagrams, technical manuals. 	<p>Learning experiences for the HSC must address:</p> <p>An awareness of safe work practices and procedures including:</p> <ul style="list-style-type: none"> occupational health and safety (OHS) induction training (general, work activity and site-specific) selection, use and maintenance of personal protective equipment (PPE) selection of appropriate tools for the task correct use, maintenance and storage of tools, equipment and machinery correct handling, application, transport and storage of hazardous and non-hazardous materials safe posture (sitting, standing, bending and lifting) correct manual handling (lifting and transferring) hazard identification and risk control procedures to follow in the event of an emergency basic first aid training and access to first aid kits correct use of fire fighting equipment: <ul style="list-style-type: none"> fire blanket fire extinguishers fire hydrant and hose effective communication and teamwork adherence to work instructions, workplace policies and standard operating procedures housekeeping/clean-up procedures with due consideration to OHS and the environment. <p>A range of sources for work instructions and procedures including:</p> <ul style="list-style-type: none"> work schedules job card/sheet/plans/specifications standard operating procedures (SOP) standard operation sheets Material Safety Data Sheets (MSDS) diagrams/sketches regulations/legislation manufacturer/workplace guidelines, policies and procedures Australian Standards.
			A definition of:

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
	<p>1.2 Appropriate device or equipment is selected according to standard operating procedures, to achieve required outcome.</p>		<ul style="list-style-type: none"> • specification/s. <p>An awareness of the two common systems of measurement used in the manufacturing, engineering and related services industries:</p> <ul style="list-style-type: none"> • metric • imperial. <p>Learning experiences for the HSC must address:</p> <p>A basic knowledge of a range of measuring devices/equipment including:</p> <ul style="list-style-type: none"> • name • characteristics • application • standard operating procedures (SOP) for correct use • limitations • maintenance/basic care and storage. <p>A range of measuring devices/equipment including:</p> <ul style="list-style-type: none"> • rule • tape • protractor • set square • combination square • dial indicator • thermometer • micrometer • vernier calliper • feeler gauge • engineers square • surface plate. <p>Consideration/s for the selection of measuring device/equipment including:</p> <ul style="list-style-type: none"> • skills/training • appropriateness for purpose • time • cost • limits and tolerances • job specification • work environment (production environment or workstation).
<p>2 Obtain measurements using a <i>range of measuring devices</i></p>	<p>2.1 Correct and appropriate measuring technique is used.</p>	<p>Range of measuring devices</p> <ul style="list-style-type: none"> • protractors, combination squares, set 	<p>Learning experiences for the HSC must address:</p> <p>Industry-accepted techniques to obtain a range of</p>

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		squares, dial indicators, thermometers, tapes, rules, micrometers, vernier-scaled measuring equipment.	measurements.
	2.2 <i>Measurements</i> are accurately obtained.	Measurements <ul style="list-style-type: none"> • measuring length, squareness, flatness, angle, roundness, clearances or any other measurements that can be read off analog, digital or other measuring device. 	Learning experiences for the HSC must address: A range of measurements including: <ul style="list-style-type: none"> • length • width/breadth • depth • height • angle • squareness • flatness • roundness • temperature • clearances. Readings of all measurements accurately for a range of tasks/projects to the finest graduation. An awareness of the consequences of incorrect measurements for: <ul style="list-style-type: none"> • the client • the organisations/company • the environment.
	2.3 Dimensions are determined or verified using <i>basic calculations</i> , where required.	Basic calculations <ul style="list-style-type: none"> • calculations needed to assist in determining measurements where a reading of the graduated device is not sufficient, for example subtracting one measurement from another to give a third measurement. Examples of calculations needed are addition, subtraction, multiplication, division, fractions and decimals. Calculations may be made using a calculator. 	Learning experiences for the HSC must address: Performance of calculations using: <ul style="list-style-type: none"> • pen and paper • a calculator. Basic calculations involving: <ul style="list-style-type: none"> • application of the four basic arithmetic operations <ul style="list-style-type: none"> - addition - subtraction - multiplication - division • manipulation of
			<ul style="list-style-type: none"> - whole numbers - mixed numbers - decimals - fractions.

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3 Maintain measuring devices	3.1 Routine care and storage of devices is undertaken to manufacturers' specifications or standard operating procedures.		<p>Learning experiences for the HSC must address:</p> <p>Issues relating to the storage of measuring devices including:</p> <ul style="list-style-type: none"> • security • climatic effects • OHS considerations • stability • ease of access. <p>Knowledge of methods by which basic measuring devices are stored and accessed.</p>
	3.2 <i>Routine adjustments</i> to devices are made and checked.	<p>Routine adjustments</p> <ul style="list-style-type: none"> • validating the device using simple zeroing or scale adjustment. 	<p>Learning experiences for the HSC must address:</p> <p>Validation of measuring devices including:</p> <ul style="list-style-type: none"> • zeroing • scale adjustment • test piece.
4 Communicate measurements as required	4.1 Measurements are accurately recorded, where required.		<p>Learning experiences for the HSC must address:</p> <p>The importance of checking measurements and calculations.</p> <p>Recording measurements and calculations.</p> <p>The importance of recording information that is:</p> <ul style="list-style-type: none"> • clear • legible • accurate • concise • and contains appropriate use of industry terminology and abbreviations. <p>Documentation typical to the workplace for recording task/project measurements and calculations.</p>
	4.2 Freehand sketch which depicts required <i>information</i> is prepared, as required.	<p>Information</p> <ul style="list-style-type: none"> • dimensions, instructions, base line or datum points. 	<p>Learning experiences for the HSC must address:</p> <p>Freehand sketching techniques appropriate to manufacturing, engineering and related services industries.</p>

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			An awareness of different conventions used in manufacturing, engineering and related services industries including those related to: <ul style="list-style-type: none"> • dimensions • instructions • base line or datum points.