# Skills Assessment – Measurement

**Event 2 of 2**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MEM12023A - Perform engineering measurements (1)

### Qualification/Course code, name and release number

MEM30305 - Certificate III in Engineering - Fabrication Trade (4)

Version: *1.0*

Date created: *19 July 2018*

Date modified: *16/09/2019*

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RTO Provider Number 90003 | CRICOS Provider Code: 00591E

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## Assessment instructions

Table 1 Assessment instructions

| Assessment details | Instructions |
| --- | --- |
| **Instructions for the trainer and assessor** | This is a skill based assessment and will be assessing the student on their ability to demonstrate skills required in the unit.  This assessment is in 2 parts:  1. Practical  2. Observation Checklist  Pre assessment  The student must have successfully completed the knowledge assessment for MEM12023A prior to attempting the practical skills assessment tasks.  **Task 1 – 7**  The purpose of Tasks 1 to 7 is to gather the necessary evidence that the student can identify, validate and use various measuring instruments to obtain engineering measurements accurately within allowable tolerances and specifications.  **Task 8**  Complete a free hand sketch orthogonal. The sketch is to include all measurements.  The student must address all the requirements in the observation checklist and all times during the assessment comply with Standard operating practices and recognised WHS practices whilst complying with any instructions or directions you give them as the assessor.  Model answers, sample responses or a criteria for the task are provided in the observation guide.  Use these to support your judgement when determining a satisfactory or unsatisfactory result.  Complete the observation checklist for the task.  The assessment feedback comments are to be structured so as to give the student advice on the steps and actions the need to take to reach a satisfactory result when re assessed.  The Assessment feedback page must be signed by both the student and the assessor so the student displays they have received, understood and accepted the feedback.  Ensure the students name appears on the bottom of each page of the submitted assessment. |
| **About this marking guide** | The student’s response to each task or activity must contain the criteria indicated in this marking guide in order for their response to be correct.  All tasks and activities must be completed correctly in order to satisfactorily complete this assessment event.  Assessors will need to make a judgement call as to whether each response meets the criteria based upon the:   * Rules of Evidence:   + Validity – does the answer address the skill required and does the evidence reflect the four dimensions of competency?   + Sufficiency – is the task or activity sufficient in terms of length and depth?   + Currency – has the work been done so recently as to be current?   + Authenticity – is this work the student’s own authentic work? * Principles of Assessment   + Fairness – individual student’s needs are considered in the assessment process   + Flexibility – assessment is flexible to the individual student   + Validity – any assessment decision is justified, based on the evidence of performance of the student   + Reliability – evidence presented for assessment is consistently interpreted and assessment results are comparable irrespective of the assessor conducting the assessment * Dimensions of competency   + Task skills   + Task Management Skills   + Contingency Planning Skills * (Addressed in all tasks)   + Job Role Environment Skills |
| **Student must provide** | Calculator, pen, pencil, eraser, PPE that conforms to Workshop Operations SOP. |
| **Assessor must provide** | A work area fitted with suitable space.  Access to relevant information and documentation on compliance requirements.  Assessor is to ensure the workshop is set up with all the necessary measuring tools which include:  • Tape measure ( 8 Meter)  • Block square (engineers)  • Combination square  • Plate square  • Dividers (150 mm)  • Folding rule (600 mm line of chords)  • Steel rule 300mm  • Vernier caliper  It is recommended a variety of coupons are prepared for each task, depending on the number of students being assessed.  Records of correct dimensions and associated calculations will need to be recorded for each task item and used as benchmark answers.  Further details on tools and coupons required are listed on the following page. |
| **Due date/time allowed/venue** | 90 minutes for all tasks |

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| --- | --- | --- | --- |
| **Assessor Must Provide – Further Details** | | | |
| **Task** | **Material Requirements** | **Quantity** | **Comment** |
| 1 | Tool Kit – Complete with:  Tape measure ( 8 Meter)   * Block square (engineers) * Combination square/set * Plate square * Dividers (150 mm) * Folding rule (600 mm line of chords) * Steel rule 300mm * Vernier calliper | 1 off per student | This tool kit will be required for Tasks 1-7. |
| 2 | Work Bench, desk, or table. | 1 off per student | The work bench, desk or table can be issued for task 2 and to work from for remaining activities |
| 3 | Flat Bar 75 x 6 x 200 long   * 5 Holes required ∅ 16 mm * Gauge distance on holes to one side * Pitch distance to vary along length | Determine locally for size of group being assessed. | This is a precision measurement assessment task, designed to be completed with Vernier callipers. Coupons should be prepared to suit. |
| 4 | Flat Bar 75 x 6 x 200 long   * Press at an angle 75 mm from one end | This task is designed to be completed with a line of chords. Suggested angle of press is 10° to 20° either side of 90° |
| 5 | Flat Bar 75 x 6 x 300 long, 2 off   * Weld together into approximately 90° angle | This task is designed to be completed with a plate square and rule. It is recommended the coupon is prepared to suit. |
| 6 | Flat Bar 75 x 6 x 200 long   * Cut one end at an angle of approximately 90° | This task is designed to be completed with a block square and rule. Suggested angle of cut is 5 mm to 10 mm either side of 90°. |
| 7 | Flat Bar 75 x 6 x 200 long  Cut one end at an angle of approximately 30° | This task is designed to be completed with a combination set or line of chords rule. Suggested angle of cut is 5° to 10° either side of 30°. |
| 8 | **A3 Sheet** as per template provided in MEM12023A\_AE\_Sk\_2of2 document | 1 off per student |  |

## Part 1: Practical

To complete this part of the assessment, the student is required to participate in a practical demonstration of how to complete a task or activity.

These eight (8) practical tasks will be observed by you.

The student’s responses will be used as part of the overall evidence requirements of the unit.

You should refer to the list of criteria provided in the Observation Checklist to understand what skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on.

Once completed the student is required to submit this assessment and the tasks and activities required to be completed to you for marking.

**Contingency Management:**

While undertaking this task a number of unforeseen circumstances may arise. The assessor will have the opportunity to question each learner to gather an understanding of how the student will respond to these events. Below is a table with examples of possible questions and acceptable responses.

The assessor has the opportunity in the observation checklist to record relevant questions and responses in the table ***“Table 3 Additional Questions”***

Table 4 Unforeseen Circumstances

|  |  |  |
| --- | --- | --- |
| Scenario | Assessors question | Acceptable students response |
| Power failure in workshop | What is the correct action in the case of power failure? | *Notify assessor of failure.*  *Move to safe location* |
| Emergency evacuation | What do you do if an emergency evacuation drill happens during the assessment? | *Follow standard emergency evacuation procedure* |
| Measurement tool defective | What do you do if you find a measurement tool is defective | *Report the tool as defective and replace tool* |

Simulated Environment Conditions

***Note: The assessor may direct the student to use different equipment in different spaces to ensure competency is applied in new and different situations.***

The assessment is to be carried out in the workshop complying with all WHS requirements and compliance with Standard Operating Procedures.

The assessment Tasks 1 – 8 should take approximately 90 minutes.

#### Assessment requirements

In this Skills Practical assessment task the student is satisfactorily perform the following:

* Identify and check the condition of measuring tools issued in a kit
* Select the appropriate measuring tool(s)
* Measure and record the dimensions of allocated items
* Perform verification calculations as detailed
* Provide a sketch of an item measured in Task 2
* Follow any further instructions given by the assessor.

#### Instructions

* Verify the measuring tool kit issued for the assessment is complete and each measuring device (tool) is in good working order so that accurate measurements can be taken to within the tolerance specified
* Select the most appropriate measuring tool(s) from the list on the procedure sheet to attain the measurements for the tasks
* Circle the tool selected from the tool list to perform the measurement task. Some measuring tasks may require a second tool
* Measure the allocated items as detailed on the procedure sheets with each measuring tool selected, using appropriate handling and measuring techniques
* Record measurements in the spaces provided on each procedure sheet. Use millimetres (mm) unless noted otherwise.
* Ensure measurements are taken **within tolerances specified** on the top right corner of each procedure sheet.
* Perform calculations as detailed on the procedure sheet
* Ensure measuring devices are used and stored correctly
* Sketch an item as detailed for Task 8
* Clarify any details of this assessment you are unsure of with your teacher/assessor
* Use the OBSERVATION CHECKLIST to confirm the tasks have been completed
* Ensure all measuring tools are packed and returned to store at the completion of the tasks

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| Task 1 Procedure Sheet – Verify measurement tools checklist | | | | | | | | |
| To complete this assessment you will be issued with a kit containing the tools listed below.  You are required to complete the checklist verifying the tools have been issued and are suitable to carry out accurate measurements to the tolerances specified on each procedure sheet.  Any tool marked with an  must be discussed with your assessor.  Clarify any details of this assessment you are unsure of with your teacher/assessor.  | | | | | | | | |
| **Tool** | **Checks and Verifications**   | | | | | | | |
| *Example line* | *Issued* |  | *Checked and OK* |  | *Checked and Not OK* |  |  | |
| Tape Measure ( 8 Meter) | Issued |  | Hook end is loose |  | Graduations are clear |  |
| Block Square ( engineers) | Issued |  | Squareness confirmed |  |  | | | |
| Combination Square | Issued |  | Rotates freely |  | Locks in position |  | Graduations are clear |  |
| Plate Square | Issued |  | Squareness confirmed |  |  | | | |
| Folding rule 600 mm (line of chords) | Issued |  | Hinges freely |  | Has line of chords |  | Graduations are clear |  |
| Steel Rule 300 mm | Issued |  | Graduations are clear |  |  | | | |
| Vernier caliper | Issued |  | Closes to zero |  | Slides freely |  | Graduations are clear |  |
| Dividers | Issued |  | Adjusting nut spins |  | Legs slide freely |  | Points are sharp |  |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Task 2.0 Procedure Sheet – Measure workbench/table and perform calculations | | | | | | | |
| The student will be allocated a workbench or table to perform the measurement tasks and calculations as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | | **Tolerance ±2.0mm** |
| Tape measure (8 metre) | | Block square (engineers) | | Combination square | Plate square | |
| Steel rule (300 mm) | | Folding rule 600 mm (line of chords) | | Vernier calliper | Dividers | |
| 1. **Measure item and record result in the spaces below** | | | | | | | |
| Record your results below in millimetres (mm) | | Convert your results to Meters (m) | |  | | | |
| Length A (mm) = | | Length A (m) = | |
| Width B (mm) = | | Width B (m) = | |
| Diagonal C (mm) = | | Diagonal C (m) = | |
| Diagonal D (mm)= | | Diagonal D (m)= | |
| Height E (mm) | | Height E (m) | |
| Task 2.1 Procedure Sheet– Perform verification calculations | | | | | | | |
| **Using the measurements recorded from the Task 2.0 complete the calculations in the space provided below for:**   1. **Perimeter** 2. **Area** 3. **Diagonal** | | | | | | | |
| **a) Perimeter** | | **b) Area** | | **c) Diagonal** | | | |
| Perimeter Formula = 2(L+W)  Provide answer in Metres (m) | | Area Formula = (L x W)  Provide answer in Metres (m) | | Diagonal Verification Formula = √ A² + B²  Provide all working and Answer in Metres (m) | | | |
| Length = m | | Length A = m | | A = m | | | |
| Width = m | | Width B = m | | B = m | | | |
| Length + Width = m | | Length x Width = m | | A² = m | | | |
| 2 x Length + Width = m | |  | | B² = m | | | |
| √ A² + B² = m | | | |
| **Perimeter = Metres** | | **Area = m²** | | **Diagonal Verification = Metres** | | | |
| Task 3 Procedure Sheet– Measure hole position, size, pitch and verification calculations | | | | | | | |
| The student will be allocated a drilled item to perform the measurement tasks and calculations as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | **Tolerance 0.5 mm** | |
| Steel rule (300 mm) | Folding rule 600 mm (line of chords) | | Vernier calliper | Dividers | |
| 1. **Measure item and record result in the spaces below.** | | | | | | | |
| Length A = | Width H = | | ∅ K = |  | | | |
| Edge B = | Edge I = | |
| Hole Centre C = | Edge J = | |
| Hole Centre D = |  | | |
| Hole Centre E = |
| Hole Centre F = |
| Edge G = |
| 1. **Verification Calculations -** Using the measurements recorded above, add edge distance and hole centres to confirm length (A) and width (H) | | | |
| **Sum of B to G =** | | **Sum of IJ =** | |
| Task 4 Procedure Sheet– Measure Angle, Length, Width, Thickness | | | | | | | |
| The student will be allocated a bent flatbar to perform the measurement tasks as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | **Tolerance ± 1 mm on lengths** | |
| Steel rule (300 mm) | Folding rule 600 mm (line of chords) | | Dividers | Combination square | | **Tolerance ± 1° on angle** | |
| 1. **Measure item and record result in the spaces below** | | | | | | | |
| Angle A° = | | | | A°  B  D  C  Top View  Front View  Press Line | | | |
| Length B = | | | |
| Width C = | | | |
| Thickness D = | | | |
|  | | | |
| Task 5 Procedure Sheet– Measure deviation from 90° | | | | | | | |
| The student will be allocated a fabricated item to perform the measurement tasks as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | **Tolerance ± 1.0 mm** | |
| Tape measure (8 metre) | Steel rule (300 mm) | | Folding rule 600 mm (line of chords)) | Combination square | | Plate square | |
| 1. **Measure item and record result in the spaces below** | | | | | | | |
| Length = | | | |  | | | |
| Width = | | | |
| Thickness = | | | |
| Inset Distance = | | | |
| Deviation = | | | |
|  | | | |
| Task 6 Procedure Sheet– Check for 90° | | | | | | | |
| The student will be allocated a flatbar, cut at an angle to perform the measurement tasks and as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | **Tolerance ± 1 mm** | |
| Steel rule (300 mm) | Folding rule 600 mm (line of chords) | | Block square (engineers) | Combination square | |
| 1. **Measure item and record result in the spaces below** | | | | | | | |
| Height = | | | |  | | | |
| Width = | | | |
| Deviation = | | | |
|  | | | |
| Task 7 Procedure Sheet– Check cut angle | | | | | | | |
| The student will be allocated a flatbar cut at an angle to perform the measurement tasks and as detailed below | | | | | | | |
| 1. **Circle appropriate tool used to take measurements for this task** | | | | | | **Tolerance ± 1 mm on lengths** | |
| Steel rule (300 mm) | Folding rule 600 mm (line of chords) | | Dividers | Combination square | | **Tolerance ± 1° on angle** | |
|  | |
| 1. **Measure item and record result in the spaces below** | | | | | | | |
| Height = | | | |  | | | |
| Width = | | | |
| Cut Angle° = | | | |
|  | | | |

**Task 8: Free hand sketch of workbench used for Measurements in Task 1.**

**Assessment requirements**

In this Skills assessment task the student is satisfactorily perform the following

* Create a free hand sketch of the work bench/ table that was used in Task 2.1 of this assessment.

**Instructions**

* Complete a free hand sketch on the Task 8 procedure sheet on the following page
* Provide a front view, top view and left or right side view in third angle projection
* Dimensions required include, Length, width and height
* Itemise each part of the bench/table. Eg top Item 1
* Complete a parts list in the space provided
* Refer to the Task 2.1 (a) Perimeter and (b) calculations and notate onto the drawing in the space provided
* Sketch to be in proportion and legible
* Line weight conventions to be used outlines dark, dimension lines light

**NOTE** –Hidden detail is not required on the sketch

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| **Task 8 Procedure Sheet: Free hand sketch of workbench / desk measured in Task 2.0.** |

## Part 2: Observation Checklist

The Observation Checklist will be used by you to mark the students’ performance in any of the previous three event types. Use this Checklist to understand what skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on. All the criteria must be met. The student’s demonstration will be used as part of the overall evidence requirements of the unit. You may ask questions while the demonstration is taking place or if appropriate directly after the task/activity has been completed.

| Task | Task/Activity Performed | S | U/S | Assessor Comments (Describe the student’s ability in demonstrating the  required skills and knowledge) |
| --- | --- | --- | --- | --- |
| Task 1 | Select appropriate measurement tool.  Student completes Tool Verification Checklist |  |  | *Date of Observation:*  *The Student:*   * *Identifies each tool issued in the kit provided.* * *Carries out necessary checks to verify tools are in suitable working order* * *Communicates with the assessor if their tool kits is not verified as complete or in suitable working order to complete Tasks 1 to 7* * *Clarifies with the assessor any assessment details they do not understand* |

| Task | Task/Activity Performed | | S | U/S | Assessor Comments (Describe the student’s ability in demonstrating the  required skills and knowledge) |
| --- | --- | --- | --- | --- | --- |
| 2.0 | Measure item as detailed and record dimensions   * Student completes Task 2.0 (a) * Student completes Task 2.0 (b) | |  |  | *Date of Observation:*  *Task 2.0*  *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*   *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres* |
| 2.1 | Perform calculations   * Student completes Task 2.1 (a) * Student completes Task 2.1 (b) * Student completes Task 2.1 (c) | |  |  | *The student:*   * *Completes perimeter calculation correctly* * *Completes area calculation correctly* * *Student completes diagonal (verification) calculation correctly. This calculated answer should correspond to the recorded measurement for C and D (if measured item is square)* |
| 3 | Measure item as detailed and record dimensions   * Student completes Task 3 (a) * Student completes Task 3 (b) |  | |  | *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*     *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres* |
| Perform calculations to confirm measurements taken   * Student completes Task 3 (c) |  | |  | *The Student*   * *Completes the calculation; sum of B to G correctly and answer verifies Length (A) of item* * *Completes the calculation; sum of IJ correctly and the answer verifies width (H) of item* |

| Task | Task/Activity Performed | | S | U/S | Assessor Comments (Describe the student’s ability in demonstrating the  required skills and knowledge) |
| --- | --- | --- | --- | --- | --- |
| 4 | Measure item as detailed and record dimensions   * Student completes Task 4 (a) * Student completes Task 4 (b) | |  |  | *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*     *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres and degrees* |
| 5 | Measure item as detailed and record dimensions   * Student completes Task 5 (a) * Student completes Task 5 (b) | |  |  | *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*     *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres* |
| 6 | Measure item as detailed and record dimensions   * Student completes Task 6 (a) * Student completes Task 6 (b) | |  |  | *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*     *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres* |
| 7 | Measure item as detailed and record dimensions   * Student completes Task 7 (a) * Student completes Task 7 (b) * Student checks Tasks 1 to 7 Procedure sheets to ensure measurements, and calculations have been recorded correctly |  | |  | *The Student*   * *Selects measuring tool or tools that are appropriate for the measurement task and able to measure item to tolerance specified* * *Uses the tool correctly and carefully.* * *Stores the measuring tool appropriately during the measuring tasks and on completion of each procedure*     *The Student records measurements:*   * *For the item specified* * *Within the tolerance detailed* * *Using the correct unit; millimetres and degrees*   *The Student*   * *Checks Tasks 1 to 7 to ensure conformance to specifications* |
| 8 | Prepare a detailed sketch to specifications   * Student completes Task 8 (a) |  | |  | *The Student completes a detailed free hand sketch of bench/table used in Task 2 as per instruction sheet for Task 8. Sketch must:*   * *Show front, top and side view* * *Show dimensions for length, width and height* * *Include perimeter and area* * *Include a parts list* |