Australian Government

Department of Education, Employment and Workplace Relations

# MEM12007D Mark off/out structural fabrications and shapes

**Release: 1**

# MEM12007D Mark off/out structural fabrications and shapes

## Modification History

Not Applicable

# Unit Descriptor

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| **Unit descriptor** | This unit of competency covers the skills required by an Engineering Tradesperson - Fabrication for transferring the dimensions from the detail drawing to work, making templates as required, developing patterns and/or transferring measurements to structures, interpreting relevant codes, standards and symbols and estimating quantities of material from drawings. |

# Application of the Unit

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| **Application of the unit** | The unit of competency applies to the marking off/out of general fabrications and shapes using appropriate tools and equipment. The marking out is undertaken to specified measurements, tolerances and shapes.<br><br>Skills covered by this unit are generally applied in occupational and work situations associated with steel fabrication, boilermaking or sheet metal work.<br><br>This unit has been developed for Engineering Tradesperson - Fabrication apprenticeship training and the recognition of trade level skills in mark off/out of structural fabrications and shapes.<br><br>All work and work practices are carried out to industry, regulatory and legislative requirements. The task may be performed in the workshop or in situ.<br><br>Templates and patterns are produced as required.<br><br>In a marine setting, it includes basic lofting/set out for construction of marine vessels and may include items such as stem and transom development and use of tables of offsets that reflect chine and hull configuration. This may include lofting surfaces, straight edges, string lines, French curves, templates, etc. Marking out techniques may apply to a range of materials and shapes.<br><br>Where more extensive lofting practices are used, MEM09021B Interpret and produce curved 3-dimensional shapes should be considered.<br><br>For marking out general engineering components, refer to MEM12006C Mark off/out (general engineering). |

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| | **Band**: **A**<br>**Unit Weight**: **4** |

## Licensing/Regulatory Information

Not Applicable

## Pre-Requisites

| **Prerequisite units** | | |
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| **Path 1** | MEM12023A | Perform engineering measurements |
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## Employability Skills Information

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| **Employability skills** | This unit contains employability skills. |

## Elements and Performance Criteria Pre-Content

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| Elements describe the essential outcomes of a unit of competency. | Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide. |

# Elements and Performance Criteria

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| 1. Transfer dimensions from a detail drawing to work or surface | 1.1. Specifications and work requirements are determined and understood using correct and appropriate calculations<br>1.2. Marking out is carried out to specifications or standard operating procedures using appropriate tools and equipment<br>1.3. Datum points are established |
| 2. Make templates/patterns as required | 2.1. Appropriate template/pattern material is chosen when required<br>2.2. Required templates are produced to specifications<br>2.3. Correct storage procedures are followed including labelling and identification to standard operating procedures |
| 3. Develop patterns and/or transfer measurements to structures | 3.1. Most appropriate development and/or measurement sequence is chosen and applied<br>3.2. Allowances for fabrication and assembly are correctly determined and transferred<br>3.3. Measurement transfer/layout of components is checked to ensure accuracy/set out |
| 4. Interpret relevant codes, standards and symbols | 4.1. Relevant standards/codes and symbols are interpreted<br>4.2. Requirements of standards/codes are interpreted and applied to materials and processes |
| 5. Estimate quantities of materials from detail drawings | 5.1. Materials are correctly identified<br>5.2. Quantities are estimated from drawing<br>5.3. Material wastage is minimised |

# Required Skills and Knowledge

| REQUIRED SKILLS AND KNOWLEDGE |
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| This section describes the skills and knowledge required for this unit. |
| **Required skills** |
| Required skills include:<br>• reading, interpreting and following information on written job instructions, |

| REQUIRED SKILLS AND KNOWLEDGE |
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| specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents<br>• undertaking numerical operations, geometry and calculations/formulae within the scope of this unit<br>• planning and sequencing operations<br>• using techniques and equipment required for marking off/out and developing patterns<br>• checking for conformance to specifications<br>• establishing and marking datum points<br>• developing patterns according to specification<br>• determining fabrication and assembly allowances and transferring to the pattern<br>• where applicable, applying the requirements of the codes/standards during the geometric development/marking off/out process<br>• determining material and component quantities from drawings and job specifications<br>• minimising material wastage |
| **Required knowledge** |
| Required knowledge includes:<br>• procedures for marking off/out and pattern development<br>• tools and equipment to be used in the preparation of the marking off/out<br>• datum points<br>• materials that can be used for the preparation of templates and their application<br>• manufacturing allowances that have to be considered when developing patterns<br>• template labelling and identification procedures<br>• storage requirements of templates<br>• appropriate methods of development/marking off/out of a range of given objects<br>• appropriate fabrication and assembly allowances<br>• effects of material type and thickness on fabrication and assembly allowances<br>• sources of data on fabrication and assembly allowances<br>• relevant standards and codes and the meaning of symbols used<br>• requirements of the codes/standards applicable to the work to be done<br>• materials from which the component/assembly is to be manufactured<br>• benefits of minimising material wastage<br>• applicable industry standards, national/Australian Standards, NOHSC guides, state/territory regulatory codes of practice/standards<br>• safe work practices and procedures<br>• relevant hazards and control measures related to the competency |

# Evidence Guide

| EVIDENCE GUIDE | |
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| The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package. | |
| **Overview of assessment** | A person who demonstrates competency in this unit must be able to mark off/out structural fabrications and shapes. Competency in this unit cannot be claimed until all prerequisites have been satisfied. |
| **Critical aspects for assessment and evidence required to demonstrate competency in this unit** | Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different workplace situations and contexts. Critical aspects of assessment and evidence include:<br>• examining detailed drawings for fabrication requirements and specifications including materials, measurements and tolerances, joining methods, standards and code requirements<br>• correctly determining sequence of measuring and/or development<br>• correctly establishing and marking datum points<br>• accurately transferring measurements to components<br>• correctly calculating allowances for fabrication and assembly including shrinkage, thickness and inside/outside measurements<br>• accurately producing templates. |
| **Context of and specific resources for assessment** | This unit has been developed to support training in and recognition of trade level competency in marking off/out structural fabrications and shapes as applied to a sheet metal or metal fabrication environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace.<br>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. |
| **Method of assessment** | Typically, persons engaged in Engineering Tradesperson - Fabrication work are required to apply their geometric development skills and techniques across a range of jobs and specifications.<br>A single assessment event is not appropriate. On the job |

| EVIDENCE GUIDE | |
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| | assessment should be included as part of the assessment process wherever possible. Where assessment occurs off the job, judgement must consider evidence of the candidate's performance in a productive work environment that includes a sufficient range of appropriate tasks and materials to cover the scope of application for this unit.<br><br>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.<br><br>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. |
| **Guidance information for assessment** | This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with marking off/out structural fabrications and shapes or other units requiring the exercise of the skills and knowledge covered by this unit.<br><br>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. |

# Range Statement

| RANGE STATEMENT |
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| The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and |

| **RANGE STATEMENT** | |
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| regional contexts) may also be included. | |
| **Equipment** | Equipment may include marking out tools as required |
| **Template material** | Template material may include:<br>• steel plate<br>• perspex<br>• timber<br>• cardboard<br>• paper |
| **Storage procedures** | Storage procedures may include:<br>• labelling<br>• identification (e.g. template lofts) |
| **Allowances** | Allowances may include:<br>• thickness<br>• bend<br>• pitch<br>• angle<br>• circumference<br>• perimeter |
| **Standards/codes and symbols** | All work carried out in accordance with legislative and regulatory requirements |

# Unit Sector(s)

| **Unit sector** | |
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# Co-requisite units

| **Co-requisite units** | | |
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# Competency field

| **Competency field** | Measurement |
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