



Australian Government

Department of Education, Employment and Workplace Relations

MEM09209A Detail bearings, seals and other componentry in mechanical drawings

Release: 1

MEM09209A Detail bearings, seals and other componentry in mechanical drawings

Modification History

Release 1 - New unit of competency

Unit Descriptor

This unit of competency covers the skills and knowledge required to produce detailed engineering drawings containing bearings and mechanical seals, engineering keys and keyways, holes and shafts to provide specific clearances by applying general tolerances, and confirming the geometric shape of components by applying geometric tolerances.

Application of the Unit

This unit is suitable for those working within a drafting work environment and can be applied across all engineering disciplines. Drawings may be carried out with or without the use of computer-aided design (CAD) systems and are completed to Australian Standard (AS) 1100.1–1992 Technical drawing – General principles.

If CAD systems are to be used, the unit MEM30031A Operate computer-aided design (CAD) system to produce basic drawing elements, should also be selected.

Drawings are completed under supervision.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Pre-Requisites

MEM09002B Interpret technical drawing

MEM09204A Prepare basic engineering detail drawings

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

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

1	Determine drawing requirements	1.1	Check purpose, scope and information requirements for drawing
		1.2	Interpret available information relevant to project and work requirements and identify and address further information needs
		1.3	Identify and prepare equipment required to complete work
		1.4	Identify and access organisational files, templates and symbols as required for work
2	Identify system requirements	2.1	Access catalogues, tables, standards and specifications to determine required components
		2.2	Identify types of bearings, their features and uses
		2.3	Identify types of mechanical seals, their features and uses
		2.4	Determine method of general tolerancing, classes of fit and forms of geometric shapes from engineer, sketches or specifications
		2.4	Determine other componentry and type of lubricants to be used
		2.6	Identify and apply relevant codes, standards and symbols used for components and methods used to locate on drawings

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| 3 | Prepare detail drawing | <ul style="list-style-type: none"><li data-bbox="547 291 1402 369">3.1 Lay out drawing in accordance with the sketches and specifications<li data-bbox="547 392 1402 515">3.2 Apply line work using a range of different line types and media in accordance with standard industry drawing practice<li data-bbox="547 537 1402 660">3.3 Produce detail and assembly drawings containing engineering bearings and mechanical seals, applying general tolerances, where required<li data-bbox="547 683 1402 761">3.4 Produce detail drawings requiring sizing and tolerancing of keys and keyways<li data-bbox="547 784 1402 862">3.5 Produce detail drawings containing shafts and holes and fully tolerance to suit a particular Class of Fit<li data-bbox="547 884 1402 963">3.6 Produce detail drawings of engineering components applying geometric tolerances to the shape<li data-bbox="547 985 1402 1041">3.7 Apply surface texture finishes to detail drawings<li data-bbox="547 1064 1402 1209">3.8 Ensure drawing accurately reflects specifications, is presented according to organisational requirements and contains all relevant information, including full notation and dimensioning<li data-bbox="547 1232 1402 1321">3.5 Apply workplace occupational health and safety (OHS) and environmental procedures |
| 4 | Document and store drawings | <ul style="list-style-type: none"><li data-bbox="547 1400 1402 1512">4.1 Document drawings and associated technical information in accordance with project requirements and organisational procedures<li data-bbox="547 1534 1402 1583">4.2 Store drawings according to organisational procedures |

Required Skills and Knowledge

Required skills

Required skills include:

- literacy skills sufficient to read and interpret instructions, relevant codes of practice and specifications for drawings work
- using computer technologies and navigating software
- numeracy skills sufficient to interpret technical information and conduct mathematical problem solving as required in the scope of this unit
- using and maintaining drawing equipment
- applying spatial principles to achieve scale and proportion
- interpersonal skills to consult with other disciplines
- drafting skills
- applying symbols, schedules and legends to the drawing
- arranging the views in a logical manner and in accordance with AS 1100.1–1992 Technical drawing – General principles
- correctly using line thickness and construction to identify parts
- using engineering and manufacturer catalogues, tables, standards and specifications
- applying surface texture symbols to comply to engineer's requirements
- applying toleranced dimensions to a detail drawing
- reading and selecting the correct key, keyway and keyseat sizes given a specified condition using the appropriate tables
- reading and selecting correct toleranced dimensions to meet the required Class of Fit as selected by the engineer or from the specifications
- selecting a bearing or seal from engineering and manufacturer catalogues, tables, standards and specifications to fit into housings and over shafts
- converting between unilateral, bilateral and limit of size or direct tolerances
- applying tolerances to meet the individual fit classifications between a shaft and hole (clearance, interference and transition)
- filing drawings according to workplace procedures

Required knowledge

Required knowledge includes:

- general knowledge of different approaches to drawing
- awareness of copyright and intellectual property issues and legislation in relation to drawing
- environmental and OHS issues associated with the tools and materials used for drawing
- quality assurance procedures
- company standards for CAD
- order of drawing process
- company checking procedures for drawings

- layout and presentation
- the standards applicable to the work to be undertaken
- the process of checking the completed drawing
- the process of storing paper drawings and electronic drawing files
- the International System of Units (SI)
- the different types of bearings used in the manufacture of an engineering project
- the different types of seals used in the manufacture of an engineering project
- surface texture finishes and machining processes
- geometric tolerances with regard to the roundness, straightness, flatness, concentricity, and so on, of an engineering component
- terminology associated with the preparation of mechanical drawings

Evidence Guide

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 interpret and apply drawing specifications and industry standards in the production of mechanical drawings which detail bearings seals and other componentry.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>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> <p>Specifically the candidate must be able to:</p> <ul style="list-style-type: none"> • work within typical site/teamwork structures and methods • apply worksite communication procedures • comply with organisational policies and procedures, including quality requirements • participate in work meetings • comply with quality requirements • use industry terminology • apply appropriate safety procedures • demonstrate industry knowledge, including: <ul style="list-style-type: none"> • industry size, scope of work and economic issues • relevant industrial awards and enterprise agreements • relevant legislative provisions covering discrimination and equal employment opportunity.
Context of and specific resources for assessment	<p>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.</p> <p>Where applicable, reasonable adjustment must be</p>

	<p>made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with drafting or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
Method of assessment	<p>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.</p>

Range Statement

Available information	<p>Available information may include:</p> <ul style="list-style-type: none"> • construction documents • assembly and installation drawings • work specifications • information for plant services equipment • industry codes, standards and regulations • design brief
Bearings	<p>Bearings may include:</p> <ul style="list-style-type: none"> • plain and anti-friction bearings, including ball, roller, angle, self-aligning, thrust and taper bearings
Seals	<p>Seals may include:</p> <ul style="list-style-type: none"> • all devices designed to prevent the movement of fluid from one area to another, or to exclude contaminants, such as: <ul style="list-style-type: none"> • static and dynamic seals, including wiper, rod, piston, guide and V-packing O-rings
General tolerances	<p>General tolerances may include:</p> <ul style="list-style-type: none"> • unilateral • bilateral • limits of size or direct
Appropriate personnel	<p>Appropriate personnel may include:</p> <ul style="list-style-type: none"> • designer • engineer • supervisor • contractor/consultant • builder
Support services	<p>Support services may include:</p> <ul style="list-style-type: none"> • estimating department and personnel • engineering department and personnel • drafting department and personnel • project manager • factory manager or staff

Unit Sector(s)

Drawing, drafting and design

Custom Content Section

Not applicable.