

## National Unit Specification: General Information

**UNIT** Craft Appreciation in Mechanical Engineering Services  
(Intermediate 2)

**NUMBER** D919 11

### COURSE

### SUMMARY

This unit will introduce the candidate to a range of basic skills appropriate to Mechanical Engineering Services including marking out, selecting and using tools.

### OUTCOMES

- 1 Identify a range of tasks and describe the use of types of materials used in mechanical engineering services.
- 2 Produce simple drawings and sketches of mechanical engineering systems.
- 3 Cut, shape and work materials.
- 4 Carry out forming processes.
- 5 Apply methods of jointing pipework.

### RECOMMENDED ENTRY

Access to this module is at the discretion of the centre. However, it would be beneficial if the candidate had gained some prior practical experience.

### CREDIT VALUE

2 Credits at Intermediate 2.

### CORE SKILLS

Information on the automatic certification of any core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

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## Administrative Information

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## **National unit specification: statement of standards**

**UNIT**            Craft Appreciation in Mechanical Engineering Services (Intermediate 2)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

### **OUTCOME 1**

Identify a range of tasks and describe the use of types of materials used in mechanical engineering services.

#### **Performance Criteria**

- a) The identification of tasks relating to mechanical engineering services is accurate.
- b) The description on the uses of common mechanical engineering services materials is correct.

#### **Evidence Requirements**

Written and/or oral evidence is required for this outcome to show that the candidate can describe the uses of 5 common materials used in mechanical engineering services and 10 tasks associated with mechanical engineering services.

### **OUTCOME 2**

Produce simple drawings and sketches of mechanical engineering systems.

#### **Performance Criteria**

- a) Engineering information is interpreted correctly.
- b) Single line diagrams of stipulated systems are drawn correctly with regard to current regulations.
- c) The description of the operation and function of components is correct.

#### **Note on range for the outcome**

Systems: cold water supply; hot water supply; single stack sanitation; low temperature hot water heating.

#### **Evidence Requirements**

Graphical evidence of the candidate's ability to produce working diagrams of the systems as described in PC (b). Written and/or oral evidence of the candidate's knowledge of the operation and function of the components in each system.

## **National unit specification: statement of standards (cont)**

**UNIT**            Craft Appreciation in Mechanical Engineering Services (Intermediate 2)

### **OUTCOME 3**

Cut, shape and work materials

#### **Performance Criteria**

- a)     Materials are measured and marked out to stated tolerances.
- b)     The appropriate tools are selected for given tasks.
- c)     Materials are cut to stated tolerances.
- d)     Power tools are used to drill and cut holes to stated dimensions.
- e)     Work methods and activities are correct in terms of satisfying current legislation.

#### **Evidence Requirements**

Practical exercises in which the candidate can demonstrate the ability to produce two selected work pieces to comply with the stated tolerances.

Written and/or oral evidence is required to show the knowledge of knowledge of statutory and safety regulations, fire control and accident procedures and the safe and efficient use of both hand and portable power operated tools.

### **OUTCOME 4**

Carry out forming processes.

#### **Performance Criteria**

- a)     Working processes for hot and cold forming of materials are selected correctly.
- b)     Working processes for hot and cold forming of materials are applied to within specified tolerances.
- c)     Work methods and activities are correct in terms of satisfying current legislation.

#### **Evidence Requirements**

Practical exercises in which the candidate can demonstrate the ability to produce four selected work pieces to comply with the stated tolerances.

Written and or oral evidence is required to show the candidate's knowledge of statutory and safety regulations, fire control and accident procedures and the safe and efficient use of both hand and portable power operated tools.

## **National unit specification: statement of standards (cont)**

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### **OUTCOME 5**

Apply methods of jointing pipework.

#### **Performance Criteria**

- a)     The taps and dies for given tasks are selected correctly.
- b)     Methods of forming screw threads on pipes are applied correctly.
- c)     Jointing pipework by screw threads on pipes is performed correctly.
- d)     The application of jointing methods for pipe and tube of different materials (including non-metallic materials) is correct.
- e)     Work methods and activities are correct in terms of satisfying current legislation.

#### **Evidence Requirements**

Practical exercises in which the candidate can demonstrate the ability to produce four selected work pieces to comply with the stated tolerances.

Written and or oral evidence is required to show the candidate's knowledge of statutory and safety regulations, fire control and accident procedures and the safe and efficient use of both hand and portable power operated tools.

## National unit specification: support notes

**UNIT**            Craft Appreciation in Mechanical Engineering Services (Intermediate 2)

This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

### GUIDANCE ON CONTENT AND CONTEXT

This unit is designed to introduce the candidate to basic skills normally associated with mechanical engineering services, including interpreting engineering information, producing basic drawings, marking out, selected and using tools on a variety of materials.

Corresponding to the outcomes 1-5:

1        This outcome introduces the candidate to the basic tasks and types of materials a mechanical engineering craftsperson will be involved with. The candidate should be introduced to a number of working situations such as new work, repair work, maintenance and renovation. Within these situations the candidate should learn about the tasks involved with the following:

- i)        cold water supply system;
- ii)       hot water supply system;
- iii)      a sanitation discharge system;
- iv)      a low temperature hot water heating system.

The candidate should be asked to identify 10 tasks that the mechanical engineering services craftsperson may have to undertake.

The candidate should also be asked to identify and describe the main properties of five of the following materials, choosing at least one from each section:

- a)       Pipework:
  - i)        copper;
  - ii)       steel;
  - iii)      polyvinyl chloride;
  - iv)      polythene.
  
- b)       Valves:
  - i)        brass;
  - ii)       bronze;
  - iii)      steel.

## National unit specification: support notes (cont)

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- c) Sheet work:
  - i) galvanised steel
  - ii) lead;
  - iii) aluminium;
  - iv) plastic.

2 In this outcome the candidate should interpret engineering information, produce simple drawings and sketches, and demonstrate knowledge of the basic operation and function of the components in each of the following:

- i) cold water supply system;
- ii) hot water supply system;
- iii) sanitation discharge system;
- iv) low temperature hot water heating system.

The drawings should include:

cold water supply – both direct and indirect systems, from the main to exit points should be shown;

hot water supply – direct system to include pipe, cistern and cylinder;

sanitation – simple single stack system;

low temperature hot water heating system – from the boiler to the heat emitters, including pump and cold feed/expansion cistern.

3 In this outcome the candidate should be introduced to methods of measuring and marking out for cutting, sawing and drilling. Correct use of tools in cutting, sawing and drilling materials should be demonstrated. Appropriate power tools to cut and drill holes should be made available to the candidate. The candidate should be made aware of the purpose of drilling and hole boring, the different methods used, the main features of drills and hole saws, types and application of drilling machines, factors affecting speed and mode of drilling. The candidate should be able to demonstrate due care and maintenance of tools and machines. He or she should also be able to demonstrate knowledge of general rules for efficiency and safety precautions specific to cutting, sawing and drilling operations.

4 In this outcome the candidate should demonstrate competence in hot and cold working processes for bar, sheet, pipe, rod and section materials. He or she should also show knowledge of the relationship between properties of materials and the forming process; folding and bending tools; factors to be considered in forming. All activity should be in accordance with current Health and Safety Regulations.

## **National unit specification: support notes (cont)**

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- 5        In this outcome the candidate should be introduced to different applications of screw threads and the terminology associated with screw threads. He or she should be introduced to tapping and screwing techniques. The candidate should be able to demonstrate competence in threading by taps and dies in screws, bolts, studs and nuts. He or she should also demonstrate competence in pipe jointing by screw threads, and jointing pipes and tubes of different materials (including non-metallic materials). This will also involve demonstrating knowledge of materials used for sealing pipe joints. All activity should be in accordance with current Health and Safety Regulations.

### **GUIDANCE ON TEACHING AND LEARNING APPROACHES**

This module should be workshop based. Practical work by candidates should follow demonstration and explanation by the tutor. Candidates should perform each skilled operation using tools and equipment to an acceptable standard.

Outcomes should provide ample scope for the production of artefacts such as tool holders, pipe brackets, formed pipe bends, and simple sheet metalwork as well as fixing techniques for pipes and components. Use could be made of films, videos and film strips as well as manufacturers' booklets and catalogues.

### **GUIDANCE ON APPROACHES TO ASSESSMENT**

Centres may use the Instruments of Assessment which are considered by tutor/trainer to be appropriate to meet the performance criteria for each outcome.

### **SPECIAL NEEDS**

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements* (SQA, 1998).