

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number-	2211073	-Session-1993-94
-Superclass-	VG	
-Title-	REPAIRING AND MAINTAINING PLANT AND EQUIPMENT (THERMAL JOINING AND CUTTING) (x1¹/₂)	

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Interpreting instructions, planning, organising and adopting safe working practices in repairing surface defects in metals, by soldering, brazing, manual metal arc welding and oxyacetylene welding and cutting and shaping metals using oxy/fuel equipment.

OUTCOMES (Elements of Competence)

1. interpret technical information for servicing and repairing plant and equipment;
2. select materials and substances for servicing and repairing plant and equipment;
3. prepare materials and components for repair;
4. repair surface defects for servicing and repairing plant and equipment;
5. shape and cut materials to repair and maintain plant and equipment.

This unit incorporates the standards of the CITB Lead Body.

CREDIT VALUE: 1.5 NC Credits

ACCESS STATEMENT: This module forms part of the level II SVQ in Plant Maintenance, details of which are given in the Support Notes, under Progression. There is no access statement for this module but it is designed to complement the other units in the SVQ and candidates would normally be expected to be receiving complementary industrial experience in a related field.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

This specification is distributed free to all approved centres. Additional copies may be purchased from SQA (Sales and Despatch section) at a cost of £1.50 (minimum order £5).

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**STATEMENT OF STANDARDS****UNIT NUMBER:** 2211073**UNIT TITLE:** REPAIRING AND MAINTAINING PLANT AND EQUIPMENT (THERMAL JOINING AND CUTTING)

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

OUTCOME (ELEMENT OF COMPETENCE)

1. INTERPRET TECHNICAL INFORMATION FOR SERVICING AND REPAIRING PLANT AND EQUIPMENT

PERFORMANCE CRITERIA

- (a) Accurate and relevant selection and interpretation is made of technical information from given sources in relation to the task.
- (b) Instructions given to the candidate are correctly interpreted and implemented.
- (c) Instructions and information relayed to others are clear and concise.
- (d) Corrective actions are implemented against deviations from technical information.

RANGE STATEMENT

Information sources: drawings; manufacturers' specifications; workshop manuals; operator's or instruction manual; technical services bulletins; parts manuals; information charts; oral or written instructions.

Corrective actions: specifications; manuals; bulletins; amendment procedures.

Calculations: multiplication; division; addition; subtraction; percentages.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in:

- (i) taking information from:
 - manufacturers' specification or information charts;
 - operator or instruction manuals;
 - workshop manuals.

- (ii) calculating, from given information sources, linear measurement, sizes and quantities.

Oral or written evidence of knowledge and understanding of types and purpose of information sources.

All the performance criteria must be met and all items in the range statement covered.

OUTCOME (ELEMENT OF COMPETENCE)

- 2. SELECT MATERIALS AND SUBSTANCES FOR SERVICING AND REPAIRING PLANT AND EQUIPMENT**

PERFORMANCE CRITERIA

- (a) The selection of materials and substances complies with the specification in terms of quantity, quality and types.
- (b) Corrective actions are implemented to establish utility of materials and substances.
- (c) Instructions given to the candidate are correctly interpreted and implemented.
- (d) Instructions and information relayed to others are clear and concise.

RANGE STATEMENT

Information sources: manufacturers' technical information; oral or written instructions; workshop or operator's manuals; symbols; abbreviations; charts; tables.

Corrective actions: materials and substance replacement procedures.

Materials: electrodes; filler rods; mild steel carbon; steel copper; alloy steel; aluminium; aluminium alloys.

Substances: fluxes; cleaning agents; solvents; solder; fire extinguishing equipment.

Location: site; workshop.

Safety: personal protection regulations: materials handling regulations; HASWA (Health and Safety at Work Act); COSHH (Control of Substances Hazardous to Health) Regulations.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in selecting materials and substances.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) methods for reporting defects in materials and substances;
- (iii) types of materials and substances used to carry out repairs;
- (iv) types of tools and equipment used for welding, brazing, soldering and cutting tasks;
- (v) uses and limitations of materials, substances, tools and equipment in the range;
- (vi) methods of storing materials and equipment;
- (vii) replacement procedures for selecting materials and substances in the range;
- (viii) responsibilities regarding statutory legislation.

All the performance criteria must be met and all items in the range statement covered.

OUTCOME (ELEMENT OF COMPETENCE)

3. PREPARE MATERIALS AND COMPONENTS FOR REPAIR

PERFORMANCE CRITERIA

- (a) Instructions and information relayed to others are clear and concise.
- (b) Instructions given to the candidate are correctly interpreted and implemented.
- (c) Preparation of materials and components to conform with the manufacturer's specification.
- (d) The selection of tools and equipment is appropriate to the work.
- (e) Corrective actions are implemented against deviations from the preparation specification.
- (f) The finished surface conforms with the specification.
- (g) Work methods and activities are correct in terms of satisfying current legislation.
- (h) The cleanliness of the work area is maintained.
- (i) Work is completed to an agreed time schedule.

RANGE STATEMENT

Information sources: manufacturers' technical information; manufacturers' specifications; operator's or instruction handbooks; oral or written instructions; parts manuals.

Corrective actions: preparation specification amendment procedures.

Hand tools: files; chisels; hammers; spanners; sockets; hacksaws; wire brushes.

Portable and static tools: drills; grinders.

Equipment: portable and static cleaning equipment; jigs; clamps; emery cloth; measuring instruments; marking instruments.

Materials: carbon steel; cast iron; copper; mild steel; alloy steel; aluminium; aluminium alloys.

Substances: fluxes; cleaning agents; solvents; solder.

Preparation processes: cleaning; filing; chiselling; grinding; cutting; applying; shaping; disassembling; assembling; marking.

Safety: personal protection legislation; machine operating procedures; materials handling regulations; HASWA (Health and Safety at Work Act); COSHH (Control of Substances Hazardous to Health) Regulations.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in preparing materials and substances.

Oral or written evidence of knowledge and understanding of:

- (i) types and purposes of information sources in the range;
- (ii) application and suitability of tools and equipment for the preparations procedures;
- (iii) reasons for different types of preparation processes and procedures for arc welding, gas welding, brazing, soldering and oxy flame cutting;
- (iv) methods of storage of materials substances and components;
- (v) machinery/equipment operating procedures/instructions;
- (vi) responsibilities regarding statutory regulations.

OUTCOME (ELEMENT OF COMPETENCE)**4. REPAIR SURFACE DEFECTS FOR SERVICING AND REPAIRING PLANT AND EQUIPMENT****PERFORMANCE CRITERIA**

- (a) Repairs and finished surfaces are assessed to conform with specifications.
- (b) Defects are repaired to conform with technical information or specification.
- (c) The cleanliness of the work area is maintained.
- (d) The selection of tools and equipment is appropriate to the work.
- (e) Work is completed to agreed time schedules and satisfies current legislation.
- (f) Instructions given to the candidate are correctly interpreted and implemented.
- (g) Instructions and information relayed to others are clear and concise.

RANGE STATEMENT

Information sources: manufacturers' technical information; operator's or instruction handbooks; manufacturers' specifications; oral or written instructions; parts lists or handbooks; simple drawings.

Tools: hand tools; static and portable power tools; marking out tools; jigs; clamps.

Equipment: gas cylinders; regulators; pressure gauges; hoses; hose protection devices; torches; nozzles; electric and copper bit soldering irons; flame heaters; AC and DC manual metal arc welding units; electrode holders; return clamp; electrodes; filler metal rods; portable and static grinding equipment; measuring instruments.

Substances: fluxes; solder.

Materials: carbon steel; cast iron; copper; mild steel; alloy steel; aluminium; aluminium alloys.

Preparation processes: welding; brazing; soldering; applying.

Safety: personal protection legislation; HASWA (Health and Safety at Work Act); COSHH (Control of Substances Hazardous to Health) Regulations; handling, storage, transportation and use of gas cylinders; machinery and equipment operating procedures.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in:

- (i) repairing construction plant and equipment surface defects by:
 - basic oxy-acetylene welding;
 - brazing;
 - soldering;
 - manual metal arc welding;
- (ii) producing joints by thermal fusion.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources in the range;
- (ii) characteristics, uses and limitations of materials, substances and equipment in the range;
- (iii) working pressures, reading gauges and the significance of the readings;
- (iv) basic welding terminology;
- (v) purpose of inspecting completed joints by visual inspection, destructive testing and non-destructive testing;
- (vi) applications and limitations of the thermal joining processes within the range;
- (vii) procedures for reporting and rectifying defects in equipment in the range;
- (viii) responsibilities regarding statutory regulations.

OUTCOME (ELEMENT OF COMPETENCE)

- 5. SHAPE AND CUT MATERIALS TO REPAIR AND MAINTAIN PLANT AND EQUIPMENT

PERFORMANCE CRITERIA

- (a) Instructions given to the candidate are correctly interpreted and implemented.
- (b) Instructions and information relayed to others is clear and concise.
- (c) The selection of tools and equipment is appropriate to the work.
- (d) Finished surface conforms to the specification.
- (e) Components are profiled from material to conform with the specifications.
- (f) Work methods and activities satisfy current legislation.
- (g) The cleanliness of the work area is maintained.
- (h) Work is completed to an agreed time schedule.
- (i) Components are profiled from material to conform with specifications.

RANGE STATEMENT

Information sources: manufacturers' technical information; manufacturers' specifications; oral or written instructions; operator's or instruction manuals; manufacturers' parts manuals, charts and tables.

Tools: hand tools; marking and measuring tools and equipment.

Equipment: gas cylinders; regulators; pressure gauges; hoses; hose protection devices; torches; nozzles; safety glasses; measuring instruments; attachments and cutting guides.

Preparation processes: marking out; shaping; cutting; cleaning.

Materials: carbon steels.

Location: site; workshop.

Safety: personal protection legislation; machinery operating procedures; HASWA (Health and Safety at Work Act); COSHH (Control of Substances Hazardous to Health) Regulations.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in shaping and cutting materials to carry out modifications and repairs on construction plant and equipment by producing:

- straight cuts;
- square and bevel edges;
- simple shapes;
- radii and holes.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources in the range;
- (ii) characteristics, uses and limitations of equipment and materials in the range;
- (iii) working pressures, reading gauges and the significance of the readings;
- (iv) methods and procedures of checking for gas leaks;
- (v) basic oxy fuel cutting terminology;
- (vi) applications and limitations of cutting processes;
- (vii) purpose of edge preparation equipment;
- (viii) purpose of visual inspection after cutting;
- (ix) procedures for reporting and rectifying defects in oxy fuel cutting equipment;
- (x) responsibilities regarding statutory regulations.

ASSESSMENT RECORDS

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by

the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

SPECIAL NEEDS

In certain cases, modified outcomes and range statements can be proposed for certification. See references at end of Support Notes.

© Copyright SQA 1993

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**SUPPORT NOTES**

UNIT NUMBER	2211073
UNIT TITLE	REPAIRING AND MAINTAINING PLANT AND EQUIPMENT (THERMAL JOINING AND CUTTING)

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

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 60 hours. The use of notional design length for programme design and timetabling is advisory only.

PURPOSE This unit is designed to enable the candidate to develop skills and knowledge to repair and maintain a range of plant and equipment used in the construction industry by thermal joining and cutting. It is suitable for operatives working in the construction industry or a services or installation industry related to construction.

SQA publishes summaries of NC units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

This module will help you to acquire skills and knowledge necessary to repair and maintain a range of plant and equipment used in the construction industry. You will learn how to join and cut materials by thermal processes in compliance with manufacturers' specifications and relevant statutory safety regulations.

CONTENT/CONTEXT The candidate successfully completing this module will require underpinning knowledge and skills relating to the interpretation of technical information, selection of materials and substances and the preparation of materials and components for the servicing and repair of surface defects on a range of construction plant and equipment.

The unit would be offered to candidates from the construction and related services industries. The skills are transferable within different working environments but the unit is primarily aimed at candidates whose normal place of work would be a site or similar environment.

The range statement is applicable to all areas of construction and other related or similarly structured industries. The competences and underpinning knowledge gained in successfully completing this unit would be transferable across a range of disciplines within the built environment.

The unit deals with repairs to surface defects on construction plant and equipment and is complemented by units dealing with related aspects of work in construction plant maintenance.

It should be delivered as part of a structured programme of training and orientated to the context of the candidate's work and area of responsibility.

APPROACHES TO GENERATING EVIDENCE The achievement of the underpinning knowledge required for this unit would be assisted by the use of slides and videos, and hands-on experience.

Tutors/trainers should demonstrate practical elements step by step until the candidate feels confident enough to attempt them on his/her own, and the safety factors should be thoroughly emphasised.

Supervisors and employers should also play an important part in assisting candidates to generate evidence.

ASSESSMENT PROCEDURES Candidates will be able to provide evidence of performance using a variety of methods. These will include:

- Performance at work (recorded in Candidate's Assessment and Evidence Record or other methods).
- Performance in training (recorded in Candidate's Assessment and Evidence Record or other methods).
- Simulated exercises (skills/progress test results).
- Past achievement/experiences e.g. letters of endorsement; past certificates.

Evidence gathering from the workplace will be the preferred method; however there may be situations where this is inappropriate or the evidence is insufficient. Supplementary evidence will also be required to demonstrate the underpinning knowledge related to the competences in the unit.

For detailed guidance on assessment, reference should be made to the publications listed at the end of the Support Notes and to the Assessment Guidance Notes available for the delivery of the Scottish Vocational Qualification of which this module is a component.

PROGRESSION This unit forms part of the level II SVQ in Plant Maintenance.

Each module is a separate unit and the modules are not necessarily taken in a prescribed order, although there is a logical sequence to the acquisition of the skills and knowledge concerned.

To gain the award, the candidate must successfully complete all of the following modules:

2211063	Servicing and Repairing Plant and Equipment (General Servicing)
2211073	Repairing and Maintaining Plant and Equipment (Thermal Joining and Cutting) (x 1.5)
2211083	Repairing and Maintaining Plant and Equipment (Plant Electrical Systems and Components) (x 1.5)
2211093	Repairing and Maintaining Plant and Equipment (Power Units)
2211103	Repairing and Maintaining Plant and Equipment (Power Trains - Mechanical)
2211113	Repairing and Maintaining Plant and Equipment (Hydraulic Systems and Components)
2211123	Repairing and Maintain Plant and Equipment (Pneumatic Systems and Components)
2211133	Maintaining Plant and Equipment (Auxiliary Systems and Components) (x 1.5)

RECOGNITION Many SQA NC units are recognised for entry/recruitment purposes. For up-to-date information see the SQA guide 'Recognised and Recommended Groupings'.

REFERENCES

1. Guidelines for Module Writers.
2. SQA's National Standards for Assessment and Verification.
3. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
4. Procedures for special needs statements are set out in SQA's guide 'Students with Special Needs'.

© Copyright SQA 1993

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.