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NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**STATEMENT OF STANDARDS****UNIT NUMBER:** 2211163**UNIT TITLE:** REPAIRING AND OVERHAULING PLANT AND EQUIPMENT

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 REPAIR AND OVERHAUL OF PLANT AND EQUIPMENT

PERFORMANCE CRITERIA

- (a) Technical information derived from given sources relates to components to be replaced and equipment to be installed.
- (b) Corrective actions are implemented to establish practicable reconditioning and overhaul data.
- (c) Co-ordinating directions and communications are clear, concise and effective.

RANGE STATEMENT

Information sources: manufacturers' specifications; exploded view drawings; diagrams; symbols; workshop manuals; oral or written instructions; operator instruction manuals; technical service bulletins; manual and non-manual stock recording systems; parts manuals or lists; catalogues; cross-reference guides; servicing charts; statutory regulations.

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

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

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in:

- (i) extracting overhaul and repair information from workshop manuals and manufacturers' specifications;
- (ii) extracting information from parts lists, manuals, catalogues and cross-reference guides;
- (iii) extracting variations from manufacturers' specifications, manuals, bulletins and amendment procedures;

- (iv) calculating from given information sources, capacities, volumes, quantities and linear measurement.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) methods of checking and reporting inaccuracies in information sources.

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

OUTCOME (ELEMENT OF COMPETENCE)

- 2. REMOVE SUBSTANCES, PARTS AND COMPONENTS FROM PLANT AND EQUIPMENT FOR INSPECTION OR REPAIR**

PERFORMANCE CRITERIA

- (a) Oral or written instructions and information given to the candidate are correctly interpreted and implemented.
- (b) Waste materials and substances are removed to conform with safe working practices and effective operation.
- (c) Environmental damage is minimised by the removal of waste materials and substances.
- (d) Removal of components is carried out to minimise damage.
- (e) Tools and equipment provided are those required to complete the task to specification.
- (f) The cleanliness of work area is maintained.
- (g) Work is completed to agreed time schedules.
- (h) Working conditions and the use of resources satisfy current legislation and organisational guidelines.

RANGE STATEMENT

Information sources: manufacturers' technical information; manufacturers' specifications; oral or written instructions; drawings; diagrams; operator or instruction handbooks; technical service bulletins.

Tools: hand tools; power tools; specialist servicing and overhauling tools and equipment.

Equipment: lifting equipment; fluid drain units and containers; waste containers; lifting and support equipment.

Substances: fuels; lubricants; coolants; fluids.

Plant and equipment: static plant; wheeled plant; tracked plant; small plant; attachments; auxiliary equipment.

Components: power units; steering; braking; chassis; suspension; mechanical assemblies and sub-assemblies.

Parts: auto-electrical hardware; electrical cable and fittings; retaining hardware; controls; valves; linkages; bearings; bushes; shafts; housings; gears; chains; couplings; belts; wheels; pipe network; pistons.

Preparation processes: removing; releasing; dismantling; draining; disposing; replacing; inspecting.

Locations: site; workshop.

Safety: personal protective equipment; plant 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:

- (i) removing parts and components from plant and equipment in the range;
- (ii) dismantling components from plant and equipment in the range;
- (iii) inspecting parts and components in the range;
- (iv) draining substances from components in the range.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) methods of removal and replacement of parts and components;
- (iii) purpose of inspecting parts and components when dismantling;
- (iv) application, suitability and limitations of hand tools, power tools and specialist tools;
- (v) use of measuring instruments and aids for inspection;
- (vi) reasons for using lifting equipment and aids to remove parts and components;
- (vii) handling and storage of parts and components;
- (viii) maintenance and repair requirements of removed parts and components in the range;
- (ix) methods and procedures for draining, flushing and replenishing substances in the range;
- (x) methods and procedures for disposing of waste materials and substances in the range;
- (xi) responsibilities with regard to Statutory Regulations.

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

OUTCOME (ELEMENT OF COMPETENCE)

- 3. ASSESS COMPONENTS SERVICEABILITY AGAINST REPAIR AND OVERHAUL SPECIFICATION**

PERFORMANCE CRITERIA

- (a) Oral or written instructions and information relayed to the candidate are confirmed as being understood.
- (b) Preparation of components are in accordance with the specification.
- (c) Corrective actions are implemented against deviation from preparation specification.
- (d) Tools and equipment provided are those required to complete the task to specification.
- (e) Prepared components are assessed for serviceability against the specification.
- (f) The cleanliness of work area is maintained.
- (g) Work is completed to agreed time schedules.
- (h) Working conditions and the use of resources satisfy current legislation and organisational guidelines.

RANGE STATEMENT

Information sources: manufacturers' specifications and recommendations; manufacturers' technical information; oral or written instructions; operator or instruction handbooks; technical service bulletins; drawings; diagrams; symbols; statutory regulations.

Corrective actions: specification and preparation amendment procedures.

Measuring equipment: micrometers (internal and external); vernier callipers; rules; tapes; callipers (inside and outside); feeler gauges; height and depth gauges; dial test indicators.

Tools: hand tools; power tools; specialist servicing and overhaul tools.

Materials: abrasive cloth and paper; abrasive discs.

Substances: proprietary cleaning agents; water.

Components: shafts; bearings; bushes; pistons; gears; chains; belts; controls; spacers; shims; housings; retaining hardware; mechanical assemblies and sub-assemblies; pipe network; hoses.

Preparation processes: cleaning; scraping; dressing; impelling; inspecting; measuring; salvaging; reclaiming; dismantling; rejecting.

Location: site; workshop.

Safety: personal protective equipment; 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:

- (i) preparing parts and components in the range for inspection;
- (ii) dismantling parts and components for inspection;
- (iii) inspecting parts and components in the range;
- (iv) measuring parts and components in the range;
- (v) reclaiming and salvaging parts and components in the range;
- (vi) rejecting unserviceable parts and components in the range.

Oral or written evidence of knowledge and understanding of:

- (i) types and purposes of information sources;
- (ii) methods of cleaning and preparing parts and components;
- (iii) importance of cleanliness of parts and components prior to inspection;
- (iv) methods and procedures for inspecting parts and components;
- (v) importance of using correct measuring instruments, tools and equipment;
- (vi) methods and procedures for measuring parts and components accurately;
- (vii) importance of 'cost effectiveness' when assessing components and parts for repair and overhaul;
- (viii) importance of using manufacturers' guidelines for re-usable parts and salvage operations;
- (ix) procedures for reporting defects in parts and components;
- (x) cost of common components and simple costing processes for cost-effective overhaul;
- (xi) operation and working principles of parts and components in the range;
- (xii) reasons for and methods of inspecting and reporting construction plant parts and components for safety, serviceability, overhaul, repair and maintenance requirements;
- (xiii) methods and procedures for storing reclaimed components;
- (xiv) methods and procedures for disposing of unserviceable components;
- (xv) responsibilities with regard to statutory regulations.

OUTCOME (ELEMENT OF COMPETENCE)

- 4. SELECT SUBSTANCES, PARTS AND COMPONENTS, FOR REPAIR AND OVERHAUL

PERFORMANCE CRITERIA

- (a) Oral or written instructions and information given to the candidate are correctly interpreted and implemented.
- (b) Provision of substances, parts and components complies with the specification.
- (c) Corrective actions are implemented to establish utility of materials, substances, parts and components.

- (d) Co-ordinating directions and communications are clear, concise and effective.
- (e) Quantity of substances, parts and components complies with the specification.
- (f) Quality of substances, parts and components complies with the specification.

RANGE STATEMENT

Information sources: manufacturers' technical information; oral or written instructions; operating or instruction handbooks; parts lists or manuals; technical service bulletins; cross-reference guides.

Corrective actions: defective, non-match, sub-standard materials, substances, parts and components.

Substances: fuels; lubricants; coolants; fluids; proprietary cleaning agents; solvents; jointing compounds; adhesives; flux; solder.

Parts and components: mechanical assemblies and sub-assemblies; auto-electrical hardware; electrical cable and fittings; retaining hardware; metal filler rods; gaskets; seals; pipe network; hoses; bearings; bushes; shafts; housings; linkages; gears; chains; couplings; belts; pistons; valves.

Safety: personal protective equipment; HASWA (Health and Safety at Work Act); COSHH (Control of Substances Hazardous to Health) Regulations.

Location: site; workshop.

EVIDENCE REQUIREMENTS

Performance evidence of competence under working conditions in selecting substances, parts and components.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) types and purpose of various parts and components;
- (iii) replacement methods and procedures for selecting parts, components and substances;
- (iv) methods for calculating the cost of spare parts and major items;
- (v) storing of parts and components;
- (vi) manual and non-manual stock record systems;
- (vii) methods for reporting defects in parts and components;
- (viii) characteristics, uses and limitations of the parts and components in the range;
- (ix) responsibilities with regard to statutory regulations.

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

OUTCOME (ELEMENT OF COMPETENCE)**5. ASSEMBLE PARTS TO FORM COMPONENTS TO SPECIFICATION****PERFORMANCE CRITERIA**

- (a) Oral or written instructions and information given to the candidate are correctly interpreted and implemented.
- (b) Technical information derived from given sources relates to parts and components to be assembled.
- (c) Parts and components are secured and located to conform with the specification.
- (d) Tools and equipment provided are those required to complete the task to the specification.
- (e) The cleanliness of work area is maintained.
- (f) Work is completed to agreed time schedules.
- (g) Working conditions and the use of resources satisfy current legislation and organisational guidelines.

RANGE STATEMENT

Information sources: manufacturers' technical information; manufacturers' specifications; oral or written instructions; operating instruction manuals; parts manuals, lists and catalogues; technical service bulletins.

Tools and equipment: hand tools; specialist servicing and reconditioning tools; power tools (static and portable).

Parts: auto-electrical hardware; electric cable and fittings; retaining hardware; pipe network; hoses; gaskets; seals; housings; shafts; bearings; bushes; pistons; gears; chains; belts; linkages; controls; spacers; shims.

Components: power units; steering; braking; chassis; suspension.

Preparation processes: assembling; measuring; marking; cleaning; lubricating; checking; locating; securing; removing; positioning; adjusting; testing.

Location: site; workshop.

Safety: personal protective equipment; 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:

- (i) preparing parts and components for plant and equipment in the range;
- (ii) assembling parts and components in the range;
- (iii) carrying out adjustments to parts and components in the range;
- (iv) measuring parts and components in the range;
- (v) functional checking of assembled components.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) construction and principal design features of assemblies and sub-assemblies;
- (iii) methods and procedures for preparing parts and components in the range prior to and during assembly;
- (iv) application and suitability of tools and equipment for assembling parts and components in the range;
- (v) cost of common components and simple costing processes for cost-effective overhaul;
- (vi) reasons for making adjustments prior to, during and after assembly;
- (vii) importance of assembling parts and components in accordance with the manufacturers' specifications;
- (viii) tolerances and fits of parts in, on and to components;
- (ix) importance of carrying out adjustments on parts and components during assembly in accordance with manufacturers' specifications;
- (x) reasons for carrying out functional checks on assembled components;
- (xi) responsibilities with regard to statutory regulations.

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

OUTCOME (ELEMENT OF COMPETENCE)

6. POSITION AND SECURE COMPONENTS TO SPECIFICATION

PERFORMANCE CRITERIA

- (a) Oral or written instruction and information given to the candidate are correctly interpreted and implemented.
- (b) Parts and components are positioned to conform with the specification.
- (c) Parts and components are secured to conform with the specification.
- (d) Tools and equipment selected enable the task to be carried out to the specification.
- (e) The cleanliness of the work area is maintained.
- (f) Records are complete, accurate, clear and accessible.
- (g) Work is completed to agreed time schedules.
- (h) Work methods and activities satisfy current legislation.

RANGE STATEMENT

Information sources: manufacturers' technical information; oral or written instructions; operator instruction manual; workshop manuals; technical service bulletin.

Records: company required forms.

Plant and equipment: static plant; wheeled plant; tracked plant; small plant.

Components: power units; transmissions; steering; braking; chassis suspension; mechanical assemblies and sub-assemblies; auto-electrical hardware; electrical cable; hoses; inspection covers; housings; wheels; retaining hardware.

Preparation processes: locating; securing; positioning.

Tools and equipment: hand tools; specialist servicing tools; lifting equipment; power tools.

Location: site; workshop.

Safety: personal protective equipment; manual lifting; 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:

- (i) positioning and securing parts and components on plant and equipment in the range;
- (ii) making adjustments on components to specification.

Oral or written evidence of knowledge and understanding of:

- (i) types and purpose of information sources;
- (ii) purpose of assembling parts and components in accordance with the manufacturers' specifications;
- (iii) methods of securing parts and components on plant and equipment;
- (iv) purpose of positioning and securing parts and components in accordance with the manufacturers' specifications;
- (v) purpose of making adjustments to parts and components in accordance with the manufacturers' specifications;
- (vi) methods of testing parts and components after securing and positioning them;
- (vii) procedures for replenishing and replacing lubricants after positioning and securing components;
- (viii) methods of recording servicing and maintenance tasks;
- (ix) responsibility with regard to statutory regulations.

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

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.

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

UNIT NUMBER 2211163

UNIT TITLE REPAIRING AND OVERHAULING PLANT AND EQUIPMENT

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 40 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 related to repairing and overhauling plant and equipment. It is suitable for operatives working in the construction industry or a service 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 the skills and knowledge necessary to remove and inspect substances, parts and components and to select substances, parts and components for repair and overhaul, thereafter assembling parts to provide components for refitting.

CONTENT/CONTEXT The candidate successfully completing this module will require underpinning knowledge and skills relating to the processes and techniques required for repairing and overhauling plant and equipment including removing substances, parts and components and inspecting for repair and reassembling.

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 repairing and overhauling plant and equipment and is complemented by units dealing with related aspects of work in 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 could 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 III 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 units:

Construction: Plant Maintenance (level III)

2211143	Servicing Plant and Equipment
2211153	Inspecting Plant and Equipment to Identify Defects
2211163	Repairing and Overhauling Plant and Equipment
2211173	Commissioning Plant and Equipment
4120723	Contributing to the Planning, Organisation, Monitoring, Control and Evaluation of Operational Activities
4120733	Maintaining Working Conditions and Operational Activities to Meet Quality Standards (x 0.5)

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'.

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