

**-SQA- SCOTTISH QUALIFICATIONS AUTHORITY**

**NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**

**GENERAL INFORMATION**

-Module Number-           **3150694**   **-Session- 1994-95**  
-Superclass-               **VE**  
-Title-                       **PROTECTION SYSTEMS**

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**-DESCRIPTION-**

**GENERAL COMPETENCE FOR UNIT:** Describing the safety systems applicable to hazardous situations in the industrial environment.

**OUTCOMES**

1. identify the principal factors which lead to the ignition of flammable hazards;
2. describe hazardous areas and methods of providing safe installations for hazardous areas;
3. describe the need for monitoring the presence and levels of non-flammable hazards;
4. describe the need for operating permit to work and shut down systems.

**CREDIT VALUE:** 1 NC Credit

**ACCESS STATEMENT:** A suitable selection of measurement technology modules.

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

Additional copies of this unit may be purchased from SQA (Sales and Despatch section). At the time of publication, the cost is £1.50 (minimum order £5).

**NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION****STATEMENT OF STANDARDS****UNIT NUMBER:** 3150694**UNIT TITLE:** PROTECTION SYSTEMS

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**

1. IDENTIFY THE PRINCIPAL FACTORS WHICH LEAD TO THE IGNITION OF FLAMMABLE HAZARDS

**PERFORMANCE CRITERIA**

- (a) The identification of the essential elements which lead to ignition of a flammable substance is correct.
- (b) The identification of flammable mixtures with respect to concentration in air of particular substances is correct.
- (c) The identification of sources of ignition inherent in hazardous processes is correct.

**RANGE STATEMENT**

Ignition factors: fire triangle; flammable limits; common sources of ignition.

**EVIDENCE REQUIREMENTS**

Written evidence of the ability to identify the principal factors which lead to the ignition of flammable hazards.

**OUTCOME**

2. DESCRIBE HAZARDOUS AREAS AND METHODS OF PROVIDING SAFE INSTALLATIONS FOR HAZARDOUS AREAS

**PERFORMANCE CRITERIA**

- (a) The definition of hazardous zones is correct.
- (b) The description of Ex protection methods is correct.
- (c) The identification of equipment that is suitable for use in a particular hazardous zone is correct.

**RANGE STATEMENT**

The range statement for this outcome is specified within the performance criteria.

**EVIDENCE REQUIREMENTS**

Written evidence of the ability to define hazardous zones, describe 3 different methods of Ex protection and identify the methods as suitable for use in a hazardous area.

**OUTCOME**

3. DESCRIBE THE NEED FOR MONITORING THE PRESENCE AND LEVELS OF NON-FLAMMABLE HAZARDS

**PERFORMANCE CRITERIA**

- (a) The description of the hazards associated with given substances is correct.
- (b) The identification of Occupational Exposure Limits for given substances is correct.

**RANGE STATEMENT**

The range statement for this outcome is specified within the performance criteria.

**EVIDENCE REQUIREMENTS**

Written evidence of the ability to describe the hazards associated with and identify OEL's of 8 substances.

**OUTCOME**

4. DESCRIBE THE NEED FOR OPERATING PERMIT TO WORK AND SHUT DOWN SYSTEMS

**PERFORMANCE CRITERIA**

- (a) The description of the common features of a permit to work system for a given plant is correct.
- (b) The identification of the purpose of a permit to work system for a given plant is correct.
- (c) The description of the common features of a shut down system for a given plant is correct.
- (d) The identification of the purpose of a shut down system for a given plant is correct.

**RANGE STATEMENT**

Permit to work and shut down systems: safety and protection of personnel and plant, minimisation of hazards, compliance with legal requirements.

**EVIDENCE REQUIREMENTS**

Written evidence of the ability to describe the common features and purpose of permit to work systems and shut down systems covering the above ranges.

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**ASSESSMENT**

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 the 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:** 3150694

**UNIT TITLE:** PROTECTION SYSTEMS

**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 module will provide the candidate with a knowledge of protection systems. The module is suitable for candidates following a programme in industrial instrumentation.

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 provide you with a knowledge of the factors which lead to the ignition of flammable hazards. You will also learn about hazardous areas and safety, the monitoring of that and the reasons for operating permit to work and shut down systems.

**CONTENT/CONTEXT** Corresponding to Outcomes 1-4:

1. Definition of: flashpoint, flammable limits, ignition energy, ignition temperature, vapour density, combustion, explosion, pressure piling, detonation.  
  
Effects of: electrical sparks, hot surfaces, friction, impact, vibration, spontaneous chemical combustion.
2. Definition of Zones 0,1 and 2. Gas groupings and temperature ratings. Ex ia, EX s, Ex ib, Ex d, Ex p, Ex e, Ex n, Ex o, Ex q and Ex m. Suitability of each type of equipment for each zone.
3. Monitoring and reporting systems. Safety audits. Definition of Occupational Exposure Limits (OELs). Relevant OEL's for specific industry to be selected from Guidance Note EH40/91 1991 (Health and Safety Document).

4. Shut down systems: protection of personnel, plant, environment.

Common features of shutdown system: sensors; fail safe systems; executive decision making; voting systems; cause and effect.

Common features and a permit to work system: clear procedures; lines of communication; retainment; verification procedures; responsible personnel.

**APPROACHES TO GENERATING EVIDENCE** This module relates to industrial situations and applications difficult to replicate in the real situation. To reduce such constraints case study material should be drawn, where possible, from the industrial background of the candidate.

**ASSESSMENT PROCEDURES** Centres may use the Instruments of Assessment which are considered by tutors/trainers to be most appropriate. Examples of Instruments of Assessment which could be used are as follows:

Outcomes 1-4 It is recommended that an appropriate number of structured questions are set for each outcome.

**PROGRESSION** The candidate could progress onto Higher National units.

**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. Guide to unit writing.
2. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
3. Procedures for special needs statements are set out in SQA's guide 'Students with Special Needs'.
4. Information for centres on SQA's operating procedures is contained in SQA's Guide to Procedures.
5. For details of other SQA publications, please consult SQA's publications list.

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