

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 4250711 **-Session-** 1991-92
-Superclass- TH

-Title- **PLUMBING : HOT WATER SYSTEMS 3 (x¹/₂)**

-DESCRIPTION-

Purpose This module is designed to extend the student's knowledge of hot water supply systems and to introduce the principles of operation of hot water systems for use in non-domestic buildings. It also covers the design requirements necessary to inhibit legionella in water supply systems.

It is aimed at those following a career in plumbing and receiving complementary industrial experience.

Preferred Entry Level 4250681 Plumbing: Hot Water Systems-1 (x 1/2)
4250691 Plumbing: Hot Water Systems-2
4250500 Cold Water Systems 1: Introduction
4250510 Cold Water Systems 2: Contamination and Large Domestic and Commercial/Industrial Systems (x 1/2)

Outcomes: The student should:

1. outline the design features of Hot Water systems for use in non-domestic buildings;
2. outline the design requirements of a hot water system capable of inhibiting legionella.

Assessment Procedures Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified for each Outcome.

The following abbreviations are used below:

PC Performance Criteria
IA Instrument of Assessment

Note: The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory.)

OUTCOME 1**OUTLINE THE DESIGN FEATURES OF HOT WATER SYSTEMS FOR USE IN NON-DOMESTIC BUILDINGS**

PCs

- (a) The pipework layouts drawn are correct in terms of connection to components and appliances and are in accordance with appropriate regulations.
- (b) The identification of the components, pipework and valves is clear and in accordance with accepted terminology.
- (c) The location of the components, pipework and valves is correct in terms of the system performance and in accordance with appropriate regulations.

IA Assignment

The student will be set an assignment consisting of one graphical exercise to test the application of knowledge required to outline the design features of a hot water system for use in non-domestic buildings.

The student will be required to outline the layout for a pump-assisted secondary circulating system of hot water supply.

The student will be provided with an elevational drawing of A3 size of a four storey building. The drawing will detail the position of the storage cistern (roof location) and duplicated hot water storage cylinders/calorifiers (ground floor location). At each floor there should be a minimum of four hot water draw-offs.

The student will be required to complete and annotate the drawing to show the location of the pipework layout, circulating pumps and isolating and flow regulating valves for the situation given.

Satisfactory achievement of the Outcome will be based on the student producing an annotated drawing in accordance with all Performance Criteria.

OUTCOME 2 OUTLINE THE DESIGN REQUIREMENTS OF A HOT WATER SYSTEM CAPABLE OF INHIBITING LEGIONELLA

- PCs (a) The outlined installation requirements are correct in terms of:
- (i) prevention of water stagnation in pipework;
 - (ii) prevention of water stagnation in storage vessels;
 - (iii) stored water temperatures;
 - (iv) maintaining water temperature at terminal fitting inlets;
 - (v) identified risk areas.

IA Assignment

The student will be set an assignment consisting of the production of a fully detailed drawing to test the application of knowledge required to outline the design requirements of a hot water system capable of inhibiting legionella.

The student will be provided with an elevational drawing of A4 size of a building with the position of sanitary appliances and hot and cold water storage vessels indicated. The sketch must include:

- (a) a range of three wash basins;
- (b) a range of three thermostatically controlled showers.

The student will be required to complete and fully annotate the drawing. In addition, the student will be required to state the recommended storage temperatures for hot and cold water and to identify the areas in the system which can be classified as having a higher than normal risk of legionella contamination.

Satisfactory achievement of the Outcome will be based on the student producing an annotated diagram in accordance with all Performance Criteria.

**The following sections of the descriptor are offered as guidance.
They are not mandatory.**

CONTENT/CONTEXT

Corresponding to Outcomes 1-2:

1. Pipework arrangements for vertical and horizontal cylinders/calorifiers. Duplicate arrangement of cylinders. Secondary circuit circulating pumps, duty and standby. Circulating pump locations. Types of secondary flow and return circuit layouts. Means of maintaining secondary flow temperature (eg. self-regulating heating tape). Types of valves for isolating and regulating flow in secondary circuits. Provisions for accommodating pipework expansion, location of anchor points. Large diameter pipework support and jointing methods. Pipework insulating materials.
2. Causes and main sources of legionella infection in hot and cold water storage systems. Special risks associated with terminal fittings, drain points, pipework connections to storage vessels, appliances left unused for periods of time.

Design and installation precautions necessary to limit risk of legionella infection - prevention of stagnant water conditions in pipework and hot and cold storage vessels, prevention of deadlegs, capacities of storage vessels, recommended storage temperatures for water in hot and cold storage vessels, means of maintenance of storage temperatures, water temperature at terminal fittings, drainage requirements for pipework and storage vessels.

Sketching and annotating hot and cold water systems; incorporating recommendations designed to limit risk of legionella infection. Identification of risk areas in systems.

Flushing, cleaning and sterilisation of systems prior to use, periodic maintenance and sterilisation requirements for systems. Precautions to be observed prior to use of systems in buildings or areas of buildings which have been unoccupied for periods of time.

SUGGESTED LEARNING AND TEACHING APPROACHES

This module is essentially classroom based where students should be encouraged through group discussion and debate to look at the implications of plumbing design in relation to hot water supply for non-domestic buildings.

Case studies may prove beneficial in determining correct design features for potentially identified problem areas.

Adequate opportunity should also be given to enable students to sketch and identify components and pipework.

Text books, Institute of Plumbing Design Guide, magazine articles, handouts, worksheets and Overhead Projector transparencies could all be used to advantage.

It is recommended that reference be made to I.O.P Legionnaires' Disease Good Practice Guide for Plumbers.

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