

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
24 Douglas Street
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0075065 -Session-1987-88

-Superclass- XH

-Title- HEATING AND PROCESS PIPE SIZING

-DESCRIPTION-

Type and Purpose A specialist module which enables the student to gain a basic knowledge of heating and process pipe sizing.

Preferred Entry Level 64001 Introduction to Fundamentals of Technology.
or
75063 Heating and Ventilating: Services Provision.

Learning Outcomes The student should:

1. know the principles and layouts of hot water supply systems;
2. know the factors associated with the supply and storage of domestic hot water;
3. size domestic hot water service flow and return circulation pipes;
4. size low pressure hot water pipes for heating systems;
5. size steam and condensate pipes.

Content/Context Corresponding to Learning Outcomes 1-5:

1. Hot water supply systems: primary circulation, direct and indirect hot water service systems, secondary circulation, recommended hot water storage temperatures and temperature at appliances such as baths and showers and methods of obtaining such temperatures.

2. Supply and storage of domestic hot water: choice of systems, secondary pipework, reheat cycles, size of indirect storage cylinder, size of cold water storage tank, use of CIBSE Guide, 'dead-leg' system, pumped and gravity secondary circulation, type of pump, pump position and arrangements for secondary circulation.
3. Sizing hot water services flow and return circulation pipes: probability theory relating to maximum simultaneous demand applied to simple layout, demand units for a given hot water service system, outflow quantities and pressures, pipe sizes, return pipe sizes, calculation of pump duty.
4. Determination of the diameter of low pressure hot water pipes: required mass flow rate, available pressure, systems resistance and circuit pressure drop, the index circuit, equivalent length of index circuit allowing for pipe fittings, pump duty required.
5. Determination of the diameter of steam and condensate pipes: use of pressure loss and velocity methods for pipe sizing. Mass flow rates for steam and condensate pipes, selection of steam and condensate pipe sizes from tables.

Suggested
Learning and
Teaching
Approaches

The module activities should be experienced in an environment appropriate to the learning outcomes.

A systems approach is essential in the study of practical hardware.

The appropriate CIBSE Guides should be made available to students.

Visits to appropriate building sites would be worthwhile.

Units and terminology should be presented in context throughout the module.

Assessment
Procedures

Acceptable performance in the module will be satisfactory achievement of the performance criteria specified for each learning outcome. student is required to:

- (a) describe the primary circulation, pumped and gravity, between the heat source and storage cylinder;

- (b) sketch one direct and one indirect hot water service cylinder and the corresponding hot water service system;
- (c) state two reasons for secondary circulation;
- (d) state recommended temperatures of:
 - (i) storage hot water;
 - (ii) water at appliances such as baths and showers.

Where the instrument of assessment is a calculation and the student does not solve it correctly, credit should be given for an appreciation of the correct method of calculation and for any correct sections of the calculation.

Where cutting scores are stated these are intended to be for guidance. The precise cutting score for a test will depend on the difficulty of the test and will have to be decided by the tutor aided by the Assessor.

The following abbreviations are used below:

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|----|--------------------------|
| LO | Learning Outcome |
| IA | Instrument of Assessment |
| PC | Performance Criteria |
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|-----|----|--|
| LO1 | IA | Written and sketching exercise in which the student should describe two methods of obtaining these temperatures. |
| | PC | The student's description and sketches should include all requisite components and fittings for a working system. |
| LO2 | IA | Written exercise in which the student is required to: <ul style="list-style-type: none"> (a) list the factors which affect consumption and choice of system; (b) identify secondary pipework and give examples of reheat cycles for storage purposes; (c) describe methods of sizing the indirect storage cylinder and the cold water storage tank with reference to the CIBSE Guide; |

- (d) state the type of pump used for secondary circulation;
- (e) state alternative pump positions and arrangements for secondary circulation.

PC Cutting Score 80%.

LO3 IA Calculations exercise in which the student is presented with a system and is required to:

- (a) apply the equation for maximum simultaneous demand to a simple layout;
- (b) apply the system of demand units for a given hot water service system;
- (c) determine the outflow rates and the pressure at outflows;
- (d) determine flow pipe sizes, hot water services return pipe diameter and pump duty.

PC Cutting Score 70%.

LO4 IA (1) Short written exercise in which the student is required to define the terms:

- (i) available pressure;
- (ii) system resistance;
- (iii) circuit pressure drop.

PC All terms should be correctly and fully described.

IA (2) Calculations exercise in which the student for a given system, is required to:

- (a) determine mass flow rate for a given heat load;
- (b) calculate equivalent length of index circuit on a percentage basis;
- (c) determine the pump duty.

PC Cutting Score 70%.

LO5 IA Calculations exercise in which the student, for a given system, is required to:

- (a) calculate mass flow rates and actual pressure drop rates for each section;
- (b) determine pipe sizes using tables and CIBSE recommendations for condensate pipe sizing.

PC Cutting Score 70%.

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