



## F9H5 04 – Install and Commission Hot and Cold Water Systems

This Unit comprises of the following  
National Occupational Standards (NOS)

# SUMMES8 (SQA Unit Code - F9H5 04)

## Identify systems, equipment and components



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### Overview

This unit is about dealing with a customer identifying their requirements and providing commercially acceptable solutions to them. It covers making changes and alterations required by the customer throughout the work.

It is about assessing the implications, impact and feasibility of alterations and changes to the system.

This unit is also about recognising when variations to the work programme are necessary and knowing how to go about agreeing these, and the relevant people with which to liaise.

# SUMMES8 (SQA Unit Code - F9H5 04)

## Identify systems, equipment and components

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### Performance criteria

*You must be able to:*

- P1 identify and record the customer job requirements
- P2 obtain and record information on the work location and features
- P3 identify any areas of the proposed system or components where compliance with industry requirements is necessary
- P4 identify alternative system options, including environmental technologies, and taking into consideration factors such as efficiency (e.g. energy or water)
- P5 explain clearly to relevant people system options which meet identified requirements and those which offer additional benefits such as energy or water efficiency
- P6 obtain customer agreement to the proposal
- P7 carry out and apply relevant calculations to determine system component requirements
- P8 present the system proposal in a manner which enables customer agreement
- P9 confirm that the completed system meets requirements
- P10 inform the relevant person(s) immediately when changes are necessary before work can commence
- P11 record and agree with the relevant person, necessary changes to the work that have cost implications and act on those changes as appropriate

## SUMMES8 (SQA Unit Code - F9H5 04)

### Identify systems, equipment and components

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#### Knowledge and understanding

*You need to know and understand:*

- K1 how to obtain information from site drawings and plans
- K2 how to carry out a review of the location
- K3 the range of documentation detailing industry requirements
- K4 how to identify possible proposals which meet the following: customer requirements, site structures and features, and industry requirements
- K5 the range of environmentally friendly materials, products, procedures and energy saving devices applicable to their work and the benefits of their use
- K6 how to obtain agreement from the customer to progress a selected system proposal
- K7 the range of job information that is required to develop proposals for work on new buildings and existing properties
- K8 positioning requirements for components within systems and standard system layouts
- K9 how to calculate the requirements of system components – size and specification
- K10 methods of presenting information to customers through the use of drawings, specifications and quotations
- K11 the authority and organisational procedures at the site relevant to work plans and changes to the work plans
- K12 how to negotiate variations to work programmes, under what circumstances this might be necessary and the need to obtain written acceptance to major work or material variations and the organisational requirements for reporting changes

## SUMMES8 (SQA Unit Code - F9H5 04)

Identify systems, equipment and components

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** customer requirements, alterations

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# SUMMES10 (SQA Unit Code - F9H5 04)

## Install plumbing systems, equipment and components



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### Overview

This is about installing plumbing systems and components.

It covers fabricating sections of pipework using the practical skills required by the different materials and systems and measuring work situations to find the lengths and angles of pipe sections required. It is also about installing and checking pipework and other components and applying soundness tests to systems to ensure that there are no leaks.

# SUMMES10 (SQA Unit Code - F9H5 04)

## Install plumbing systems, equipment and components

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### Performance criteria

*You must be able to:*

- P1 confirm that the materials, tools and equipment required for the installation processes are fit for their intended purpose
- P2 fabricate system components using work methods that conform to industry requirements
- P3 position system components to conform to the system design requirement
- P4 fix system components using methods that conform to industry requirements
- P5 connect system components to systems and input services using methods that meet industry requirements
- P6 carry out the installation processes minimising damage to customer property and building features
- P7 report to the immediate job supervisor, line manager, or customer, circumstances that affect the progress of the installation
- P8 confirm the integrity of the installed system using soundness testing procedures
- P9 take precautionary actions to prevent the unauthorised use of uncommissioned systems and components

# SUMMES10 (SQA Unit Code - F9H5 04)

## Install plumbing systems, equipment and components

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### Knowledge and understanding

*You need to know and understand:*

- K1 how to measure and record installation and site details for prefabrication purposes
- K2 the industry practices and work standards for fabricating and installing system components
- K3 the positioning and fixing requirements for system components to conform to the system design and intended functions
- K4 the procedures required for connecting to input services or connecting pipework into existing systems
- K5 methods of working which protect the building décor, customer property and existing systems or components
- K6 job management structures and methods of reporting and recording job progress or problems delaying progress
- K7 the care and maintenance requirements of tools and equipment, and checks for safe condition
- K8 the range of tests used to confirm the soundness of systems and components and how to use the range of soundness test equipment



## **SUMMES10 (SQA Unit Code - F9H5 04)**

Install plumbing systems, equipment and components

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**Original URN** M10

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** installing, checking pipework and other components

# SUMMES12 (SQA Unit Code - F9H5 04)

## Service and maintain mechanical systems, equipment and components



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### Overview

This unit is about what is required to service and maintain a range of systems and components in order to satisfy industry requirements.

The person carrying out this work must be able to undertake servicing of appliances for the different systems

They are expected to establish the service and maintenance requirements for the systems and components and carry out service and maintenance of systems and components.

They must be able to service and maintain a range of systems and components, follow instructions and job information, and complete accurate service and maintenance records and schedules.

# SUMMES12 (SQA Unit Code - F9H5 04)

Service and maintain mechanical systems, equipment and components

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## Performance criteria

*You must be able to:*

- P1 carry out service and maintenance activities using procedures which comply with industry requirements
- P2 service and maintain system components to ensure continued effective operation of the system
- P3 complete records to provide an accurate history of the service and maintenance of system components

# SUMMES12 (SQA Unit Code - F9H5 04)

## Service and maintain mechanical systems, equipment and components

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### Knowledge and understanding

*You need to know and understand:*

- K1 how to use performance specifications for systems and components, and maintenance procedures necessary to restore or maintain the continued performance of systems and components
- K2 the maintenance procedures necessary to ensure compliance with industry requirements for routine and non-routine service and maintenance activities
- K3 how to complete records and reports of the maintenance of systems and components
- K4 the action to take when the system or component does not work to full performance specification

## SUMMES12 (SQA Unit Code - F9H5 04)

Service and maintain mechanical systems, equipment and components

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** Servicing of appliances for different systems

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# SUMMES13 (SQA Unit Code - F9H5 04)

## Decommission plumbing systems, equipment and components



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### Overview

This unit is about de-commissioning plumbing systems and components.

The person carrying out this work must ensure that the appropriate persons are advised of the intention to take the system out of use, and that these persons are advised when the de-commissioning has been completed.

Precautions should be taken to prevent the system or component accidentally being re-activated while de-commissioning is taking place, or while work operations are being carried out.

They must know the layouts of systems and components in order that they can establish the affects of de-commissioning on the activities of other persons and so that notices can be placed at appropriate points to advise that the system is out of use.

They must be able to prove that they are able to safely isolate systems from supplies, and to carry out checks to ensure that the system is safe before proceeding with de-commissioning, or with any work for which the system is being shut down.

Certain systems may contain substances e.g. inhibitors, which could be harmful to health or the environment, and it is important that the person carrying out this work knows how to safely collect and dispose of these.

# SUMMES13 (SQA Unit Code - F9H5 04)

## Decommission plumbing systems, equipment and components

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### Performance criteria

*You must be able to:*

- P1 liaise with other persons at appropriate points within the de-commissioning process to minimise disturbance to work routines
- P2 check that conditions within the system will permit safe de-commissioning
- P3 decommission systems or components using tests and procedures, which comply with industry requirements
- P4 take precautionary actions to ensure that de-commissioned systems or components do not prove a safety hazard

# SUMMES13 (SQA Unit Code - F9H5 04)

## Decommission plumbing systems, equipment and components

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### Knowledge and understanding

*You need to know and understand:*

- K1 the importance of confirming the system design, specification, functions and outcomes of suspending the operation of the system
- K2 the need to liaise with others whose procedures or routines may be affected by the suspension of the system operation
- K3 the potential hazards that could arise from de-commissioning activities and the checks to be carried out before de-commissioning takes place
- K4 the de-commissioning procedures for temporary and permanent de-commissioning of systems
- K5 the precautions to ensure that de-commissioned systems do not prove a safety hazard –measures to prevent systems being brought into operation – safety and warning notices
- K6 how to safely collect and dispose of system contents that may be hazardous to health or the environment
- K7 how to complete systems de-commissioning records



## SUMMES13 (SQA Unit Code - F9H5 04)

Decommission plumbing systems, equipment and components

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** advising of intention & completion

## SUMMES14 (SQA Unit Code - F9H5 04)

Identify faults in plumbing systems, equipment and components



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### Overview

This unit covers the key areas of maintenance work involving diagnosing the cause of faults in water systems and components. Diagnostic requirements in this unit apply only to system components such as: pipe materials, taps, float valves, isolation valves, shower valves and pumps. It does not include appliances.

The person carrying out this work should be able to locate simple faults in the system or component performance.

## SUMMES14 (SQA Unit Code - F9H5 04)

Identify faults in plumbing systems, equipment and components

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### Performance criteria

- You must be able to:*
- P1 obtain clear and detailed information about the reported faults including any components which need to be replaced
  - P2 advise the relevant people clearly and accurately about the potential disruption and consequences of carrying out a diagnosis of faults
  - P3 locate faults in systems or system components using procedures that comply with industry requirements
  - P4 report to the relevant person diagnosed faults in systems and components
  - P5 liaise with other persons to agree fault rectification procedures which will minimise disruption to work routines

## SUMMES14 (SQA Unit Code - F9H5 04)

### Identify faults in plumbing systems, equipment and components

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#### Knowledge and understanding

*You need to know and understand:*

- K1 the necessary information for carrying out a successful fault diagnosis
- K2 how to interpret information on system or component performance, including advice from users, visual inspections or checks or diagnosis tests to locate faults
- K3 the potential disruption and consequences of carrying out a diagnosis of faults
- K4 how to liaise with others to ensure co-operation in the fault diagnosis process
- K5 the work action and sequences required to diagnose faults in systems and components
- K6 the measures to ensure that systems do not present a safety hazard to potential users, or the workforce, when carrying out diagnosis procedures
- K7 how to isolate unsafe systems and components
- K8 the procedures for reporting diagnosed faults in systems and components

## SUMMES14 (SQA Unit Code - F9H5 04)

Identify faults in plumbing systems, equipment and components

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<b>Relevant occupations</b>	Building and construction; Skilled Trades Occupations; Construction and Building Trades nec
<b>Suite</b>	Mechanical Engineering Services; Building Maintenance Multi-trade Repair and Refurbishment Operations
<b>Key words</b>	diagnose faults, pipe & fittings

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# SUMMES15 (SQA Unit Code - F9H5 04)

## Rectify faults in plumbing systems, equipment and components



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### Overview

This unit is about rectifying faults that have been diagnosed in water systems. The rectification requirements of this unit apply to system components such as: pipe materials, taps, float valves, isolation valves, shower valves, pumps, boilers, and control components.

The person carrying out the work should be able to determine the information required, (which may be verbal instructions), and the people who need to be kept informed during the work activities.

They should be able to rectify faults and restore the system or component performance to specification.

## SUMMES15 (SQA Unit Code - F9H5 04)

### Rectify faults in plumbing systems, equipment and components

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#### Performance criteria

*You must be able to:*

- P1 rectify faults in systems to restore the system or component function to performance specification
- P2 take precautionary actions to prevent the unauthorised use of unsafe systems or components

# SUMMES15 (SQA Unit Code - F9H5 04)

## Rectify faults in plumbing systems, equipment and components

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### Knowledge and understanding

*You need to know and understand:*

- K1 how to interpret information on system or component performance, including advice from users, visual inspections or checks or diagnosis tests to locate faults
- K2 the work procedures for the rectification of faults in systems or components which will ensure minimum disruption to customers and routines
- K3 how to liaise with others to ensure co-operation in the fault rectification process
- K4 the work action and sequences required to rectify faults in systems and components
- K5 the measures to ensure that systems do not present a safety hazard to potential users, or the workforce, when carrying out rectification procedures
- K6 the actions to be taken when the system or component cannot be restored to full performance
- K7 how to isolate unsafe systems and components



## SUMMES15 (SQA Unit Code - F9H5 04)

Rectify faults in plumbing systems, equipment and components

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**Suite** Mechanical Engineering Services; Building Maintenance Multi-trade Repair and Refurbishment Operations;

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**Key words** Rectification, components

# SUMMES25 (SQA Unit Code - F9H5 04)

## Inspect and test mechanical systems, equipment and components



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### Overview

This unit is about carrying out pre-commissioning checks and tests on systems.

The person carrying out the work must be able to undertake the various checks and tests necessary before the system is brought into operation.

They are required to check the operation and correct position of components. They must also carry out tests to ensure there are no leaks and undertake cleaning or flushing of the system.

In the case of ductwork, there is a specified, permissible level of air leakage.

It is important that they are aware of the effect that isolating part of a system has on the full system.

# SUMMES25 (SQA Unit Code - F9H5 04)

## Inspect and test mechanical systems, equipment and components

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### Performance criteria

- You must be able to:*
- P1 confirm that the system or components installation complies with industry requirements
  - P2 check that input services to the system components are suited to their intended purpose
  - P3 check system or components for soundness using procedures that comply with industry
  - P4 carry out pre-commissioning tests and checks in accordance with industry requirements
  - P5 check that the system cleanliness, additives and charging comply with industry

# SUMMES25 (SQA Unit Code - F9H5 04)

## Inspect and test mechanical systems, equipment and components

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### Knowledge and understanding

*You need to know and understand:*

- K1 the procedures, equipment and legislative requirements for applying specified tests to systems
- K2 the methods of establishing that input services adequately supply all components within the system
- K3 the methods of connecting components to systems
- K4 the actions to take where pre-commissioning checks or tests reveal basic or complex system or component defects
- K5 how to complete pre-commissioning documentation confirming the safe pre-commissioning of systems and components

## SUMMES25 (SQA Unit Code - F9H5 04)

Inspect and test mechanical systems, equipment and components

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** pre-commissioning check, clean & flush, leaks

# SUMMES27 (SQA Unit Code - F9H5 04)

## Commission mechanical systems



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### Overview

This unit is about commission systems following the appropriate pre-commissioning tests and checks being carried out.

It is about bringing the system into operation and ensuring it operates effectively as intended.

The person carrying out this work is required to check that components are installed correctly, ensure there are no leaks and undertake cleaning and flushing.

For ductwork there is a specified permissible level of air leakage. It is not intended that they meet the demands of commissioning specialists. As a guide, they should be able to operate on heating systems with an input of up to 60kW for domestic installation and 150kW for industrial and commercial.

It is important that they are aware of the effect that isolating part of a system has on the full system.

# SUMMES27 (SQA Unit Code - F9H5 04)

## Commission mechanical systems

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### Performance criteria

- You must be able to:*
- P1 ensure that the necessary information on the system or component performance is available
  - P2 liaise with other persons at appropriate points within the commissioning process to minimise disturbance to work routines
  - P3 check the correct function of systems or components against performance requirements
  - P4 adjust system controls to establish that system components meet design specification
  - P5 provide the customer with information necessary to the continuing operation of the system or component

# SUMMES27 (SQA Unit Code - F9H5 04)

## Commission mechanical systems

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### Knowledge and understanding

*You need to know and understand:*

- K1 the sources of information on the performance of systems or components
- K2 the procedures for establishing correct system or component performance and checking against the job specification
- K3 the routines and sequences for commissioning systems or components
- K4 the points in the commissioning process where co-operation and liaison with other trades and customers may be required
- K5 where to access user information appropriate to different systems and components
- K6 how to complete commissioning documentation confirming the safe commissioning of systems and components
- K7 system handover procedures and demonstrating the operation of systems and components to end-users
- K8 the actions to take when components being commissioned do not meet performance requirements



# SUMMES27 (SQA Unit Code - F9H5 04)

## Commission mechanical systems

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**Relevant occupations** Building and construction; Skilled Trades Occupations

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**Suite** Mechanical Engineering Services

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**Key words** commission, test, clean & flush