Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-20)

Candidate performance evidence logbook

600/1806/9

www.cityandguilds.com
February 2014
Version 2.0

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Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-20)

Candidate performance evidence logbook

www.cityandguilds.com
February 2012
Version 1.0

Qualification title	Number	QAN
Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation	6188-20	600/1806/9

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1 About your candidate logbook

1.1 Contact details

Candidate name	
Candidate enrolment no	
Centre name	
Centre number	
Programme start date	
Date of registration with City & Guilds	

Keep a record of relevant contact details in the space provided below. You may find it helpful to make a note of phone numbers and e-mail addresses here.

Your Assessor(s)	
Your Internal Verifier	
Quality Assurance Contact	

1 About your candidate logbook

1.2 Introduction to the logbook

This logbook will help you complete the units, which are assessed by your performance at work, in the City & Guilds' **Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-20)**. It contains forms you can use to record your evidence of what you have done.

About City & Guilds

City & Guilds is your awarding body for this qualification. City & Guilds is the UK's leading awarding body for vocational qualifications.

Information about City & Guilds and our qualifications is available on our website **www.cityandguilds.com**.

2 The assessment process

The following people at your centre will explain the assessment process and help you achieve your unit(s).

The assessor/tutor
The assessor/tutor is the person you will have the most contact with as you work towards your unit(s). You may have more than one assessor/tutor depending on which unit(s) you take or you may be assessed by a person who is not your tutor.

The internal verifier
The internal verifier maintains the quality of assessment within the centre.

The external verifier
The external verifier works for City & Guilds and helps to ensure that your centre meets the required standards for quality and assessment.

3 Using your logbook

Recording forms

This logbook contains all of the forms you and your assessor will need to plan, review and organise your evidence. Your assessor will be able to help you decide which forms you need to complete and help you fill them in.

Please photocopy these forms as required.

4 Qualification structures

To achieve the **Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-20)**, learners must achieve **81** credits from the 11 mandatory units (201-205, 208-210 and 228-230).
Learners can also take additional units from the elective units (223-227 and 231) but they will not be counted towards the minimum credit required for achievement of this qualification.
This Logbook includes only those units assessed by performance in the workplace (marked with an *).

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	GLH
J/602/2479	201	Understand and carry out safe working practices in building services engineering	10	88
J/602/2482	202	Understand how to communicate with others within building services engineering	3	28
D/602/2486	203	Understand how to apply environmental protection measures within BSE	4	38
J/602/2496	204	Understand how to apply scientific principles within MES	7	66
A/602/2768	205	Understand and carry out site preparation and pipework fabrication techniques for industrial and commercial systems	40	356
M/602/2735	208	Understand industrial and commercial heating system installation techniques	3	28
F/602/2738	209	Understand industrial and commercial chilled water system installation techniques	3	28
T/602/2493	*210	Apply safe working practices in building services engineering working environment	2	4
K/602/2751	223	Understand industrial and commercial warm air heating installation techniques	2	18
F/602/2755	224	Understand industrial and commercial compressed air system installation techniques	3	28
D/602/2780	*225	Install industrial and commercial fire protection systems	2	4
K/602/2782	*226	Install warm air heating systems	2	4
A/602/2785	*227	Install industrial and commercial compressed air systems	2	4
Y/602/2728	228	Understand industrial and commercial cold water system installation techniques	3	28
H/602/2733	229	Understand industrial and commercial hot water system installation techniques	3	28

Y/602/2776	*230	Install industrial and commercial heating and ventilating systems	3	4
J/602/2949	231	Understand industrial and commercial fire protection system installation techniques	2	18

5 Overall Unit Sign-off

The following portfolio units are included in the rules of combination for the **Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-20).** Learners **must** achieve units 210 and 230 to achieve the qualification. Additional units 225-227 may also be taken.

City & Guilds unit	Unit title	Unit Achieved Yes/No	Assessor Initials	Date
210	Apply safe working practices in building services engineering working environment			
225	Install industrial and commercial fire protection systems			
226	Install warm air heating systems			
227	Install industrial and commercial compressed air systems			
230	Install industrial and commercial heating and ventilation systems			

Declaration

I confirm that the evidence supplied for the above selected units is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of the selected units with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

Unit 210 Apply safe working practices in building services engineering working environment

Level: 2
Credit value: 2
UAN: T/602/2493

Outcome 1	**Be able to demonstrate personal health and safety precautions in the workplace**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	demonstrate that appropriate personal protective equipment is used throughout work activities			
2	ensure that health & safety precautions are in place:			
	• first aid kit provision			
	• fire extinguisher provision			
3	demonstrate safe manual lifting techniques.			

Outcome 2	**Be able to prepare and use access equipment in the workplace**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	use risk assessments to identify safe methods of working at height			
2	check access equipment for safe condition prior to use			
3	perform the safe erection of access equipment			
4	demonstrate the safe use of access equipment.			

Outcome 3	**Be able to check that the work area is safe in order to carry out work**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	carry out a check of the work location for health and safety hazards			
2	verify that access and exit routes to and from the immediate work location are safe and free from obstructions			
3	demonstrate safe working practices when working with heat producing equipment.			

Outcome 4	**Be able to liaise with those responsible for health and safety in the workplace**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	demonstrate methods of recording accidents in the accident book in accordance with company procedures			
2	demonstrate methods of reporting hazards and accidents in accordance with company procedures.			

Unit 210 Apply safe working practices in building services engineering working environment

Declaration

I confirm that the evidence supplied for this unit is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of this unit with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

Unit 225 Install industrial and commercial fire protection systems

Level: 2
Credit value: 2
UAN: D/602/2780

Outcome 1	**Be able to complete preparation work for fire protection installation activities**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	check the work location and report factors that will impact on the work to the supervisor or line manager			
2	source appropriate job information and documentation for the following system installation including **two** of the following:			
	• sprinklers:			
	- wet			
	- dry			
	- alternate wet and dry			
	• hose reel:			
	- wet riser			
	• dry riser			
	• foam installations			
	• gas extinguishers			
	• carbon dioxide			
3	use job information and documentation to ensure that the following is fit for purpose:			
	• equipment			
	• tools			
4	identify the points in the work process where liaison with other persons may be necessary:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			
5	demonstrate that job information on key aspects of the work has been issued to relevant people including user instructions or manufacturer's instructions			

6	demonstrate that authorisation has been obtained from the relevant person(s) prior to commencement of the work, from at least one from the following:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			
7	note any pre work damage or defects to existing equipment or building features should it exist, and report to job supervisor or line manager			
8	demonstrate that suitable personal protective equipment has been worn throughout the duration of work preparation activities			
9	check that the materials needed to complete the job are free from damage and report any defects to a supervisor or line manager, including copper pipe and low carbon steel			
10	complete preparatory work for the installation of fire protection systems, to include:			
	• use of material and equipment requisites where appropriate			
	• confirmation that the selection of material, equipment and components are compatible to the installation			
	• confirmation that the work location is ready for installation activities			
	• confirmation of secure site storage for tools, equipment, materials and components			
	• confirmation of suitable access equipment			
	• confirmation of suitable lifting equipment where required.			

Outcome 2	**Be able to install industrial and commercial fire protection systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	confirm job information appropriate to the installation process is available			
2	demonstrate that materials, tools and equipment necessary for the installation of fire protection systems:			
	• are available as required			
	• are safely and securely stored			
	• meet industry requirements			
	• are fit for intended purpose			
3	fabricate and install pipework materials including **all** of the following:			
	• copper pipe			
	• low carbon steel			
	for **two** of the following systems:			
	• sprinklers			
	• hose reel			
	• dry riser			
4	complete jointing of system pipework using:			
	• compression			
	• threaded			
	• grooved			
	• flanges			
	• soft soldering			
5	position and fix:			
	all of the following appliances:			
	• hose reels			
	• breeching valves			
	• landing valves			
	three of the following components:			
	• storage cisterns			
	• appliance control valve or tap, terminal fittings			
	• automatic air valves			
	• stop valves			
	• float operated valves			
	• single and double check valves			
	• gate valves			

	• service valves			
	• drain taps			
	• sprinkler heads			
	• pumps			
	• pressure vessels			
6	position and fix appropriate brackets for systems installations pipework for:			
	• horizontally mounted pipework			
	• vertically mounted pipework			
	in pipework materials which include **all** of the following:			
	• copper pipe			
	• low carbon steel			
7	perform pipework connections to **two** of the following:			
	• mains			
	• risers			
	• fire fighting equipment, including hose reels			
	• fire alarm systems			
8	demonstrate that all aspects of the installation process conform to industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
9	apply methods of working to ensure that any damage to customer/client property and building features is avoided during work activities			
10	report problems which may affect the progress of the installation, to the immediate job supervisor, line manager or customer.			

Outcome 3	**Be able to complete soundness tests on industrial and commercial fire protection systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	conduct visual inspections of the following fire protection systems and confirm compliance with industry requirements:			
	• sprinklers			
	• hose reel			
	• dry riser			
2	confirm that the fire protection system is ready to receive soundness tests to cover:			
	• pipework			
	• appliances			
	• components			
3	perform procedures for:			
	• cleaning			
	• flushing			
	• charging systems in accordance with industry requirements			
4	conduct procedures for establishing that input services to the system components are suited to the intended purpose for **two** of the following systems:			
	• sprinklers: - wet			
	- dry			
	- alternate wet and dry			
	• hose reel: - wet riser			
	• dry riser			
	• foam installations			
5	apply a soundness test to **one** of the following in accordance with appropriate industry standards, guides and good practice guides:			
	• sprinklers			
	• hose reel			
	• dry riser			
6	conduct pre-commissioning tests and checks in accordance with appropriate industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			

7	conduct checks to confirm:			
	• system cleanliness			
	• system is charged			
	• un-commissioned systems and components cannot be activated.			

Outcome 4	**Be able to decommission industrial and commercial fire protection systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	verify that decommissioning processes minimise disturbance to work routines			
2	conduct decommissioning of systems and components which comply with industry requirements, **one** of the following:			
	• sprinklers			
	• hose reel			
	• dry riser			
3	conduct decommissioning of systems or components which comply with industry requirements including **one** from the following:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
4	verify that the decommissioning procedures carried out prevent the inadvertent operation of the installed system through:			
	• temporary capping of pipework sections			
	• use of safety and warning notices			
5	verify that decommissioned systems and components are left safe, in line with industry requirements.			

Unit 225 Install industrial and commercial fire protection systems

Declaration

I confirm that the evidence supplied for this unit is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of this unit with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

Unit 226 Install warm air heating systems

Level: 2
Credit value: 2
UAN: K/602/2782

Outcome 1	**Be able to complete preparation work for warm air heating installation activities**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	check the work location and report factors that will impact on the work to the supervisor or line manager			
2	source appropriate job information and documentation for the following system installation including **two** of the following:			
	• tempered air supply ventilation			
	• fan coil units			
	• direct fired warm air heaters			
	• ducted distribution systems			
3	use job information and documentation to ensure that the following are fit for purpose:			
	• equipment			
	• tools			
4	identify the points in the work process where liaison with other persons may be necessary:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			
5	demonstrate that job information on key aspects of the work has been issued to relevant people including user instructions or manufacturer's instructions			
6	demonstrate that authorisation has been obtained from the relevant person(s) prior to commencement of the work from **at least one** from the following:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			

7	note any pre work damage or defects to existing equipment or building features, should it exist, and report to job supervisor or line manager			
8	demonstrate that suitable personal protective equipment has been worn throughout the duration of work preparation activities			
9	check that the materials / components needed to complete the job are of the correct quantity and are free from damage and report any defects to a supervisor or line manager, from materials/components used for warm air system installation activities including **all** of the following:			
	• diffusers			
	• mechanical and thermostatic controls			
10	complete preparatory work for the installation of warm air heating systems, to include:			
	• use of material and equipment requisites where appropriate			
	• confirmation that the selection of material, equipment and components are compatible to the installation			
	• confirmation that the work location is ready for installation activities			
	• confirmation of secure site storage for tools, equipment , materials and components			
	• confirmation of suitable access equipment			
	• confirmation of suitable lifting equipment where required.			

Outcome 2	**Be able to install industrial and commercial warm air heating systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	confirm job information appropriate to the installation process is available			
2	demonstrate that materials, tools and equipment necessary for the installation of warm air heating systems are:			
	• available as required			
	• safely and securely stored			
	• meet industry requirements			
	• fit for intended purpose			
3	fabricate and install pipework materials including **all** of the following:			
	• copper			
	• stainless steel			
	• low carbon steel			
	• mechanical controls			
	from **two** of the following systems:			
	• tempered air supply ventilation			
	• fan coil units			
	• direct fired warm air heaters			
	• ducted distribution systems			
4	complete jointing of system pipework using:			
	• compression			
	• threaded			
	• grooved			
	• flanges			
	• soft soldering			
5	position and fix **one** of the following appliances:			
	• ducted warm air heater unit			
	• direct fired warm air heaters			
	• heating source:			
	- gas			
	- low temperature hot water			
	one of the following components:			
	• ductwork sections, rectangular and circular, angles and elbows			
	• diffusers			
	• mechanical and electrical time and thermostatic controls			

6	position and fix appropriate brackets for systems installations for:			
	• horizontally mounted pipework			
	• vertically mounted pipework			
	in materials, which include **all** of the following:			
	• low carbon steel			
	• stainless steel			
	• copper			
7	perform connections to:			
	• low temperature hot water			
	• gas supply			
8	demonstrate that all aspects of the installation process conform with industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
9	apply methods of working to ensure that any damage to customer/client property and building features is avoided during work activities			
10	report problems which may affect the progress of the installation, to the immediate job supervisor, line manager or customer.			

Outcome 3	**Be able to soundness test industrial and commercial warm air heating systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	conduct visual inspections for **all** of the following warm air heating systems and confirm compliance with industry requirements:			
	• tempered air supply ventilation			
	• fan coil units			
	• direct fired warm air heaters			
	• ducted distribution systems			
2	confirm that the warm air heating system is ready to receive soundness tests to cover:			
	• pipework			
	• appliances			
	• components			
3	perform procedures for:			
	• cleaning			
	• charging systems in accordance with industry requirements			
4	conduct procedures for establishing that input services to the system components are suited to the intended purpose, for the following:			
	• gas			
	• low temperature hot water			
5	apply a soundness test to **one** of the following systems in accordance with appropriate industry standards:			
	• tempered air supply ventilation			
	• fan coil units			
	• direct fired warm air heaters			
	• ducted distribution systems			
6	conduct pre-commissioning tests and checks in accordance with appropriate industry requirements including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
7	conduct checks to confirm:			
	• system cleanliness			
	• un-commissioned systems and components cannot be activated.			

Outcome 4	**Be able to decommission industrial and commercial warm air heating systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	verify that decommissioning processes minimise disturbance to work routines			
2	verify that systems or components are safe for decommissioning			
3	conduct decommissioning of systems which comply with industry requirements including **two** from the following:			
	• tempered air supply ventilation			
	• fan coil units			
	• direct fired warm air heaters			
	• ducted distribution systems			
4	verify that the decommissioning procedures carried out prevent the inadvertent operation of the installed system through:			
	• temporary sealing of ductwork sections			
	• use of safety and warning notices			
5	verify that decommissioned systems and components are left safe, in line with industry requirements.			

Unit 226 Install warm air heating systems

Declaration

I confirm that the evidence supplied for this unit is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of this unit with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

Unit 227 Install industrial and commercial compressed air systems

Level: 2
Credit value: 2
UAN: A/602/2785

Outcome 1	**Be able to complete preparation work for compressed air installation activities**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	check the work location and report factors that will impact on the work to the supervisor or line manager			
2	source appropriate job information and documentation for the following system installation including **one** of the following:			
	• compressed air controls			
	• compressed air tools & equipment			
	• process systems			
3	use job information and documentation to ensure that the following are fit for purpose:			
	• equipment			
	• tools			
4	identify the points in the work process where liaison with other persons may be necessary:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			
5	demonstrate that job information on key aspects of the work has been issued to relevant people, including user instructions or manufacturer's instructions			
6	demonstrate that authorisation has been obtained from the relevant person(s) prior to commencement of the work from **at least one** of the following:			
	• other site workers			
	• site visitors			
	• supervisor or line manager			

7	note any pre work damage or defects to existing equipment or building features, should it exist, and report to job supervisor or line manager			
8	demonstrate that suitable personal protective equipment has been worn throughout the duration of work preparation activities			
9	check that the materials needed to complete the job are of the correct quantity and are free from damage and report any defects to a supervisor or line manager from materials used for compressed air installation activities including **two** of the following:			
	• galvanised LCS pipe			
	• ABS Plastic			
	• PVC-U Plastic			
10	complete preparatory work for the installation of warm air heating systems, to include:			
	• use of material and equipment requisites where appropriate			
	• confirmation that the selection of material, equipment and components are compatible to the installation			
	• confirmation that the work location is ready for installation activities			
	• confirmation of secure site storage for tools, equipment ,materials and components			
	• confirmation of suitable access equipment			
	• confirmation of suitable lifting equipment where required.			

Outcome 2	**Be able to install industrial and commercial compressed air systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	confirm job information appropriate to the installation process is available			
2	demonstrate that materials, tools and equipment necessary for the installation of compressed air systems:			
	• are available as required			
	• are safely and securely stored			
	• meet industry requirements			
	• are fit for intended purpose			
3	fabricate and install pipework materials including **all** of the following:			
	• galvanised LCS pipe			
	• ABS Plastic			
	• PVC-U Plastic			
	from **two** of the following systems:			
	• compressed air controls			
	• compressed air tools & equipment			
	• process systems			
4	complete jointing of system pipework using **all** of the following techniques:			
	• compression			
	• threaded			
	• grooved			
	• flanges			
	• solvent welded			
5	position and fix:			
	one of the following appliances:			
	• hand tools			
	• machines			
	• control systems			
	three of the following components:			
	• compressors			
	• receivers			
	• separators			
	• filters			
	• regulators			
	• lubricators			
	• flow meters			

	• drain traps			
	• air & gas traps			
	• isolating valves			
	• air dryers			
	• heat recovery			
	• after-coolers			
	• pressure gauges			
6	position and fix appropriate brackets for systems pipework installations for:			
	• horizontally mounted pipework			
	• vertically mounted pipework			
	in materials which include **all** of the following:			
	• galvanised LCS pipe			
	• ABS Plastic			
	• PVC-U Plastic			
7	perform connections to **two** of the following:			
	• compressors			
	• machinery			
	• receivers			
	• hand tools			
	• systems			
8	demonstrate that all aspects of the installation process conforms with industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
9	apply methods of working to ensure that any damage to customer/client property and building features is avoided during work activities			
10	report problems which may affect the progress of the installation, to the immediate job supervisor, line manager or customer.			

Outcome 3	**Be able to soundness test industrial and commercial compressed air systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	conduct visual inspections from **one** of the following compressed air systems and confirm compliance with industry requirements:			
	• compressed air controls			
	• compressed air tools & equipment			
	• process systems			
2	confirm that the compressed air system is ready to receive soundness tests to cover:			
	• pipework			
	• appliances			
	• components			
3	perform procedures for:			
	• cleaning			
	• charging systems in accordance with industry requirements			
4	conduct procedures for establishing that the following input services to the system components are suited to the intended purpose:			
	• air intake			
	• compressor			
5	apply a soundness test to **one** of the following in accordance with appropriate industry standards, guides and good practice guides:			
	• hand tools			
	• machines			
	• control systems			
6	conduct pre-commissioning tests and checks in accordance with appropriate industry requirements including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
7	conduct checks to confirm:			
	• system cleanliness			
	• system is charged			
	• un-commissioned systems and components cannot be activated.			

Outcome 4	**Be able to decommission industrial and commercial compressed air systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	verify that decommissioning processes minimise disturbance to work routines			
2	conduct decommissioning of systems and components which comply with industry requirements, from **one** of the following:			
	• hand tools			
	• machines			
	• control systems			
3	conduct decommissioning of systems or components which comply with industry requirements **including one** from the following:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
4	verify that the decommissioning procedures carried out prevent the inadvertent operation of the installed system through:			
	• temporary capping of pipework sections			
	• use of safety and warning notices			
5	verify that decommissioned systems and components are left safe, in line with industry requirements.			

Unit 227 Install industrial and commercial compressed air systems

Declaration

I confirm that the evidence supplied for this unit is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of this unit with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

Unit 230 Install industrial and commercial heating and ventilation systems

Level: 2
Credit value: 3
UAN: Y/602/2776

Outcome 1	**Be able to complete preparation work for cold water, hot water, heating and chilled water systems installation activities**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	check the work location and report factors that will impact on the work to the supervisor or line manager			
2	Source appropriate job information and documentation for cold water, hot water, heating and chilled water system installation including:			
	systems:			
	cold water (**one** of the following):			
	• storage (indirect)			
	• non storage (direct)			
	hot water (**one** of the following):			
	• open vented			
	• unvented			
	• storage (indirect)			
	• secondary circulation			
	• instantaneous (plate heat exchanger)			
	heating (**two** of the following):			
	• low temperature hot water heating			
	• medium temperature hot water heating			
	chilled water (**two** of the following):			
	• air conditioning systems			
	• heat rejection systems			
	• chilled beams			
	• fan coil units and air handling units			
	job information and documentation:			
	• statutory regulations			
	• codes of practice			
	• industry standards			

	• industry guides/good practice guides			
	• verbal instructions			
3	use job information and documentation to ensure that the following is fit for purpose:			
	• equipment			
	• tools			
4	identify the points in the work process where liaison with other persons may be necessary:			
	• other site workers			
	• customers/clients			
	• supervisor or line manager			
5	demonstrate that job information on key aspects of the work has been issued to relevant people including user instructions or manufacturer's instructions			
6	demonstrate that authorisation has been obtained from the relevant person(s) prior to commencement of the work, from at least one of the following:			
	• other site workers			
	• customers/clients			
	• supervisor or line manager			
7	note any pre work damage or defects to existing equipment or building features should it exist, and report to the job supervisor or line manager			
8	demonstrate that suitable personal protective equipment has been worn throughout the duration of work preparation activities			
9	check that the materials needed to complete the job are free from damage and report any defects to a supervisor or line manager: From materials used for cold water, hot water, heating and chilled water systems installation activities including **all** of the following:			
	• copper pipe			
	• plastic:			
	- ABS			
	- PVC-U			
	• stainless steel			
	• steel flues			
	• low carbon steel			
10	complete preparatory work for the installation of cold water, hot water, heating and chilled water systems, to include:			
	• use of material and equipment requisites where appropriate			

	• confirmation that the selection of material, equipment and components are compatible to the installation			
	• confirmation that the work location is ready for installation activities			
	• confirmation of secure site storage for tools, equipment, materials and components			
	• confirmation of suitable access equipment			
	• confirmation of suitable lifting equipment where required.			

Outcome 2	**Be able to install industrial and commercial cold water, hot water, heating and chilled water systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	confirm job information appropriate to the installation process is available			
2	demonstrate that materials, tools and equipment necessary for the installation of cold water, hot water, heating and chilled water systems:			
	• are available as required			
	• are safely and securely stored			
	• meet industry requirements			
	• are fit for intended purpose			
3	fabricate and install pipework materials including **all** of the following:			
	• copper pipe			
	• plastic			
	• stainless steel			
	• low carbon steel			
	for **each** of the following systems:			
	• cold water			
	• hot water			
	• heating			
	• chilled water			
4	complete jointing of system pipework for **all** of the following methods:			
	• compression			
	• threaded			
	• grooved			
	• flanges			
	• soft soldering			
	• adhesives			

5	position and fix: • hot and cold water pipework to terminations in preparation for the installation of:			
	- sanitary appliances, **one** from the following:			
	> sinks			
	> wash basins			
	> baths			
	> WCs			
	> showers			
	> hospital sanitary appliances			
	> appliances for the disabled			
	- hot and cold water system components including **all** of the following:			
	> cold water storage cistern			
	> pressure booster sets			
	> hot water storage vessels, including high temperature to low temperature calorifiers			
	> appliance control valve or tap, terminal fittings			
	- and **a minimum of any two** from the following:			
	> electric and gas water heaters			
	> stop valves			
	> shower mixing valves			
	> blending valves			
	> mixing valves			
	> circulating pumps (bronze)			
	> expansion vessels			
	> RPZ valves			
	> feed and expansion cistern (primary system)			
	• heating system: - appliances:			
	> low temperature hot water heating boiler, **one** from: o modular			
	o sectional			
	o high efficiency			
	o biomass			
	- components (**all** of the following):			
	> hot water storage vessels			

	> radiators			
	> convector heaters, natural and assisted			
	> panel heaters			
	> ceiling coils			
	> thermostatic control of heating systems			
	> time control of heating systems			
	> energy management systems			
	> motorised valves			
	> pumps/accelerators			
	> temperature and pressure relief valves			
	> expansion vessels			
	• chilled water system: - appliances (**two** from the following):			
	> refrigeration plant			
	> FCU			
	> A/C plant			
	> cooling towers			
	> air handling units			
	> heat exchangers			
	> chilled beams			
	- components (**two** from the following):			
	> isolation valves			
	> three & four port valves			
	> temperature & humidity stats			
	> calorifiers			
	> actuators			
	> RPZ valves			
6	position and fix appropriate brackets for systems installation pipework for:			
	• horizontally mounted pipework			
	• vertically mounted pipework			
	in pipework materials which include:			
	• copper pipe			
	• plastic: - ABS			
	- PVC-U			
	• stainless steel			
	• steel flues			
	• low carbon steel			

7	perform pipework connections to **all** of following:			
	• water company mains			
	• existing systems			
	• heating systems			
	• sanitary appliances			
	• industrial/commercial solar hot water applications			
	• industrial/commercial ground source heating applications			
	• boilers			
	• hot water storage vessels			
	• systems controls (including management systems)			
	• primary cooling system			
	• existing pipework			
	• appliances			
8	demonstrate that all aspects of the installation process conforms with industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
9	apply methods of working to ensure that any damage to customer/client property and building features is avoided during work activities			
10	report problems which may affect the progress of the installation, to the immediate job supervisor, line manager or customer.			

Outcome 3	**Be able to complete soundness tests on industrial and commercial cold water, hot water, heating and chilled water systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	conduct visual inspections of the following cold water, hot water, heating and chilled water systems and confirm compliance with industry requirements:			
	• cold water (**one** of the following):			
	- storage (indirect)			
	- non storage (direct)			

	• hot water (**one** of the following):			
	- open vented			
	- storage (indirect)			
	- unvented			
	- secondary circulation			
	- instantaneous (plate heat exchanger)			
	• heating (**two** of the following):			
	- low temperature hot water heating			
	- sealed heating systems			
	- medium temperature hot water heating			
	• chilled water (**two** of the following):			
	- air conditioning systems			
	- heat rejection systems			
	- chilled beams			
	- fan coil units and air handling units			
2	confirm that cold water, hot water, heating and chilled water system is ready to receive soundness tests to cover:			
	• pipework			
	• appliances			
	• components			
3	perform procedures for:			
	• cleaning			
	• flushing			
	• charging systems in accordance with industry requirements			
4	conduct procedures for establishing that input services to the system components are suited to the intended purpose for **two** of the following:			
	• water company mains			
	• mains fed, direct, or indirect			
	• gas			
	• oil			
5	apply a soundness test to **one** of the following systems in accordance with appropriate industry standards, guides and good practice guides:			
	• cold water			
	• hot water			
	• heating			
	• chilled water			

6	conduct pre-commissioning tests and checks in accordance with appropriate industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
7	conduct checks to confirm:			
	• system cleanliness			
	• use of additives where appropriate			
	• system is charged			
	• un-commissioned systems and components cannot be activated.			

Outcome 4	**Be able to decommission industrial and commercial cold water, hot water, heating and chilled water systems**			
Criteria		Candidate initials	Assessor initials	Evidence reference
1	verify that decommissioning processes minimise disturbance to work routines			
2	verify that systems or components are safe for decommissioning including at least one from the following systems:			
	• cold water			
	• hot water			
	• heating			
	• chilled water			
3	conduct decommissioning of systems or components which comply with industry requirements, including:			
	• statutory regulations			
	• codes of practice			
	• industry standards			
	• industry guides/good practice guides			
	• verbal instructions			
4	verify that the decommissioning procedures carried out prevent the inadvertent operation of the installed system through:			
	• temporary capping of pipework sections			
	• use of safety and warning notices			
5	verify that de-commissioned systems and components are left safe, in line with industry requirements.			

Unit 230 Install industrial and commercial heating and ventilation systems

Declaration

I confirm that the evidence supplied for this unit is authentic and a true representation of my own work. The work logged is my own work carried out during my normal work duties.

The answers in the question bank are my own work and discussed with my assessor on completion. I have been observed in my workplace by my assessor on several occasions.

Candidate Name:	
Candidate Signature:	
Date:	

I confirm that this candidate has achieved all the requirements of this unit with the evidence listed. Assessment was conducted under the specified conditions and context, and is valid, authentic, reliable, current and sufficient.

Assessor Name:	
Assessor Signature:	
Date:	

IV Name:	
IV Signature:	
Date:	

On Site Assessment Plan / Feedback

Evidence Reference:	

Qualification: Qualification number:
Level:

Candidate name: Date:
Assessor name:

Candidate prepared for assessment (Provide details below)	**Yes / No**	**Candidate requires support**	**Yes / No**
Candidate briefed on appeals procedure	Yes / No	Support required	

Assessment Location / Address and postcode:

Type of work to be carried out:

Assessor Feedback:
(Use Assessor continuation sheet if required)

Forward Planning:

Candidate Signature:		
Assessor Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

On Site Observation Report

Evidence Reference:	

Qualification: Qualification number:
Level:

Candidate name: Date:
Assessor name:

Candidate prepared for assessment (Provide details below)	**Yes / No**	**Candidate requires support**	**Yes / No**
Candidate briefed on appeals procedure	Yes / No	Support required	

Assessment Location / Address and postcode:

Assessor observation:
(Use Assessor continuation sheet if required)

Outcome/ Criteria

Candidate Signature:		
Assessor Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

Supplementary Evidence Sheet

Evidence Reference:	

Qualification: Qualification number:
Level:

Candidate name: Date:
Assessor name:

Unit Number:

Completed by: (please tick)

Candidate Workplace Recorder Witness

Written Evidence:

Outcome/ Criteria

Candidate Signature:		
Assessor / Workplace Recorder Name:		
Assessor / Workplace Recorder Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

Oral Questioning Supplementary Evidence Sheet

Evidence Reference:	

Qualification:
Level:

Qualification number:

Candidate name:
Assessor name:

Date:

Unit Number:

Assessor question:

Candidate answer:

Outcome/ Criteria

Candidate Signature:		
Assessor Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

Photographic Supplementary Evidence

Evidence Reference:	

Scheme / Award: Scheme Number: Level:

Candidate Name:

Unit Number:

Brief description of task being carried out in the photograph (to be completed by candidate):

(Attach Photo in this Box)

Location of photograph:

Candidate Signature:		
Assessor Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

Workplace Recorder Details

I confirm I am suitably experienced or qualified in line with the industry requirements to act as a witness for this learner. I acknowledge that I will only counter sign documentation requested by the learner where to my knowledge only the learner has completed the work and on the understanding that the work has been carried out to the acceptable standard.

Workplace Recorder Name:	
Workplace Recorder Signature:	Date:

I confirm I am suitably experienced or qualified in line with the industry requirements to act as a witness for this learner. I acknowledge that I will only counter sign documentation requested by the learner where to my knowledge only the learner has completed the work and on the understanding that the work has been carried out to the acceptable standard.

Workplace Recorder Name:	
Workplace Recorder Signature:	Date:

I confirm I am suitably experienced or qualified in line with the industry requirements to act as a witness for this learner. I acknowledge that I will only counter sign documentation requested by the learner where to my knowledge only the learner has completed the work and on the understanding that the work has been carried out to the acceptable standard.

Workplace Recorder Name:	
Workplace Recorder Signature:	Date:

Assessor Continuation Sheet

On Site Assessment Plan/Feedback
On Site Observation

Evidence Reference:	

Assessor Briefing and Report	**Criteria Observed**		**Assessment**
	Outcome	Criteria	Method

Candidate Signature:		
Assessor Signature:		Date:
IV/IQA Name:	IV/IQA Signature:	Date:

Signature Sheet

Anyone who witnesses and signs a piece of the candidate's evidence must provide a specimen signature in the table below.

Witnesses relationship to candidate eg supervisor, customer, lecturer, assessor	Name	Signature	Date

Appendix 1 Summary of City & Guilds assessment policies

Health and Safety
All centres have to make sure that they provide a safe and healthy environment for learning, including induction and assessment. City & Guilds external verifiers check this when they visit assessment centres.

Equal Opportunities
Your centre will have an equal opportunities policy. Your centre will explain this to you during your induction, and may give you a copy of the policy.

City & Guilds equal opportunities policy is available from our website **www.cityandguilds.com**, City & Guilds Customer Relations Team or your centre.

Access to assessment
City & Guilds qualifications are open to all candidates, whatever their gender, race, creed, age or special needs. Some candidates may need extra help with their assessment, for example, a person with a visual impairment may need a reader.

If you think you will need alternative assessment arrangements because you have special needs, you should discuss this with your centre during your induction, and record this on your assessment plan. City & Guilds will allow centres to make alternative arrangements for you if you are eligible and if the qualification allows for this. This must be agreed before you start your qualification.

City & Guilds guidance and regulations document *Access to assessment and qualifications* is available on the City & Guilds website **www.cityandguilds.com**, from the City & Guilds Customer Relations Team or your centre.

Complaints and appeals
Centres must have a policy and procedure to deal with any complaints you may have. You may feel you have not been assessed fairly, or may want to appeal against an assessment decision if you do not agree with your assessor.

These procedures will be explained during induction and you will be provided with information about the Quality Assurance Co-ordinator within your centre who is responsible for this.

Most complaints and appeals can be resolved within the centre, but if you follow the centre procedure and are still not satisfied you can complain to City & Guilds.

Our complaints policy is on our website **www.cityandguilds.com** or is available from the City & Guilds Customer Relations Team or your centre.

Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: **learnersupport@cityandguilds.com**
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: **intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: **singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: **business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

If you have a complaint, or any suggestions for improvement about any of the services that City & Guilds provides, email: **feedbackandcomplaints@cityandguilds.com**

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