



MCS Company Scheme Criteria for:

Air Source Heat Pump Nominated Technical Persons Criteria

DRAFT Consultation Document

This document shows the Competence Criteria required to be met by a company undertaking the type of work detailed above.



These competencies have been identified from the current Qualifications Credit Units (QCF) devolved from the National Occupational Standards (NOS) to cover the range of work a Nominated Technical Person (NTP) working in the scope identified on the front page would normally undertake.

Anybody holding:

1. An approved Heat Pump Assessment Certificate covering the scope of work

Is likely to have met with all of the criteria presented within this document.

An Experienced Workers Route (EWR) will cover all the competencies outlined if taken in support of a EWR covering the same detail as titled on this document.

A full list of Qualifications that have been deemed to have met this criteria can be found at <http://www.microgenerationcertification.org/> along with access to EWR providers.

Please note anybody who has achieved the assessment without holding the correct mandatory Pre-requisites are likely to have to demonstrate further compliance against this company criteria.

Criteria Presentation

The criteria shown below in the following tables has been purposely presented in one of five categories:

1. Health and Safety – HS
2. Technical Skills – TS
3. Soft Skills – SS
4. Other – OT
5. Additional Information - AD

Where any box is blank these are intentionally blank.

By presenting the criteria within this format, it allows evidence to be collated for the Experienced Workers Route (EWR) options of evidencing compliance with the criteria.



Health and Safety Skills			
No.	Objective	No.	Criteria
1	Know the health and safety risks and safe systems of work associated with air source heat pump systems	1	State which aspects of heat pump installation work pose risk of:
		2	Electrocution/electric shock
		3	Burns
		4	Toxic poisoning
		5	Personal injury through component/equipment handling

Technical Skills			
No.	Objective	No.	Criteria
2	Know the requirements of regulations and standards relating to the installation, testing and commissioning of air source heat pump systems	1	State which building regulation and building standards guidance documents are relevant to heat pump installation work in particular relating to:
		2	Maintaining the structural integrity of the building
		3	Maintaining the fire resistant integrity of the building
		4	The prevention of moisture ingress (building water tightness)
		5	Notification of work requirements
		6	Installation requirements
		7	Energy conservation
		8	Testing and commissioning requirements
		9	Compliance certification
		10	State which water regulation and byelaw guidance documents are relevant to heat pump installation work in particular in relation to:
		11	The installation of the system
		12	Energy conservation
		13	The safe operation of the system
		14	Testing and commissioning of the system
		15	State the requirements of the fluorinated greenhouse gases regulations in relation to the competence of personnel:
		16	Installing heat pumps where the refrigerant circuit has been assembled and tested by the manufacturer
		17	Installing heat pumps where the refrigerant circuit is to be assembled and tested in the location where the heat pump is to be installed
		18	Undertaking leakage checking on heat pump refrigerant circuits
		19	Undertaking recovery of fluorinated greenhouse gases from heat pump refrigerant circuits



3	Know the purpose and operational characteristics of air source heat pump system components	1	State the purpose and operation of the following heat pump system components:
		2	Evaporator
		3	Low pressure switch
		4	Compressor
		5	High pressure switch
		6	Condenser
		7	Dryer/receiver
		8	Sight glass
		9	Expansion valve
		10	Expansion valve phial
		11	Refrigerant four way valve
		12	Emitter circuit electro-mechanical valves
		13	Fan coil
		14	Integrated buffer tank
		15	Describe how the vapour compression refrigerant circuit within a heat pump unit operates.
4	Know the different types of air source heat pump systems and the arrangements for hydraulic emitter circuits	1	Identify three different types of heat pump system
		2	State the meaning of:
		3	Monovalent system
		4	Bivalent system
		5	Identify the following monovalent hydraulic emitter circuits:
		6	Heating only
		7	Heating with buffer tank
		8	Heating with buffer tank and indirect stored domestic hot water
		9	Heating with buffer tank and indirect stored domestic hot water with solar coil
		10	Heating with thermal store
		11	Identify the following parallel bivalent hydraulic emitter circuits which incorporate a secondary heat source other than an immersion heater:
		12	Heating with buffer tank
		13	Heating with buffer tank and indirect stored domestic hot water
		14	Heating with buffer tank and indirect stored domestic hot water with solar coil
		15	Heating with buffer tank and thermal store
		16	State the requirements for connecting buffer tanks:
		17	In series
		18	In parallel
5		1	State the meaning of the coefficient of performance (cop)



The principles of air source heat pump selection and system design	2	State the relationship between coefficient of performance and the:
	3	Heat pump input temperature
	4	Heat pump emitter temperature
	5	State the effect that ambient temperature can have on:
	6	Coefficient of performance
	7	Heat pump output
	8	State the meaning of the seasonal performance factor (spf)
	9	Identify the factors that can affect the seasonal performance factor
	10	State the meaning of system efficiency
	11	Identify the factors that can affect the 'system efficiency'
	12	State why achieving minimum heat loss from the building is important when designing a heat pump system
	13	State the effect that oversizing of a heat pump has on:
	14	System efficiency
	15	Operation
	16	State the effect that under sizing of a heat pump has on:
	17	System efficiency
	18	Operation
	19	State how to identify heat pump hydraulic flow rate requirements
	20	State how to use manufacturer's data to select heat pump units:
	21	State the meaning of bivalent points.
	22	State how bivalent points are used to determine auxiliary heat requirements
	23	State how heat pump output capacity is affected by:
	24	Heat pump input temperature
	25	Heat pump output temperature
	26	Describe the suitability of the following types of hydraulic heating system emitters for use with heat pump systems:
	27	Underfloor heating
	28	Fan assisted convector heaters
	29	Panel radiators
	30	State the typical mean water temperature recommended when designing a hydraulic emitter circuit that incorporates:
	31	Underfloor heating
	32	Fan assisted convector heaters
	33	Panel radiators
	34	State how correction factors are used to determine emitter output requirements in relation to mean water temperature and room temperature difference



		35	State the advantages and disadvantages of including a buffer tank in the system design.
		36	Describe the method of determining the size of a monovalent heat pump system.
		37	State the typical annual operating hours for a heat pump that is being used for:
		38	Heating only
		39	Heating and domestic hot water
		40	State why heat pump annual operating hours vary
6	Know the design factors and principles relating to air source heat pump systems	1	State the factors to be considered in selecting and positioning air source heat pumps in relation to its fan coil unit.
		2	State the options available to provide a defrost cycle for an air source heat pump.
		3	State the requirements for sizing a buffer tank to provide for an air source heat pump defrost cycle.
7	Know the preparatory work required for air source heat pump installations	1	State the pre-installation checks for air source heat pump systems connected to hydraulic emitter circuits
		2	State the pre-installation checks that are specific to the positioning of fan coil units.
8	Know the requirements to install, commission and hand over air source heat pump systems	1	State the requirements for moving and handling heat pump units to avoid damage to the unit.
		2	Identify the installation requirements where heat transfer fluid circuit pipework passes through the external building fabric in relation to:
		3	Provision for movement
		4	Protection against freezing
		5	Prevention of water ingress
		6	State the requirements for flushing and treating hydraulic heat emitter circuits.
		7	Confirm the hydraulic test requirements for hydraulic emitter circuits.
		8	State the conditions required for dynamic commissioning of heat pump systems.
		9	State the commissioning requirements for heat pump system controls.
		10	State the industry handover procedures for heat pump systems in relation to the:
		11	Provision of written information
		12	Provision of diagrammatic information
		13	Provision of verbal information and demonstration to the client relating to system operation and use.
9	Know the requirements to inspect service and maintain	1	State the documentation to be available to inspect, service and maintain heat pump systems.



	air source heat pump systems.	2	State the inspection, service and maintenance requirements for heat pump systems.
		3	State the industry requirements for recording the outcomes of inspection, service and maintenance of heat pump systems.
		4	State the action(s) to be taken in the event of a failure or suspected failure of the refrigerant circuit and/or a suspected refrigerant circuit defect.
10	Know how to diagnose and rectify defects and malfunctions in air source heat pump systems.	1	State the information to be available to enable fault diagnosis and rectification of system defects and malfunction.
		2	State the sequence of actions to enable diagnosis and rectification of heat pump system defects and malfunctions.
11	Be able to undertake inspection, service and maintenance of air source heat pump systems.	1	Obtain the relevant information required to enable the work to be undertaken.
		2	Undertake an inspection of an air source heat pump system to include checks in relation to:
		3	Compliance with manufacturer's installation instructions
		4	Compliance with statutory regulations
		5	Condition of system components including cleanliness
		6	The system fluid levels
		7	The system pressure levels
		8	The settings of electrical controls and temperature sensors
		9	Leakage and/or dampness
		10	Positioning of system components
		11	Quality, condition and positioning of pipework insulation
		12	The provision of information and safety labels
		13	The security of fixing of system components
		14	Undertake servicing of air source heat pump systems in accordance with manufactures instructions including:
		15	Checking for protection of the system water against freezing
		16	Cleaning, adjustment and lubrication of system components and controls
		17	Undertake service and maintenance functional tests on an air source heat pump systems to include:
		18	Safe operation
		19	Efficient operation
		20	The function of system components/controls
		21	Noise or vibration levels
		22	Complete service and maintenance records.
12	Be able to carry out fault diagnosis and rectification of defects and malfunctions on	1	Obtain the information required to enable fault diagnosis and rectification to be undertaken.
		2	Identify the cause of the following faults on heat pump systems and carry out remedial work;



	air source heat pump systems.	3	Heat pump high pressure trip/alarm activated by an emitter circuit malfunction
		4	Insufficient heat output to emitter circuit
		5	Domestic hot water heat up is satisfactory but space heating is not operating
		6	System noise and/or vibration
		7	Advise the client of the cause of the malfunction and the actions required to rectify.
		8	Take precautionary actions to prevent unauthorised use of the system prior to or during fault rectification.
		9	Take precautionary actions to minimize the risk of injury to self or others during fault rectification.
		10	Undertake post-rectification functional tests in accordance with manufacturer's instructions.
13	Be able to plan and prepare for the installation of air source heat pump systems.	1	Undertake pre-installation checks on heat pump systems which include:
		2	The authorisation for the work to proceed
		3	The availability of appropriate access to all work areas
		4	The availability and collation of relevant information
		5	Confirmation of the suitability of the proposed location of the fan coil unit
		6	Confirmation that the heat pump rating is suitable for the design load
		7	Confirmation of the suitability of the proposed location of the heat pump unit
		8	Confirmation that the emitter circuit design or existing installation is compatible with the proposed heat pump installation.
		9	Confirmation that the buffer tank size is correct
		10	Confirmation of a suitable electrical input service
		11	The proposed siting of internal system components
		12	The suitability of the building structure in relation to the proposed installation
		13	Confirm that tools, materials and equipment required for the installation work are available and are in a safe usable condition.
14	Be able to install air source heat pump systems.	1	Install the heat pump to the hydraulic emitter circuit in accordance with manufacturer's instructions, regulatory requirements and industry recognised procedures.
15	Be able to test and commission air source heat pump systems.	1	Prepare a heat pump system for testing and commissioning which includes checks and actions to confirm :
		2	Compliance with the system design and specification
		3	Compliance with system/component manufacturer requirements



		4	The suitability of the electrical supply circuit
		5	The system is ready for flushing of installation debris
		6	The system is ready for filling and venting the hydraulic circuits
		7	The system is ready for adding protection against freezing
		8	The client requirements are met
		9	The system is compliant with statutory regulations and/or industry recognised procedures
		10	Commission the system in accordance with manufacturer's instructions, design specification, client's and statutory requirements and industry recognised procedures.
		11	Undertake final checks to ensure that the system is ready for handover to client.
16	Be able to handover to the client air source heat pump systems.	1	Explain and demonstrate to the client the operation and use of the heat pump system using manufacturer's / users instructions.
		2	Explain to the client any aspects of the system at variance with the agreed design specification.
		3	Obtain confirmation of acceptance from the client of the handover of the heat pump system.
		4	Ensure that handover documentation is completed and passed to the client in accordance with manufacturer's instructions.

Soft Skills			
No.	Objective	No.	Criteria
Intentionally Blank			

Other			
No.	Objective	No.	Criteria
Intentionally Blank			

Additional Guidance			
Intentionally Blank			



DRAFT