



MCS Company Scheme Criteria for:

# Electrical Led CHP 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 CHP Assessment Certificate

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.



<b>Health and Safety Skills</b>			
<b>No.</b>	<b>Objective</b>	<b>No.</b>	<b>Criteria</b>
1	Know the health and safety risks and safe systems of work associated with mCHP unit and system installation work	1	Confirm the aspects of mCHP unit installation work which pose a risk in relation to:
		2	Electrocution
		3	Injuries caused through manual handling
		4	Confirm safe systems of work for mCHP unit installation work in relation to reducing specific risks associated with:
		5	Safe isolation/containment
		6	Manual handling

<b>Technical Skills</b>			
<b>No.</b>	<b>Objective</b>	<b>No.</b>	<b>Criteria</b>
2	Know the requirements of the relevant regulations/ standards relating to practical installation, testing and commissioning activities for mCHP units and system installations	1	Interpret building regulation/building standards guidance as relevant to mCHP unit installation work in relation to:
		2	Combustion appliances and fuel storage systems
		3	Conservation of fuel and power
		4	Electrical installations in dwellings
		5	Notification of works
		6	Interpret industry recognised electrical wiring regulation requirements as relevant to mCHP unit installation work in relation to:
		7	System installation
		8	Inspection and testing
		9	Commissioning
		10	Identify the appropriate regulatory documents which apply to Distribution Network Operator notifications
3	Know the fundamental differences between engine type mCHP units and fuel cell types	1	Confirm the operating principles and characteristics of the following engine based mCHP units:
		2	Internal combustion -
		3	Miller cycle
		4	External combustion –
		5	Stirling cycle
		6	Rankine cycle
		7	Confirm the operating principles and characteristics of the following fuel cell module mCHP units:
		8	Poton exchange membrane fuel cells (PEMFCs) -
		9	Solid oxide fuel cells (SOFCs)



4	Know the purpose and operating principles of mCHP units and system components	1	Confirm the purpose and function of the following engine based mCHP system components:
		2	Engine burner
		3	Engine
		4	Engine alternator
		5	Supplementary heat exchanger
		6	Supplementary burner
		7	Spool valve
		8	Confirm the purpose and function of the following fuel cell based mCHP system components:
		9	Catalytic burner
		10	Fuel cell stack
		11	Fuel regenerator
		12	Water jacket
		13	De-ionising cartridge
		14	State the basic operating principles of:
		15	mCHP units which contain engines
		16	mCHP units which contain fuel cells
		17	State the typical operating efficiencies for:
		18	mCHP units which contain engines
		19	mCHP units which contain fuel cells
		20	State the typical mCHP unit heat to power ratios for:
		21	mCHP units which contain engines
		22	mCHP units which contain fuel cells
5	Know the electrical connection arrangements for mCHP units and system installations	1	State the requirements for making mCHP connections in parallel with the main supply, through the following connection types:
		2	by a dedicated circuit into an existing final circuit
		3	Confirm the suitability of the existing primary electricity meter and the arrangements for metering electricity that is generated for export
		4	Confirm the requirements for the provision of:
		5	A generation meter
		6	Isolators
		7	Safety labelling/signage
6	Know the fundamental design principles used to determine the feasibility for the installation of mCHP units	1	State the methods for determining the Plant Size ratio (PSR), and why this is an important factor
		2	Confirm the methods that can be used to determine mCHP environmental performance and comparison data:
		3	SAP method
		4	Heating Plant CO <sub>2</sub> Emission Rate (HPER) method
		5	Confirm the acceptable mCHP unit environmental performance comparison values for each of the following:



		6	SAP method
		7	HPER method
		8	Confirm mCHP system space heating circuit temperature drop requirements for:
		9	New installations
		10	Existing installations
7	Know the preparatory work required for mCHP unit installation work	1	Confirm preparatory work requirements for mCHP unit installation in relation to:
		2	Authorisation for the work to proceed
		3	The availability of appropriate access to all required work areas
		4	The inspection and testing of existing electrical installations
		5	The proposed siting of key system components
		6	The suitability of the proposed mCHP unit location in relation to the existing system
8	Know the system layouts and the requirements for installing mCHP units to integrate with existing installations	1	Recognise and confirm the hydraulic system layouts and configurations for mCHP engine based units connected to:
		2	Space heating circuit only
		3	Domestic hot water cylinder and space heating circuit
		4	Recognise and confirm the hydraulic system layouts and configurations for mCHP fuel cell based units connected to a dual coil domestic hot water cylinder and space heating circuit
		5	Confirm the requirements for siting and making hydraulic pipework connections to mCHP units
9	Know the requirements to test and commission mCHP units/system installations	1	Confirm commissioning procedures and/or requirements for testing a newly installed mCHP unit/system
		2	Confirm the mechanisms for recording the commissioning of a newly installed mCHP unit/system:
		3	Benchmark
		4	Other recording systems
		5	Confirm the requirements for notifying the Distribution Network Operator upon the successful commissioning of a newly installed mCHP unit
10	Know the requirements to handover mCHP units/system installations	1	State the pre-handover checks that need to be carried out for mCHP units/system installations
		2	Confirm the recommended industry handover procedures for mCHP units/system installations in relation to:
		3	MIS 3007 requirements
		4	Requirement for customer to contact their electrical energy supplier
11	Plan and prepare for the installation of mCHP unit and system installations	1	Undertake preparatory work for mCHP installation and commissioning activities in relation to:
		2	Checking authorisation for the work to proceed



		3	Checking the availability of appropriate access to all required work areas
		4	Confirming the suitability of existing electrical installations
		5	Confirming the siting of key system components
		6	Confirming the suitability of the proposed mCHP unit location in relation to the existing system
		7	Confirm that the tools, materials and equipment required for the mCHP installation and commissioning work are available and are in a safe usable condition.
12	Install mCHP unit and system components	1	Install a mCHP unit (engine type or fuel cell type) and associated system components in accordance with manufacturer's guidance, regulatory requirements and industry recognised procedures
		2	Confirm the mCHP unit is correctly isolated from mains electrical and hydraulic supplies
		3	Complete the hydraulic and electrical connections to the newly installed mCHP unit
13	Commission and test mCHP units/systems	1	Undertake pre-commissioning checks on mCHP units/system components
		2	Undertake performance tests on mCHP units/system components
		3	Complete commissioning of a mCHP unit/system
		4	Complete relevant commissioning and testing records in accordance with manufacturer's requirements and the relevant regulatory requirements
14	Handover mCHP units/systems	1	Undertake relevant checks to ensure that the unit/system is ready for handover and compliant with manufacturer's guidance, regulatory requirements and industry recognised requirements
		2	Explain and demonstrate to the end user the operation and use of the unit/system using manufacturer's guidance and industry agreed handover procedures
		3	Obtain acceptance by the end user of the system according to the industry agreed handover procedures
		4	Ensure that all relevant handover documentation is correctly completed and recorded in the appropriate information systems and is passed to the end user in accordance with manufacturer's guidance and industry recognised procedures
15	Know the requirements for the routine inspection, service and maintenance of mCHP units and systems	1	State which documentation needs to be available to enable a routine service and maintenance inspection
		2	Confirm the typical routine service and maintenance requirements in relation to:
		3	Safe shutdown and isolation of appliance
		4	Visual inspection requirements



		5	Cleaning of components
		6	Functional testing
		7	Performance testing
		8	Adjustment of controls/components
		9	Confirm the recording and reporting requirements for routine maintenance work
16	Know how to diagnose faults in mCHP units and systems	1	State the information that needs to be available to enable fault diagnosis
		2	Confirm the work action and sequences required to diagnose the following faults on engine based mCHP units:
		3	Engine burner - false flame readings
		4	Engine - thermocouple error
		5	Engine alternator - overload or short circuit
		6	Supplementary heat exchanger – excessive temperature
		7	Supplementary burner - false flame readings
		8	Spool valve – fault or incorrect calibration
17	Know how to rectify faults in mCHP units and systems	1	Confirm the work action and sequences required to rectify the following faults on engine based mCHP units:
		2	Engine burner - false flame readings
		3	Engine - thermocouple error
		4	Engine alternator - overload or short circuit
		5	Supplementary heat exchanger – excessive temperature
		6	Supplementary burner - false flame readings
		7	Spool valve – fault or incorrect calibration
18	Undertake the routine service and maintenance of mCHP units and system installations	1	Obtain the relevant information required to enable the work
		2	Undertake, using safe systems of work, a visual service and maintenance inspection, to include checks in relation to:
		3	Compliance with manufacturer’s installation instructions
		4	Compliance with statutory regulations
		5	The condition of system components
		6	The correct positioning of system components
		7	The secure fixing of system components
		8	Undertake, using safe systems of work, routine service and maintenance tests to include:
		9	Safe shutdown and isolation of appliance
		10	Visual inspection requirements
		11	Cleaning of components
		12	Functional testing
		13	Performance testing
		14	Adjustment of controls/components
		15	Complete the relevant service and maintenance records in accordance with industry recognised procedures



19	Undertake fault diagnosis work on mCHP units and system installations	1	Obtain the relevant information required to enable the work
		2	Identify using safe systems of work, the cause of a minimum of THREE of the following faults on engine based mCHP units:
		3	Engine burner - false flame readings
		4	Engine - thermocouple error
		5	Engine alternator - overload or short circuit
		6	Supplementary heat exchanger – excessive temperature
		7	Supplementary burner - false flame readings
		8	Spool valve – fault or incorrect calibration
		9	Agree with the relevant person(s) fault rectification procedures for the faults identified
20	Undertake fault rectification work on mCHP units and system installations	1	Take relevant precautionary actions to prevent unauthorised use of the system prior to or during the fault rectification work
		2	Take relevant precautionary actions to minimise the risk of injury to self or others during the fault rectification work
		3	Rectify, using safe systems of work, a minimum of TWO of the following faults on engine based mCHP units:
		4	Engine burner - false flame readings
		5	Engine - thermocouple error
		6	Engine alternator - overload or short circuit
		7	Supplementary heat exchanger – excessive temperature
		8	Supplementary burner - false flame readings
		9	Spool valve – fault or incorrect calibration
		10	Undertake post-rectification tests in accordance with manufacturer's guidance, regulatory requirements and industry recognised procedures to confirm that the system is in a safe, functional and efficient condition.
		11	Define the function of components used in central heating systems
		12	Zone control valves for multiple space heating applications with appropriate time and temperature control arrangements
		13	Controllers
		14	Weather compensation
15	Delayed start		
16	Optimum start		
17	Home automation systems		
18	Analyse the operating principles of environmental heat sources used in conjunction with central heating systems		
19	Heat pumps		
20	Ground source		
21	Air source		
22	Micro combined heat and power		





	23	Biomass
	24	Identify the layout features of underfloor central heating systems
	25	Analyse the working principles of underfloor central heating system pipework and components
	26	Use of manifolds
	27	Controls system application - time and temperature to space heating zones
	28	Underfloor pipework arrangements from manifold to room
	29	Identify the system layout features for multiple boiler installations incorporating low loss headers
	30	Analyse functional flow wiring diagrams to determine the method of control operation for central heating systems
	31	Pumped heating only systems
	32	Pumped heating systems with combination boilers
	33	Pumped heating with gravity hot water systems
	34	Fully pumped incorporating 3 port valves – mid position and diverter valves
	35	Fully pumped incorporating 2 x two port valves
	36	Fully pumped incorporating hot water and multiple space heating zones
	37	Fully pumped incorporating weather compensation, optimum start or delayed start controllers
	38	Multiple boiler controls application
	39	Application of frost thermostats and boilers with pump overrun facility
	40	State the principles of heat loss and gain in dwellings
	41	Through the building fabric
	42	Due to ventilation
	43	Evaluate the heating requirements of rooms in dwellings when designing a central heating system
	44	Room size
	45	Temperature required – indoor to outdoor
	46	Air change rate
	47	Using basic not to scale line drawings
	48	Details for insertion into a quotation or tender for work in a small-scale dwelling
	49	Manifolds
	50	Pipework arrangements (cabling)
	51	Pipework installation techniques
	52	Solid floor
	53	Suspended timber floor



	54	Interpret manufacturer instructions and industry standards to establish the diagnostic requirements of central heating system components
	55	Checking for blockages in heat emitters and pipework
	56	Checking for correct operation of system components
	57	Circulating pumps
	58	Control components
	59	Expansion vessels
	60	Pressure relief valves
	61	Feed and expansion cisterns
	62	Specify methods of safely isolating central heating systems or components to prevent them being brought into operation before the work has been fully completed
	63	Carry out diagnostic tests to locate faults in central heating system components and carry out repair work
	64	Replacement of a circulating pump
	65	Sealed heating system components
	66	Control components
	67	Clean system components using power flushing equipment
	68	Specify the flushing requirements including the use of chemical treatments for new and existing central heating systems
	69	Cold and hot flushing
	70	Power flushing
	71	System additives
	72	Neutralisers
	73	Cleansers
	74	Corrosion inhibitors
	75	State the procedure for notifying works carried out to the relevant authority
	76	Identify the combustion process with gases used in dwellings
	77	The combustion equation
	78	Air requirements for combustion
	79	Main constituents of complete combustion
	80	Main constituents of incomplete combustion
	81	Carbon Monoxide; Soot deposits
	82	Flammability limits of gases
	83	Causes of incomplete combustion
	84	Calorific Values of gases
	85	Gross; Net; British thermal units (BTU's); Kilowatts (kW); Use of conversion charts
	86	Wobbe number of gases



	87	Identify the potential effects of Carbon Monoxide when incomplete combustion takes place
	88	Effects of exposure to Carbon Monoxide on the human body
	89	Symptoms of CO poisoning
	90	Advice to give to a person who describes symptoms of being affected by products of combustion
	91	State typical ambient levels of carbon dioxide and identify critical levels and the potential effects on the gas combustion process
	92	Specify the measures necessary to ensure that exposure to Carbon Monoxide does not take place/ is minimised?
	93	Primary measures – correct appliance installation and maintenance
	94	Secondary measures – use of Carbon Monoxide detectors
	95	Types of CO detectors available and standards of manufacture
	96	The positioning requirements for Carbon Monoxide detectors
	97	The associated maintenance requirements of CO detectors
	98	Other sources of Carbon Monoxide in dwellings
	99	Causes of activation of CO detectors & indicators
	100	Identify how to diagnose faults in gas appliance burners
	101	Flame picture
	102	Sooting
	103	Discolouration
	104	Flame Chilling
	105	Linting
	106	Condition of the burner
	107	Air supply faults
	108	Condition and size of injectors
	109	Clarify the reasons for burner faults that result in incomplete combustion
	110	Gas rate / pressure settings
	111	Effects of excessive pressure at the appliance (flame lift)
	112	Aeration
	113	Vitiation
	114	Light back
	115	Flame chilling
	116	Calculate the ventilation requirements for
	117	Adventitious air supplies
	118	Gross and net calorific values of appliances
	119	For multiple appliance installations in the same room/space
	120	Calculate the ventilation required for appliances located in compartments



	121	Room sealed appliances
	122	Identify the types of grilles and vents available for ventilation
	123	Types of grilles and vents
	124	Sizing of grilles and vents (free area availability)
	125	Calculate the free area of unmarked grilles and vents
	126	Specify the acceptable locations for ventilation to appliances
	127	Restrictions to ventilator/grille locations
	128	Installation of vents through walls (including cavity walls)
	129	Ventilation paths via other rooms
	130	Ventilation paths to compartments including ducts
	131	Siting of ventilation
	132	Wall
	133	Window
	134	Floor/ceiling (ducted and un-ducted)
	135	Clarify the effect that other heat producing appliances and other types of extraction have on the requirement for ventilation of gas appliances
	136	Oil or solid fuel appliances and flue systems
	137	Passive stack ventilation
	138	Extractor fans
	139	Cooker hoods
	140	Tumble driers
	141	Identify the working principles of flue systems serving gas appliances
	142	Open flued chimneys
	143	Room sealed - natural draught
	144	Room sealed – fanned draught
	145	Vertex type flues
	146	State the types and general layout features of chimney and flue construction
	147	Rigid chimney types
	148	Brick / masonry
	149	Pre-cast flue blocks
	150	Metallic (single & double wall flues)
	151	Flexible metallic liner installation
	152	Use of flue box systems
	153	Shared (common) chimney systems - SE & U Ducts
	154	Specify the requirements for new and existing chimney/flue installation
	155	Minimum cross sectional area of new chimney installations to serve appliances



	156	Types of flue liners – during construction (salt glazed, clay etc.)
	157	Poured/pumped concrete flue liners; Pre-cast flue blocks; Flexible flue liners
	158	Restrictions on the use of poured concrete liners
	159	Specify the requirements for new and existing chimney/flue installation
	160	Pre-cast flue design
	161	Minimum cross sectional area of new gas flue blocks; Minimum requirement of vertical flue blocks before off sets; Jointing material for pre-cast flue blocks; Minimum flue size diameter for connecting pre-cast transfer blocks to termination point; Effects of temperature on installation requirements for pre-cast flues
	162	Flexible flue liners
	163	Sealing & support requirements for flexible flue liners in chimneys; Flexible liner components; Termination of flue liners
	164	Define the design requirements of flues used with gas appliances
	165	Requirements for the catchment space to open flued space heaters
	166	Open flued chimney system
	167	Parts of an open flue chimney system
	168	Room-sealed chimney system
	169	Parts of a room sealed flue chimney system
	170	Natural and fanned draught
	171	Specify the requirements for the termination of flue systems serving gas appliances
	172	Room sealed flue positions
	173	Condensing appliances
	174	Terminal guard requirements
	175	Flue/ chimney outlet locations/terminal positions - before 2001
	176	Flue chimney outlet locations/terminal positions - after 2001
	177	Methods of dealing with down-draught on steeply pitched roofs
	178	Specify the requirements for installing chimney fans to open flues/chimney systems
	179	Requirements prior to installing fans in secondary flues
	180	Additional safety requirements when fans are installed in secondary flues



	181	Requirements for fan dilution and shared open flue, fanned draught systems in domestic dwellings
	182	Specify the flueing requirements for balanced compartments used with open flued appliances
	183	Compartment construction
	184	Ducted air positioning
	185	Cross sectional areas of air inlet ducts
	186	State the correct action to be taken when a non-commissioned appliance is identified
	187	State the actions to be taken if pipework and appliances are not commissioned when the gas supply to the property is re-established
	188	Identify the procedures for re-establishing gas supplies and relighting appliances
	189	Fixed rated appliances
	190	Range rated appliances
	191	Identify the methods of determining gas rates at appliances
	192	Use of manufacturer data (appliance input)
	193	Use of meter test dial/index for calculation of gas consumption rate
	194	Calculate the gas consumption rates for gas appliances
	195	Imperial rated meters
	196	Metric rated meters
	197	Identify and rectify faults discovered during testing
	198	Excessive pressure loss at the appliance
	199	Incorrect gas consumption rates at appliances
	200	Effects of meter pressure absorption under full load conditions
	201	Room sealed flue systems – natural draught & fan assisted
	202	Vertex type appliances
	203	State the factors that can affect flue system performance
	204	Downdraught conditions
	205	Wind effects at the appliance termination
	206	Passive stack ventilation
	207	Extraction fans sited in the vicinity of open flued appliances
	208	Specify the testing procedures that should be performed to check the correct operation of an existing chimney flue/ gas appliance
	209	Flue flow test
	210	Spillage test
	211	Flue testing procedures with appliances sited in the vicinity of extraction fans



	212	Testing fanned draught open-flue systems and associated safety controls
	213	Specify the testing procedures for room sealed fanned draught flue installations
	214	Checking case seals /case integrity
	215	Checking flue pipe/ air inlet connections for leakage
	216	Checking/testing of positive pressure case appliances
	217	Specify the testing procedures for gas appliances that require commissioning by analysis of the flue combustion products
	218	Types of portable combustion gas analysers
	219	Flue gas samples to be taken during the commissioning process
	220	Sources of information required to determine correct flue gas products and ratios
	221	Gas operative advice
	222	Gas user advice
	223	Responsibilities of the gas user
	224	Reporting gas escapes
	225	Actions that can be undertaken by the gas transporter
	226	Action of the LPG supplier
	227	Rights of entry to properties
	228	Turning off emergency controls
	229	Elimination of ignition sources
	230	Reduction of gas concentrations via ventilation
	231	Identify the correct procedure for prioritising actions in the event of an unsafe situation
	232	Gas emergency priorities
	233	Protect life
	234	Protect property
	235	Secure the escape
	236	Leave the site safe
	237	Clarify the types of unsafe situation that may be found with appliances and installations and how to respond to them
	238	Immediately Dangerous (ID) situations
	239	Actions to take; 'Do not use' notices and labels; Warning notice forms; RIDDOR reportable Installations; RIDDOR reporting forms and information required
	240	At Risk (AR) situations
	241	Actions to take; Concern for safety notices and labels
	242	Not to Current Standards (NCS) situations
	243	Actions to take; Advice notices; Notification criteria for each category of NCS; Methods of notification



		244	Identify the use of general notices and warning labels to avoid the occurrence of unsafe situations
		245	Meter labelling requirements
		246	Compartment labelling
		247	Appliance commissioning certificates
		248	Appliance service certificates
		249	Landlords safety certificates
21	Identify and complete the correct notices, forms and labels used in domestic gas utilisation	1	Identify correct application and complete the following records, forms and labels:
		2	Landlord / Home Owner Gas Safety Record
		3	Gas Safety Inspection Form
		4	Benchmark Maintenance Report
		5	MCS compliance certificate
		6	Service / Maintenance Checklist(s)
		7	Chimney / Hearth Notice Plate
		8	Select and attach appropriate labels applicable to domestic gas work:
		9	Un-commissioned Appliance Label
		10	Balanced Compartment Label
		11	Current and Power
		12	Voltage
		13	Resistance
		14	Assemble simple series and parallel circuits
		15	Identify the type of electrical installation as:
		16	TT
		17	TN-S
		18	TN-C-S
		19	Connect a domestic gas appliance to a fixed domestic electrical installation:
		20	Cable Type and Sizing calculation
		21	Fuse Rating calculation
		22	Fused Spur connection
		23	Wiring a Three Pin Plug
		24	Complete electrical installation certificate
		25	CO, CO <sub>2</sub> , O <sub>2</sub> readings, CO/CO <sub>2</sub> Ratios in a flue way
		26	CO, CO <sub>2</sub> , O <sub>2</sub> readings in the atmosphere
		27	Visually and by the use of combustion performance analysis identify complete and incomplete combustion for Type 'A', 'B' & 'C' gas appliances
		28	Complete the required checks using a combustion/atmosphere analyser in the event of "carbon monoxide detector" activation.





<b>Soft Skills</b>			
<b>No.</b>	<b>Objective</b>	<b>No.</b>	<b>Criteria</b>
Intentionally Blank			

<b>Other</b>			
<b>No.</b>	<b>Objective</b>	<b>No.</b>	<b>Criteria</b>
Intentionally Blank			

<b>Additional Guidance</b>			
Intentionally Blank			