

CHP Specification Template XRGI 9 LoadTracker CHP

The Contractor shall include for complete supply, delivery to site, installation and commissioning of a fully modulating combined heat and power (CHP) system. Natural gas fired CHP plant shall generate heat for heating and domestic hot water and electricity for use within the development. CHP will be integrated into central LTHW heating system and shall operate in preference to the boilers (as detailed on the schematic drawings). CHP shall operate in parallel to the grid and feed generated electricity into building LV network.

The CHP unit shall operate to supply combined heat and power for the development, as predicted in the initial energy assessment. The contractor shall ensure/verify that the CHP plant provides the required reduction in carbon emissions to achieve the regulatory requirements. The CHP supplier shall provide a project-specific Carbon Reduction Assessment, to quantify the savings to be expected from the CHP installation in terms of CO₂ emissions and financial cost. The assessment shall also contain an estimate of the percentage of total heat and electrical demand to be met by the CHP and recommendations for size of thermal storage vessel.

The performance requirement is based on an XRGI 9 LoadTracker CHP from SAV Systems. The CHP installation shall be carried out in accordance with the following:

CHP Unit	XRGI 9 LoadTracker
Energy Efficiency Label	A+++
Seasonal space heating energy efficiency of CHP package with Flow Master	183%
Power output (automatically modulating)	4.5 – 9 kWe
Electrical efficiency	31%
Thermal output	12 – 19.2 kWth
Thermal efficiency	65%
Total efficiency	96%
Fuel	Natural gas
Fuel consumption (natural gas)	1.7 – 3.0 m ³ /h
Fuel supply pressure	10 – 50 mbar
Noise level at 1 m	49 dB(A)
NO _x emission	< 52 mg/Nm ³
Flow temperature (to LTHW system)	constant 80°C
Return temperature (from LTHW system)	variable, shall be as low as possible
Generator	4 pole asynchronous
Output - voltage	400V, 3 phase
Output - current	16A
Service interval	min. 10,000 hours

The CHP system shall be classed as “zero NO_x” in order to achieve credits within BREEAM assessment.

The packaged CHP unit with temperature control shall meet criteria of efficiency class A+++ , with seasonal space heating energy efficiency of 183%.

The CHP system shall be supplied as a complete package from the specialist manufacturer, but as separate components and shall comprise:

1. The Power Unit with factory fitted acoustic enclosure,
2. Heat Distributor,
3. Control Panel with integral automatic control system,
4. Thermal Storage Vessel,
5. Load sharer S device for multiples installation,
6. Ancillary kit including Q-network control components as detailed on schematic (especially Flow Master module selected specifically to project requirements), interconnecting cables between CHP Power Unit and Control Panel, water and gas hoses for connecting to Power Unit, a reference meter with a set of current transformers (CTs).

The CHP system shall be complete with all controls, sensors, valves etc. to operate on a stand-alone basis.

Power Unit

1. Toyota 1.0L industrial reciprocating gas fired engine, designed for 50,000 hours service between overhauls.
2. Asynchronous generator, 3 phase, 400V, 4.5 - 9 kWe output.
3. Stainless steel engine enclosure, insulated for heat and sound with 50 mm mineral wool, integrated silencer, water cooled generator, exhaust gas heat exchanger, oil sump, oil filter, gas safety tray, spark plugs, twin walled aluminium 60/100 mm flue connection, hinged cover for easy access to engine.
4. Dimensions (L x W x H): 92 x 64 x 96 mm, weight 440 kg.

Heat Distributor

The CHP power unit shall be supplied with a Heat Distributor unit (model Q20) comprising a plate heat exchanger, two circulating pumps and motorised 3-port control valves to give hydraulic separation from the building heating and DHW system and to control all parameters of the thermal operation.

The Heat Distributor shall produce a constant flow temperature, irrespective of site return water temperature. The constant flow temperature out of the CHP Heat Distributor shall match the LTHW system flow temperature and therefore it shall be controllable in the range of up to 80°C.

Dimensions (H x W x D) 600 x 400 x 195 mm, weight 25 kg, connections 1". Heat Distributor shall be provided with strainer for protection of PHE internals.

Control Panel

The CHP package shall be supplied with a Control Panel, which shall provide automatic control of the CHP system and interface to the electrical supply. The CHP shall automatically and instantaneously modulate its electrical output to match building electrical demand. The scope of modulation shall be from 100% to 50% of the CHP electrical output. A fully automatically modulating output shall be provided, rather than a static or stepped output. The CHP shall “learn” the building load patterns and the control system will then automatically adjust the CHP operation to maximise its efficiency and performance based on the actual building load profiles.

In order to optimize CHP operation and to achieve automatic modulation, CHP electrical connection shall be made on the mains incoming supply. After the CHP electricity feed in connection a set of current transformers (CTs) for a reference meter shall be installed.

The CHP shall have remote monitoring service provided by a SIM card installed within the Control Panel and shall not require any broadband connection. CHP performance information shall be available for viewing on the Control Panel display and via dedicated website. End user shall have access to the website through a site specific user name and password which will be available for use upon completion of commissioning.

A fire alarm/gas valve interface shall be provided to the CHP Control Panel in order to put the CHP unit in standby mode upon fire alarm activation prior to the gas valve closing. When the alarm has been de-activated, the CHP unit shall restart automatically.

Thermal Storage Vessel

In order to ensure maximum utilisation of the available CHP capacity, a thermal store shall be provided within the CHP package so that heat can be generated and stored during periods of high electricity demand and low heating demand. The temperature of the thermal store contents shall be controllable by a fully automatic multi-sensor system. To prevent unwanted mixing of flow and return water inside the thermal store, single pipe connections shall be used at the top and bottom of the vessel. The capacity and type of vessel shall be selected in-line with the CHP manufacturer's guidance to ensure the correct operation and optimised efficiency of the system. The specifically designed and connected storage vessel shall maintain a separation layer between the cold return water and the hot flow water. The movements of this separation layer shall be monitored by the CHP control system and used for CHP start signals.

Thermal storage vessel, 6 bar working pressure shall be provided with:

1. 100 mm polyurethane thermal insulation suitable for indoor installation.
2. Internal diffusers to minimize turbulence caused by incoming/outgoing flows.
3. Mountings for 4 (or 8 on larger vessel) off Q-Network Storage Control thermal probes.
4. Q-Network Storage Control system, which manages the vertical level of the intermediate layer between hot and cold water in the vessel.

In order for the CHP to effectively deliver financial and environmental benefits it shall be designed to operate only when it is efficient to do so. Under no circumstances shall heat rejection equipment be utilised to dump heat.

G83/2 relay

The CHP connection must comply with Engineering Recommendation G83/2 published by the Electricity Networks Association (ENA). The CHP Control Panel shall include a mains monitoring and Type Tested protection relay as required by ER G83/2. In addition, notification must be completed to the DNO/IDNO through a notification process, within 28 days after Commissioning. The specialists CHP supplier shall include within their scope for the administration of the G83/2 notification.

Installation

All proposed elements of the CHP system must be suitable for installation within the plant room (as indicated on layout drawing) including all clearance, maintenance, ventilation and flue requirements etc.

The contractor shall be responsible for the supply and installation of the CHP exhaust/flue system. The installation shall be fully compliant with the manufacturers' requirements and recommendations and in full compliance with the clean air act. The CHP unit shall be installed with separate dedicated flue with condensate trap and outlet to drain.

Installer shall refer to design drawings for installation arrangement and system details. The CHP equipment shall be installed to the manufacturer's instructions including all necessary wiring and interconnecting pipework and valves between the CHP components and between the CHP and the main LTHW and LV system.

All testing and commissioning required to provide a fully operational CHP system shall be carried out by manufacturer/ supplier.

The CHP equipment shall have 24 months manufacturer's warranty commencing from the date of commissioning, or 90 days from the date of delivery, whichever is the earlier.