

Performance and Product Quality Certification for micro-Combined Heat and Power Units

Eurovent Certita Certification has developed and published in December 2017 a certification scheme for micro-Combined Heat and Power (mCHP) units. The programme built under the French NF brand relies on state-of-art European testing standards and is in-line with the latest regulations. The construction of the scheme has been collectively realized with the major European key players of the mCHP field: mCHP manufacturers, research centers, testing laboratories, government authorities, prescribers and customer representatives.

Background

Product overview and certification scope

Gas fueled micro-Combined Heat and Power units refers to technologies fueled with gas that generate both heat and electricity at the same time and with an electricity power lower than 50 kW. The CHP tech-



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nology has been used in the industrial sector since the 1960s but through technological development it has been adapted for domestic heat and power needs. The mCHP generators used in the unit are mostly internal combustion engines (ICE), Stirling engines and fuel cell technologies. The units commonly called mCHP boilers, are widely presented as the boiler of the future because of its high level of efficiencies and its consistency with the heat and power needs of low-energy housing.

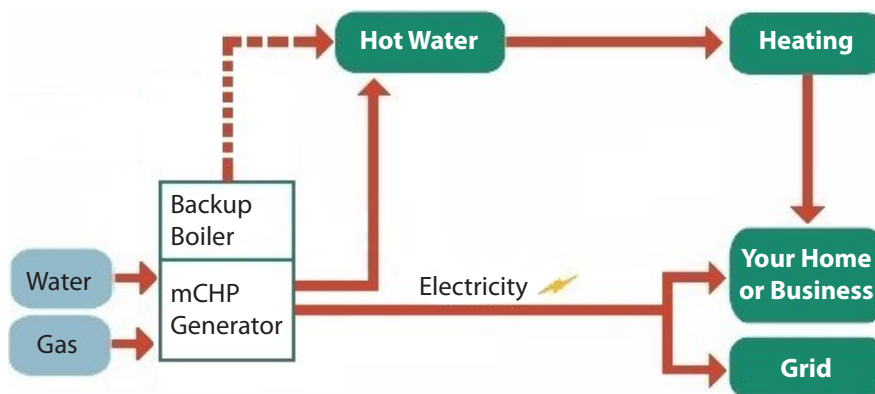


Figure 1. mCHP process diagram.

Certified performances:

Micro-combined heat and power unit		
Performance	Denomination	Threshold
Nominal thermal capacity (kWth)	$P_{thn_CHP100+Sup100}$	-
Thermal efficiency (%) - based on lower heating value	$\eta_{th_CHP100+Sup100}$	-
Electrical efficiency (%) - based on lower heating value	$\eta_{el_CHP100+Sup100}$	-
Global efficiency (%) - based on lower heating value	$\eta_{CHP100+Sup100}$	-
Seasonal Efficiency (%)	η_s	$\eta_s > 102\%$
Auxiliary Electrical Energy Consumption (kW)	P_{auxmax}	-
Electrical nominal power (kWe)	P_{eln}	-
Standby mode losses (kW)	P_{stby}	-
Auxiliary energy in standby mode (kW)	P_{SB}	-
Thermal minimal power (kWth)	P_{min}	-
Nitrogen oxides emissions (mg/kWh)	NO_x	NOx < 70 mg/kWh (Stirling) NOx < 240 mg/kWh (ICE)
Sound Power level (dB)	L_{wa}	-
Annual consumption of heating combustibles (GJ PCS)	Q_{HE}	-
Principal heat and power generator		
Nominal thermal capacity (kWth)	$P_{thn_CHP100+Sup0}$	-
Thermal efficiency (%) - based on lower heating value	$\eta_{th_CHP100+Sup0}$	-
Electrical efficiency (%) - based on lower heating value	$\eta_{el_CHP100+Sup0}$	-
Global efficiency (%) - based on lower heating value	$\eta_{CHP100+Sup0}$	-
Auxiliary electrical energy consumption (kW)	P_{auxmin}	-
Auxiliary heat generator		
Nominal thermal capacity (kWth)	$P_{Sup_CHP0+Sup100}$	-

The NF certification scope covers gas fueled mCHP units using an internal combustion engine, Stirling engine or a fuel cell technology. Units considered are gas fueled units that may include, as the case may be, a heat accumulator or/and a backup boiler. Units must be delivered as a complete unit or assembly of components referenced and designed to be installed together.

The mCHP domestic market: a young market with promising perspectives of growth

The technology has known up to now a non-uniform deployment through the World and Europe. Japan is considered as the precursor especially for fuel cell technologies, in Europe Germany has the lead. Several experimental demonstrations have been realized at European and National stages such as the ENE FIELDS project (1000 housings equipped in 11 European countries), the CALLUX project (800 units deployed in Germany) or EPILOG project in France... The technology has proved its worth and waits now to be fully supported and deployed in the European energy landscape.

The regulatory environment

The regulatory environment has evolved recently in France to consider these technologies on the market. In Particular, a decree for Feed-in tariffs for electricity (C16 decree) has been published, defining the electricity purchasing prices of mCHP units. The purchasing prices are defined according to the Primary Energy Savings (Ep) of the unit, calculated as follow based on the thermal end electrical efficiencies (η) of the machine, both certified in the NF mCHP certification scheme:

$$E_p = \left(1 - \frac{1}{\frac{\eta_{th_CHP100+Sup0}}{\eta_{Réf_th}} + \frac{\eta_{el_CHP100+Sup0}}{\eta_{Réf_el}}} \right) \times 100\%$$

As well the French Thermal regulation for buildings (RT2012) has been updated to consider fully the three technologies of generators in the calculation tools.

At the European stage, two key regulations are considered in the scheme, the Ecodesign and Energy labeling (ErP) and the European regulation for gas appliances. More specifically, the ErP has been completed with two application regulations that deal with mCHP boilers: the regulations 811/2013 [1] and 813/2013 [2], both giving accurate expectations and thresholds on the performances of the units.

The NF micro-combined heat and power brand: an independent and third party recognition of the product’s performances and quality

The NF certification brand, well-known in France and through Europe, guarantees the level of performances and product quality declared by the mCHP manufacturers. It generates clarity and transparency on the market, display understandable information on the performances and product quality, enabling end-users to compare objectively the products on the market.

The NF mCHP certification process is a reliable and robust process that includes yearly factory assessment audits and third-party product testing. The testing protocols, calculation methods, and denominations have all been harmonized to rate fairly and identically the products on the market.



Figure 2. NF mCHP marking.

The testing methods are based on the European testing standards **EN 50465 March 2015** “Gas appliances - Combined heat and power appliance of nominal heat input inferior or equal to 70 kW” and **EN 15036-1 mai 2007** “Airborne noise emissions from heat generators”.

For further information on the NF mCHP certification scheme or to apply for the certification, please feel free to contact Eurovent Certita Certification (apply@eurovent-certification.com) specifying “NF-Micro Combined Heat and Power” in the mail object. There is no deadline as this is a voluntary registration. ■

Reference documents

- [1] COMMISSION DELEGATED REGULATION (EU) No 811/2013 of 18 February 2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device.
- [2] COMMISSION REGULATION (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters