



ESPE CHiP50 cogenerator uses wood chips as fuel for gasification. The “synthesis-gas fuel” (Syngas) obtained is fuel feeding the micro-cogeneration unit, which provides the combined production of electricity and thermal energy: this device can supplement or replace boilers for industrial, handicraft and agricultural production cycles and produce electricity from renewable sources.

The gasification process can be summarised in the following stages:

1. suitably dried wood chips are conveyed to the gasification chamber (reactor)
2. the chip pyrolyzes inside the reactor, producing Syngas, Tar and Char
3. part of the products of the pyrolysis burn with air to supply heat
4. gases react with the residual organic compounds to produce additional CO and H₂
5. the residual organic compounds and the ashes fall through the lower grille

Typical thermochemical reactions within the gasification processes:

Oxidation area:	Reduction area:
$C + O_2 \rightarrow CO_2$	$C + CO_2 \leftrightarrow 2 CO$ (Boudouard reaction)
$C + \frac{1}{2} O_2 \rightarrow CO$	$C + H_2O \leftrightarrow CO + H_2$ (Hydrogen reaction)
$H_2 + \frac{1}{2} O_2 \rightarrow H_2O$	$C + 2 H_2 \leftrightarrow CH_4$ (Methane reaction)

Typical Syngas composition

(ESPE laboratory test data with wood moisture 8%):

CO: 17 - 20 Vol.-%	CnHm: 0,1 - 0,5 Vol.-%
H ₂ : 13 - 16 Vol.-%	CO ₂ : 8 - 12 Vol.-%
CH ₄ : 1 - 4 Vol.-%	N ₂ : Rest 53,5 Vol.-%

Why ESPE CHiP50?

CHiP50

- Industrial-scale machine, suitable for continuous cycle operation
- Use of the best available materials and components

- Total control of the system and process with industrial monitoring
- Automatic, simple and fast daily operation
- Clean, stable gasification without filters for Syngas cleaning (which would lead to a plant engineering and filtered

- material management complication)
- Specially designed industrial type combustion motor designed for Syngas
- Easily adaptable to the specific needs of installation sites





Cogenerator*	
Technology	internal Otto cycle combustion engine with three-phase direct coupling alternator
Motor characteristics	Liquid cooled
Fuel	Syngas from wood chips
Height dimensions	2000 mm
Width dimensions	1400 mm
Length dimensions	3050 mm
Displacement	12000 cm ³
Number of cylinders	6
RPM	1500 rpm
Gross electric power	49 kW _e
Number of phases	4 with spark ignition
Operating voltage	400 V
Output current	85 A
cos PHI	0.83
Noise	93 db
Gross thermal power	110 kW _t

Gasifier*	
Gasifier type	parallel flow fixed bed gasifier (or Downdraft)
Height dimensions	3350 mm
Base dimensions	1300 mm
Length dimensions	5300 mm
Weight	2700 kg
M10 chip supply flow	49 kg/h
Average generated Syngas flow	0.036 kg/s
Average Syngas LCV (if chip LCV = 18 MJ/kg)	5.5:6 MJ/kg
Average gasification efficiency	>75%
Ash produced	max 5% weight of input chips
Ash removal	Automatic
Chip feeding	Automatic
Operating temperature	>1000 °C

Cogenerator suitable for network supply in accordance with standard CEI 0-21 Emissions in compliance with Annex X of Italian Decree No. 152/2006.

Supplied data refer to standard frame configuration machines. An enclosed configuration is also available.

* All data described is based on fir tree chips with the following characteristics: Max water content of wood chips entering the gasifier: 10%.

Chip sizing: P 50 Main fraction 3.15mm < P < 50mm, min 80%, fine fraction < 1mm, max 5%, coarse fraction > 50 mm, max 1%

Process diagram

