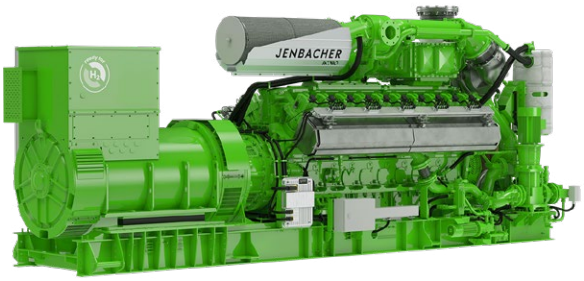
JENBACHER

JENBACHER TYPE 4

An efficiency milestone delivering high reliability and availability

Based on proven design concepts of Types 3 and 6, the modern Jenbacher Type 4 engines in the 800 to 1,560 kW power range are characterized by high power density and outstanding efficiency. Enhanced control and monitoring support simplified preventative maintenance, as well as high reliability and availability.



Reference installations

J416 – Muddy Creek Wastewater Treatment Plant, U.S.



Winston-Salem/Forsyth County Utilities used a sewage gas-fueled Jenbacher J416 engine to reduce energy costs and boost efficiency at the Muddy Creek Wastewater Treatment Plant. The combined heat and power (CHP) system also can send electricity to the local power plant, generating additional revenue.

Engine	1 x J416
Electrical output	3,890 MBTU/hr
Thermal output	2,747 MBTU/hr
Energy source	Sewage gas
Commissioning	2020

J420 – Chok Yuen Yong Industry Co., Ltd, Thailand



Five biogas-fueled Jenbacher J420 engines produce more than enough electric power to supply Chok Yuen Yong Industry's tapioca starch factory. The excess electricity produced by the engines – about 3,412 MBTU/hr – is supplied to the public grid to further reduce the facility's power costs.

Engines	5 x J420
Electrical output	24,225 MBTU/hr
Thermal output	17,742 MBTU/hr
Energy source	Biogas
Commissioning	2012, 2017

J420 – Gasgreen Energía, Ecuador



In 2016, two of INNIO's Jenbacher J320 gensets began delivering 2 MW of power running on renewable landfill gas from the Gasgreen Energía landfill site. Based on that success, three Jenbacher J420 engines were added in 2017. Today, the power plant delivers a combined 5 MW of electricity to more than 25,000 homes in Ecuador and annually saves 26 million cubic meters of landfill gas from being released into the environment.[1]

Engines	2 x J320, 3 x J420
Electrical output	17,060 MBTU/hr
Thermal output	-
Energy source	Landfill gas
Commissioning	2016, 2017

[1] emgirs.gob.ec/index.php/noticiasep/398-quito-se-destaca-en-el-ecuador%02al-producir-energia-electrica-de-la-basura

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Technical features

Feature	Description	Advantages
Heat recovery	Flexible arrangement of heat exchanger, including an optional two-stage oil plate heat exchanger on demand	— High thermal efficiency, even at high and fluctuating return temperatures
Gas dosing valve	Electronically controlled gas dosing valve with a high degree of control accuracy	— Fast response time — Rapid adjustment of air/gas ratio — Wide adjustable calorific value range
Four-valve cylinder head	Enhanced swirl and channel geometry developed using advanced computational and simulation methods (CFD)	— Reduced charge-exchange losses — Central spark plug position supporting optimal cooling and combustion conditions
Crack connecting rod	Proven technology from the automotive industry applied in high-performance stationary engines	— High dimensional stability and accuracy — Reduced connecting rod bearing wear — Simplified maintenance

Technical data

Configuration			V 70°
Bore (inch)			5.71
Stroke (inch)			7.28
Displacement/cylinder (cu.in)			186.7
Speed (rpm)			1,800 (60 Hz)
Mean piston speed (in/s)			437
Scope of supply			Generator set, cogeneration system, generator set/ cogeneration in container
Applicable gas types			Natural gas, flare gas, biogas, landfill gas, sewage gas, special gases (e.g., coal mine gas, coke gas, wood gas, pyrolysis gas)
Engine type	J412	J416	J420
No. of cylinders	12	16	20
Total displacement (cu.in)	2,239	2,984	3,728

		Dimensions l x w x h (inch)
Generator set	J412	220 x 75 x 90
	J416	250 x 75 x 90
	J420	280 x 75 x 90
Cogeneration system	J412	240 x 75 x 90
	J416	270 x 75 x 90
	J420	280 x 75 x 90
Container[2] 40-foot	J412	480 x 120 x 110 – 200
	J416	480 x 120 x 110 – 200
	J420	480 x 120 x 110 – 200
		Weights empty (lbs)
Generator set	J412	24,480
	J416	27,780
	J420	34,620
Cogeneration system	J412	25,800
	J416	29,100
	J420	35,490

Outputs and efficiencies

Natural gas			1,800 rpm | 60 Hz			
NO_x <	**Type**	**Pel (kW)[3]**	**Pth (MBTU/hr)[4]**	**ηel (%)[3]**	**ηth (%)[4]**	**ηtot (%)**
1.0 g/bhp.hr	J412	853	3277	41.7	46.9	88.6
	J416	1142	4371	41.8	46.9	88.7
	J420	1556	5879	42.6	47.2	89.8
0.5 g/bhpr	J412	853	3422	40.7	47.9	88.5
	J416	1142	4564	40.9	47.9	88.7
	J420	1556	6057	41.7	47.6	89.3

Biogas			1,800 rpm | 60 Hz			
NO_x <	**Type**	**Pel (kW)[3]**	**Pth (MBTU/hr)[4]**	**ηel (%)[3]**	**ηth (%)[4]**	**ηtot (%)**
1.1 g/bhp.hr	J412	853	3126	41.2	44.2	85.4
	J416	1142	4163	41.4	44.2	85.5
	J420	1560	5633	42.0	44.5	86.5
0.6 g/bhpr	J412	853	3184	40.5	44.3	84.8
	J416	1142	4221	40.6	44.0	84.7
	J420	1560	5739	41.3	44.6	85.9

[2] The dimensions refer to the standard base models with horizontal exhaust silencer.
[3] Technical data according to ISO 3046
[4] Total heat output with a tolerance of +/- 8%, exhaust gas outlet temperature 120°C, for biogas gas outlet temperature 180°C

All data according to full load and subject to technical development and modification. Additional engine versions available on request.

In general, "Ready for H_2" Jenbacher units can be converted to operate on up to 100% hydrogen in the future. Details on the cost and timeline for a future conversion may vary and need to be clarified individually.

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