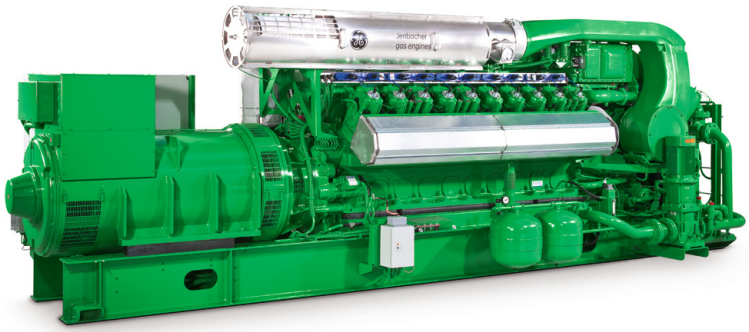
NORTHEAST ENERGY SYSTEMS™ Power Systems Specialists

WESTERN ENERGY SYSTEMS™ Power Systems Specialists

Jenbacher type 4

An efficiency milestone

Based on the proven design concepts of types 3 and 6, the modern type 4 engines in the 800 to 1,500 kW power range are characterized by a high power density and outstanding efficiency. The enhanced control and monitoring provides easy preventive maintenance, high reliability and availability.



Reference installations

J412 Union Sanitary District; Union City, CA

Fuel	Engine type	Electrical output	Thermal output	Commissioning
Biogas - Natural gas	2 x J412	1,704 kW	6,447 MBTU/hr	June 2015

Fuel blending on biogas sites allows a minimum amount of natural gas to be used to maintain a stable level of energy consistently flowing to the engine. This green site produces electricity for the plant and heat to the digester to speed bio-fuel production.

J416 City of Hayward WWTP; Hayward, CA

Fuel	Engine type	Electrical output	Thermal output	Commissioning
Biogas - Natural gas	1 x J416	1,137 kW	4,296 MBTU/hr	April 2015

Another biogas fuel blending site where natural gas is used to maintain consistent power output. The generator is fueled by biogas from sewage and the heat returns to the digester to speed biogas production.

J420 Foundry; South Gate, CA

Fuel	Engine type	Electrical output	Thermal output	Commissioning
Natural gas	1 x J420	1,426 kW	5,536 MBTU/hr	October 2012

Containerized JMC 420 produces valuable electricity for Foundry Jacket water heat is used for chilling and exhaust heat is used to pre-warm metal before it is melted.

J420 Anchorage Regional Landfill; Anchorage AK

Fuel	Engine type	Electrical output	Thermal output	Commissioning
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This project, owned and operated by Doyon Utilities LLC, takes landfill gas from Anchorage Regional Landfill and produces power for Joint Base Elmendorf-Richardson (JBER). Anchorage is now getting paid for their landfill gas and JBER is receiving 7MW of green landfill gas energy.

Technical features

Feature	Description	Advantages
Heat recovery	Flexible arrangement of heat exchanger, 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 high degree of control accuracy	- Very quick response time - Rapid adjustment of air / gas ratio - Large adjustable calorific value range
Four-valve cylinder head	Enhanced swirl and channel geometry using advanced calculation and simulation methods (CFD)	- Reduced charge-exchange losses - Central spark-plug position resulting in optimal cooling and combustion conditions
Crack connecting rod	Applying a technology – tried and tested in the automotive industry – in our powerful stationary engines	- High dimensional stability and accuracy - Reduced connecting rod bearing wear - Easy to maintain

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	J412	480 x 120 x 110
	J416	480 x 120 x 110
	J420	480 x 120 x 110

Weights empty (lbs)	J412	J416	J420
Generator set	24,480	27,780	34,620
Cogeneration system	25,800	29,100	35,490

Outputs and efficiencies

Natural gas		**1,800 rpm | 60 Hz**				
NOx <	**Type**	**Pel (kW)[1]**	**ηel (%)[1]**	**Pth (MBtu/hr)[2]**	**ηth (%)[2]**	**ηtot (%)**
1.0 g/bhp.hr	J412	850	41.2	3,344	47.4	88.6
	J416	1,141	41.5	4,459	47.5	88.9
	J420	1,426	41.4	5,570	47.4	88.8
0.5 g/bhp.hr	J412	850	40.0	3,456	47.7	87.8
	J416	1,141	40.3	4,606	47.7	88.0
	J420	1,426	40.3	5,757	47.7	88.0

Biogas		**1,800 rpm | 60 Hz**				
NOx <	**Type**	**Pel (kW)[1]**	**ηel (%)[1]**	**Pth (MBtu/hr)[2]**	**ηth (%)[2]**	**ηtot (%)**
1.0 g/bhp.hr	J412	850	40.2	3,262	45.2	85.3
	J416	1,141	40.4	4,347	45.1	85.6
	J420	1,426	40.4	5,439	45.2	85.6
0.6 g/bhp.hr	J412	850	39.3	3,375	45.7	84.9
	J416	1.137	39.5	4,501	45.7	85.2
	J420	1.426	39.5	5,623	45.7	85.2

1) Technical data according to ISO 3046
2) 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.

Further engines versions available on request.

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