MIF NC 2500 L Natural gas genset 2000 kW Continues Power

MIF PLUS INTERNATIONAL DANISMANLIK HIZMETLERI A.S.
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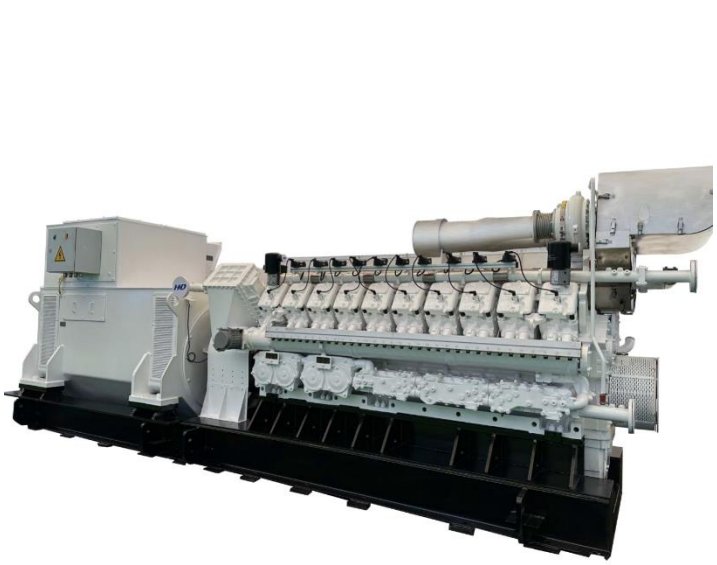

Group		Continuous output
Power	kVA	2500
Power	kW	2000
Engine Speed	rpm	1500
Standard Voltage	V	231/400
Power Factor	Cos Q	0,8
Gas consumption at 100% power (Hu = 35.88MJ/m3)	Nm3/h	527

CONTINUOUS POWER RATING (COP): COP is the power that the engine can continue to use under the prescribed speed and the specified environment condition in the normal maintenance period stipulated in the manufacturing plant. Continuous Power is applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

1. GENERALLY

The main equipment of this project is a HND CHG622V20 container gas generator set, the rated power of the single generator set is 2000 kW, the continuous output power is 2000 kW, and the output voltage is 231/400V. The power station can be operated in the grid-connected mode or the parallel island operation between the HND generator sets, and the cooling method is closed radiator.

2. STANDARD BENCHMARK CONDITIONS

When the environmental conditions do not meet the below items, the power should be corrected according to the manufactory standard.

Atmospheric pressure	100 kPa
Relative humidity	30% — 80%
Ambient air humidity	25°C

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3. GAS TECHNICAL CONDITIONS

Methane content	≥90%
Methane Number	≥80
Gas pressure	12~40 kPa
Gas temperature	≤35°C
Gas moisture	Unsaturated free water
Hydrogen sulfide(H2S) content	≤20 mg/Nm3
Total sulfur(S) content	≤200 mg/Nm3
Carbon dioxide content	≤3% (V/V)
The solid particles in the gas should not be larger than 5μm, and the content should not be larger than 30 mg/m3. If it is not satisfied, a gas processing device should be added	
Interface pipe size of gas is DN100 PN16	
Note: If the gas conditions do not meet the above conditions, the power shall be corrected according to Party B's factory standard	

4. GENERATOR SET CONTAINER

The generator set container adopts the 40-foot container base (20000 x 3500 x 3500 mm), the container adopts the integral frame structure, the box is installed inside the unit, the control cabinet, ventilation and lighting equipment, the unit noise reduction equipment, the unit starting system equipment, the gas branch pipeline equipment, the radiator, etc., the box is installed on the top of the silencer, exhaust explosion-proof valve, etc. The gas generator set container is transported as a whole, which is convenient for hoisting, positioning and installation after going to the site. The equipment installed on the top of the box and the connection pipes between the equipment and the installation bracket are placed in the transport container in the form of loose parts and shipped to the site for installation, and finally combined into a fully functional gas power station.

There are all main external interfaces in the two sides or top of each gas generator container:

Engine gas inlet	Flange DN100 PN16 （GB9119）	1 unit
● Exhaust interface	Flange DN400 PN16 （GB9119）	1 unit
● Cooling water interface	Flange DN150 PN16 （GB9119）	4 unit
● High voltage cable entry		1 unit
● Low voltage cable entry		1 unit
● Automatic control cable outlet		1 unit

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4.1 Gas generator sets

HND CHG622V20 gas engines match with Leroy-Somer Alternator, through high elastic coupling connection install on a pallet, coupler use German VULKAN brand product, cooperate with other systems to form a container-type power plant. Adopt a horizontal radiator for cooling, which will be transported separately and placed on top of the container-type power plant during field installation. The noise satisfies ≤85dB at 10 meter outside from the container.

GENERATOR BASIC PARAMETERS TABLE

Gas generator type	**MIF NC 2500 H**
Gas engine type	CHG622V20
Primary rated power (kW)	2000
Current (A)	3613
Voltage(V)	231/400
Rated speed (r/min)	1500
Power factor Cosϕ	0.8
Rated frequency (Hz)	50
Voltage regulation method	Automatically adjust
Speed regulation method	Electronic governor
Excitation	Brush less excitation
Cooling system	Horizontal radiator
The ways of generator outgoing lines	Three-phase and three-wire system
The environment temperature	40°C
Operation mode	Isolated operation or parallel operation
Working hours for per year	7200 hours
Generator set technology type	Four-stroke, water-cooled, turbocharger inter-cooling, air-fuel ratio control, spark plug ignition, electronic control, air and CH4 are mixed externally
First major overhaul	64000 hours
Container generator L*W*H (mm)/=Weight (kg) (Silencers and radiators are not included)	Please refer to the drawing
Design life of generator set	≥20 years

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ENGINE HEAT PARAMETER

		50%	75%	100%
Power output	kW	1000	1500	2000
Gas flow (Hu = 35.88MJ/m3)	Nm3/h	305	419	527
Total energy	kW	3037	4175	5211
Air flow	Nm3/h	4365	6000	7490
Air flow	kg/h	5630	7740	9662
Flue gas flow	Nm3/h	5669	6419	8013
Flue gas flow	kg/h	5859	8055	10054
Exhaust energy at 120°C	kW	550	817	1188
Jacket water energy	kW	913	1209	1334
Jacket water flow	m3/h	85	85	85

4.2 Engine Control System

The gas control system of HND gas engine uses the products of "HEINZMANN GmbH", which is the best combustion management in the world today. The air-fuel ratio control system, speed control system, ignition system and knock control system all use the PG+ system imported from the United States.

- Air-fuel ratio control system (Lean Combustion):
  Adopt lean combustion technology and accurate electronic control parameters such as ignition timing and air-fuel ratio to adapt more widely type range of gas. Ensure to get more power with lower gas consumption.
  ① Digital microprocessor control technology should be able to automatically and accurately control engine power, air-fuel ratio, ignition timing, and reduce NOx emissions while maintaining appropriate gas consumption.
  ② The air-fuel ratio control system can keep NOX emissions within a smaller fluctuation range under all environmental and operating conditions. The engine requires almost no need adjust when the ambient temperature and air humidity changed.
  ③ Through automatically adjusting the ignition timing, ensuring gas engine running with the best performance, and restraining NOx bring into existence.

4.3 Alternator

The LSA52.3 L12 alternator of Nidec Leroy-Somer was used. Nidec Leroy-Somer is a world leader in electromechanical and electronic drive systems and the world leader in industrial alternators. Founded in 1919, Leroy-Somer is a French company employing 6200 people in 28 production units and 470 points of sale and service worldwide.

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ALTERNATOR PERFORMANCE

Item	Mes. Unit	Parameter
Rated Power	kVA	2500
Power factor		0.8
Frequency	Hz	50
Voltage	V	231/400
Rated Speed	rpm	1500
Permissible Overspeed	rpm	1800
Insulation grade		H
Level of insulation protection		IP23

4.4 GENSET control system

The unit control system is equipped with 4200A circuit breaker and the ComAp unit controller is used to control the unit's start, stop, grid connection, power, etc. At the same time, it has the functions of controlling container ventilation, lighting, gas leakage protection and stop, and cooling system equipment operation.

4.5 Cooling system (Horizontal type fan cooling)

The unit adopts vertical radiator cooling mode, which integrates inter-cooler and cylinder liner water radiator. The engine is installed on the same base, and the belt drive is used to drive the fan to rotate for heat dissipation. The cooling system is equipped with preheating device to optimize the low temperature start performance.

4.6 Exhaust system

The exhaust system includes exhaust muffler, exhaust explosion-proof valve, Install it on the top of the container. Exhaust muffler should adopt industrial-grade, fire-extinguishing muffler, capacity of muffler not less than 25dB (A), equipped with a condensate drainage device.

4.7 Gas transmission system

Gas system includes pressure reducing valves, solenoid shut-off valves, manual shut-off valves, filters and other equipment, which are installed inside into the container. The main valves of the gas transmission system adopt original German DUNGS products or at the same level product. DUNGS has Vibration tested combination controls Multi block and Gas Bloc according US Military Standard MIL-STD-810G/31.Worldwide support via DUNGS branches and subsidiaries in more than 50 countries.

4.8 Heat recovery system

CHG622V20 container gas generator set is equipped with a set of hot water type recovery boilers that utilize the heat of the flared gas to heat softened water provided by the customer. The waste heat boiler is equipped with safety valve, pressure gauge, temperature gauge, etc. For detailed parameters, see the system diagram.

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5. MAIN PARTS MANUAL

No	Item	Qty	Description	Marks
A. MIF NC 2500 H Container gas generator				
1.	MIF NC 2500 H gas generator	1 unit	2000 kW	1500 r/min
1.1	CHG622V20 gas engine	1 unit	HND	
1.2	Alternator	1 unit	Nidec Leroy-Somer	
1.3	Common base	1 unit		
1.4	Elastic coupling	1 unit		
1.5	Engine control system	1 set	HEINZMANN	
2.	Auxiliary power distribution cabinets	1 set	HND	
3.	Genset control system	1 set	ComAp control	
4.	Genset cooling system	1 set		
4.1	Horizontal type radiator	1 set		
4.2	Water pump	2 units		
4.3	Electric three-way valve	1 unit		
4.4	Plate heat exchanger	1 unit		
5.5	Piping and brackets	1 set		
6.	Exhaust System	1 set		
6.1	Muffler	1 unit		
6.2	Exhaust explosion-proof valve	1 unit		
7.	Unit gas branch pipeline equipment	1 set	German DUNGS	
7.1	Filter	1 unit	DN100-PN16	
7.2	Shut-off solenoid valve	1 unit	DN100-PN16	
7.3	Branch pipes device	1 unit	DN100-PN16	
7.4	Piping and brackets	1 set		
8.	Hot water type waste heat boiler	1 set		
9.	Container	1 set	40 ft base (extend.)	
9.1	Ventilation system	1 set		With muffler
9.2	Lighting system	1 set		
9.3	Gas leak alarm system	1 set		
9.4	Noise reduction system	1 set		
9.5	Fire alarm / extinguishing system	1 set		
10.	Oxygen senser and cable	1 set		
11.	Electric Water Preheater	1 set		Option
12.	Battery charger	1 set		Option
13.	Spring shock absorber	1 set		Option
14.	High temperature butterfly valve	3 unit		