White Harvest
ENERGY

TECHNICAL SPECIFICATION

Avus 2000e

20V4000L64FNER TR | 2,518 kWe Natural Gas Generator Set

AT A GLANCE

Application	**Power generation**
Operation mode	**Grid parallel**
Electrical output	**2,518 kWe**
Electrical service	**480 V / 60 Hz**
Fuel	**Natural gas, CH_4 > 95 vol.%**
Methane number	**MN 80 nominal**
NOx (raw, dry)	**< 1 g/bhp-hr**
Electrical efficiency	**43.4 %**
Total efficiency	**90.0 %**
Reference conditions	**ISO 3046-1 / ISO 8528-6**

Manufacturer technical data

Prepared and issued by White Harvest Energy, an authorized 2G Energy sales distributor and service provider. Equipment data is OEM manufacturer data and is subject to project-specific engineering and technical revision. Performance figures apply at the stated layout conditions and are subject to project-specific derating. Source document: OEM technical data sheet TD_0930_L64_2518_60_1_EN_US, V5 (09.01.2024), GG20V4000D2.

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1 Layout conditions

Layout condition	Value
Application	**Power generation**
Operation mode	**Grid parallel**
Engine type	**20V4000L64FNER TR**
Voltage / frequency	**480 V / 60 Hz**
Cooling water temperature (in / out)	**171 / 198 °F**
NOx emissions (dry)	**< 1 g/bhp-hr**
Mixture cooler 1st stage water temperature (in)	**—**
Mixture cooler 2nd stage water temperature (in)	**136 °F**
Exhaust gas temperature	**777 °F**
Catalytic converter	**Not included**
Special equipment	**Gearbox**
Elevation above sea level	**328 ft (14.5 psi)**
Combustion air temperature	**95 °F**
Maximum ambient air dew point on site	**79.0 °F**
Standard specifications and regulations	**—**

Notes

- This configuration is supplied with a gearbox: the engine runs at 1,500 rpm and the gearbox steps the speed up to drive the generator at 60 Hz. Gearbox efficiency is given in section 8.
- A catalytic converter is not included in this configuration. Emission values in section 5 are raw engine-out values.

2 Energy balance

Energy balance	100 %	75 %	50 %	Unit
Electrical power [2], [3]	**2,518**	**1,888**	**1,259**	kWe
Energy input [4], [5]	**19,834**	**15,140**	**10,448**	kBTU/hr
Thermal output total [6]	**9,261**	**7,254**	**5,125**	kBTU/hr
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6]	**5,122**	**3,791**	**2,568**	kBTU/hr
Thermal output mixture cooler 1st stage [6]	**—**	**—**	**—**	kBTU/hr
Thermal output mixture cooler 2nd stage	**567**	**342**	**200**	kBTU/hr
Exhaust heat optional (248 °F) [6]	**(4,139)**	**(3,463)**	**(2,557)**	kBTU/hr
Engine power ISO 3046-1 [2]	**3,487**	**2,619**	**1,757**	bhp
Generator efficiency at power factor = 1	**97.3**	**97.3**	**96.8**	%
Electrical efficiency [4]	**43.4**	**42.6**	**41.1**	%
Total efficiency	**90.0**	**90.5**	**90.2**	%
Power consumption [7]	**—**	**—**	**—**	kWe

Notes

- Thermal output total is the sum of the engine thermal output and the optional exhaust heat recovered to 248 °F. The 2nd-stage mixture cooler heat is listed separately and is not included in that total.

3 Combustion air and exhaust gas

Combustion air / exhaust gas	100 %	75 %	50 %	Unit
Combustion air volume flow [1]	**5,734**	**4,290**	**2,896**	ft³/min
Combustion air mass flow	**27,748**	**20,759**	**14,013**	lb/hr
Exhaust gas volume flow, wet [1]	**6,024**	**4,512**	**3,049**	ft³/min
Exhaust gas volume flow, dry [1]	**5,391**	**4,028**	**2,715**	ft³/min
Exhaust gas mass flow, wet	**28,688**	**21,481**	**14,509**	lb/hr
Exhaust temperature after turbocharger	**777**	**836**	**890**	°F

4 Fuel

4.1 Reference fuel

Reference fuel	Value
Natural gas	**CH_4 > 95 vol.%**
Sewage gas	**Not applicable**
Biogas	**Not applicable**
Landfill gas	**Not applicable**
Propane HD 5	**Not applicable**

Notes

- Reference fuel per note (8): deviations from the layout parameters or the reference fuel can influence the efficiency and exhaust emissions obtained.

4.2 Fuel requirements

Fuel requirement	Value
Nominal rated methane number	**MN 80**
Range of heating value — design	**969.1 – 1,014.5 BTU/ft³**
Range of heating value — operation range without power derating	**773.0 – 1,062.8 BTU/ft³**

Notes

- Fuel requirements per note (9): functional capability.

5 Exhaust gas emissions

Raw emissions, dry. Catalytic converter not included.

Exhaust gas emission	Value
NOx, stated as NO_2 (dry)	**< 1 g/bhp-hr**
CO (dry)	**< 3 g/bhp-hr**
HCHO (dry)	**—**
VOC (dry)	**< 0.7 g/bhp-hr**

Notes

- Compliance with emissions standards only for ≥ 1,259 kWel.
- Values shown are raw engine-out emissions. See notes (23) and (24) in section 15 regarding engine certification status and the possible need for a catalyst.

6 Engine

Engine	Value
Combustion process	**Otto-gas engine, lean burn operation with turbocharging**
Number of cylinders / configuration	**20 / V**
Engine type	**20V4000L64FNER TR**
Engine speed	**1,500 rpm**
Bore	**6.7 in**
Stroke	**8.3 in**
Displacement	**5,817.39 in^3**
Mean piston speed	**34.45 ft/sec**
Compression ratio	**12.5**
BMEP at nominal engine speed	**314.5 psi**
Lube oil consumption (10)	**0.12 gal/hr**
Exhaust back pressure min. – max. after module	**12 – 24 in H_2O**
Turbocharger setting	**H65-TA55**

7 Generator

Generator	Value
Generator type	**LVSI804T2Wdg12**
Rating power (temperature rise class F) (11)	**3,360 kVA**
Insulation class / temperature rise class	**H / F**
Winding pitch	**2/3**
Protection	**IP23**
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) (12)	**0.8 / 1**

Generator	Value
Voltage tolerance / frequency tolerance	**± 5 % / ± 5 %**

8 Gearbox

Gearbox	100 %	75 %	50 %	Unit
Efficiency	**99.5**	**99.4**	**99.3**	%

9 Cooling circuits

9.1 Engine cooling water system

Engine cooling water system	Value
Coolant temperature (in / out), design	**171 / 198 °F**
Coolant flow rate, constant (13) (14)	**431.48 gal/min**
Pressure drop, design (14)	**45.9 psi**
Cv value (13) (15)	**243.2 gal/min**
Max. operation pressure (coolant before engine)	**87 psi**

9.2 Mixture cooler 1st stage, external

Mixture cooler 1st stage, external	Value
Coolant temperature (in / out), design	—
Coolant volumetric flow, design, constant (13) (14)	—
Pressure drop, design (14)	—
Cv value (13) (15)	—
Min. coolant flow rate / min. operation gauge pressure	—
Max. operation pressure before mixture cooler	—

Notes

- No external 1st-stage mixture cooler is configured on this data sheet. First-stage mixture cooling is carried within the engine circuit — see the engine thermal output row in section 2, which is stated for block, lube oil and 1st stage mixture cooler together.

9.3 Mixture cooler 2nd stage, external

Mixture cooler 2nd stage, external	Value
Coolant temperature (in / out), design	**136 / 143.0 °F**
Coolant volumetric flow, design, constant (13) (14)	**193.7 gal/min**
Pressure drop, design (14)	**12.17 psi**
Cv value (13) (15)	**213.6 gal/min**
Max. operation pressure before mixture cooler	**87 psi**

9.4 Heating circuit interface

Heating circuit interface	Value
Engine coolant temperature (in / out), design	—
Heating water temperature (in / out), design	—
Heating water flow rate, design (14) (16)	—
Pressure drop in heat exchanger, design (14)	—
Cv value (15) (16)	—
Max. operation gauge pressure (heating water)	—

Notes

- No heating circuit interface is configured on this data sheet. Recoverable exhaust heat is listed as an option in section 2.

10 Room ventilation

Room ventilation	Value
Genset ventilation heat (17)	**587 kBTU/hr**
Inlet air temperature (min. / design / max.)	**86 / 95 / 104 °F**
Min. engine room temperature (18)	**59 °F**
Max. temperature difference ventilation air (in / out)	**36 °F**
Min. supply air volume flow rate (combustion + ventilation) (19)	**21,000 ft³/min**

11 Starter battery and filling quantities

11.1 Starter battery

Starter battery	Value
Nominal voltage / power / capacity required	**24 V / 2 × 9 kW / — Ah**

11.2 Filling quantities

Filling quantity	Value
First filling quantity lube oil / refilling amount lube oil	**126 / 119 gal**
Coolant in engine circuit	**82 gal**
Coolant in mixture cooler	**7 gal**
Heating water for plate heat exchanger (20)	—
Lube oil for gearbox	**24 gal**

12 Gas regulation line

Gas regulation line	Value
Nominal size	**DN 100**
Gas pressure min. – max. (at gas regulation line inlet)	**2.4 – 3.6 psi**

13 Sound levels

13.1 Engine sound level

1 meter distance, free field.

Frequency	63	125	250	500	1000	2000	4000	8000
Sound pressure level (dB)	**93.1**	**95.1**	**91.5**	**95.0**	**93.5**	**92.8**	**91.8**	**99.7**

Engine sound level totals	Value
Linear total sound pressure level	**104.0 Lin dB**
A-weighted total sound pressure level	**102.0 dB(A)**
A-weighted total sound power level	**122.3 dB(A)**

Notes

- +3 dB(A) tolerance applies to the total A-weighted level; +5 dB applies to a single octave level.
- All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798 — see note (21).

13.2 Undampened exhaust noise

1 meter distance to outlet within 90°, free field.

Frequency	63	125	250	500	1000	2000	4000	8000
Sound pressure level (dB)	**118.4**	**118.9**	**108.8**	**100.5**	**91.9**	**91.5**	**91.8**	**84.1**

Exhaust noise totals	Value
Linear total sound pressure level	**122.0 Lin dB**
A-weighted total sound pressure level	**106.5 dB(A)**
A-weighted total sound power level	**119.4 dB(A)**

Notes

- +3 dB(A) tolerance applies to the total A-weighted level; +5 dB applies to a single octave level.
- Levels are undampened. Exhaust silencing is a project-specific selection.

14 Dimensions and weights

Aggregate dimensions.

Dimension / weight	Value
Length	**~ 280 in**
Width	**~ 80 in**
Height	**~ 100 in**
Weight	**~ 53,500 lb (~ 52,500 lb)**

Notes

- Dimensions and weights are approximate as published. Contact the OEM for certified drawings.
- Do not use these dimensions for installation purposes.

15 Technical framework

15.1 Configuration and boundary conditions

Configuration	Value
Power derating	—
Design drawing	—
Load step	—
Maintenance plan	—
Configuration change	**No**
Boundary conditions and consumables	**Systems and consumables have to conform to the actual company standard A001072**

15.2 Notes

Ref.	Note
(1)	Normal cubic meter at 15 psi and T = 273 K.
(2)	Prime power operation will be designed specific to the project.
(3)	Generator gross power at nominal voltage, power factor = 1 and nominal frequency (ISO 8528-6).
(4)	According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency.
(5)	Emission values during grid parallel operation.
(6)	Thermal output at layout temperature; tolerance +/- 8 %.
(7)	Max. admissible cos phi depending on voltage in accordance with the requirements of the valid "Standard specifications and regulations".
(8)	Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions.
(9)	Functional capability.
(10)	Reference value at nominal load (without amount of oil exchange), oil density set to 860 g/l.

Ref.	Note
(11)	If the voltage tolerance is greater than +/- 5 %, the theoretical service life of the insulation system may be reduced due to the permanent max. nominal conditions of the generator.
(12)	Max. allowable cos phi at nominal power (view of producer).
(13)	Stated values for cooling fluid composition 65 % water and 35 % glycol; adaption for use of other cooling fluid composition necessary. The system design must consider the tolerance.
(14)	Pressure loss at reference flow rate.
(15)	The Cv value declares the volumetric flow in gal/min at a pressure drop of 1 psi. Min. and max. flow rate limits are defined.
(16)	Stated values for pure water; adaption for other cooling fluid composition necessary.
(17)	Only generator and surface losses.
(18)	Frost-free conditions must be guaranteed.
(19)	Amount of ventilation air must be adapted to the gas safety concept.
(20)	Assemblies including pipe work.
(21)	All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798.
(22)	Max. admissible cos phi depending on voltage in accordance with the requirements of the valid "Standard specifications and regulations".
(23)	Non-certified engine. The owner/operator must comply with EPA 40 CFR 60 JJJJ, state and local requirements.
(24)	A catalyst may be required to meet applicable emission requirements. VOC emissions based on natural gas with C2+ < 4 %.