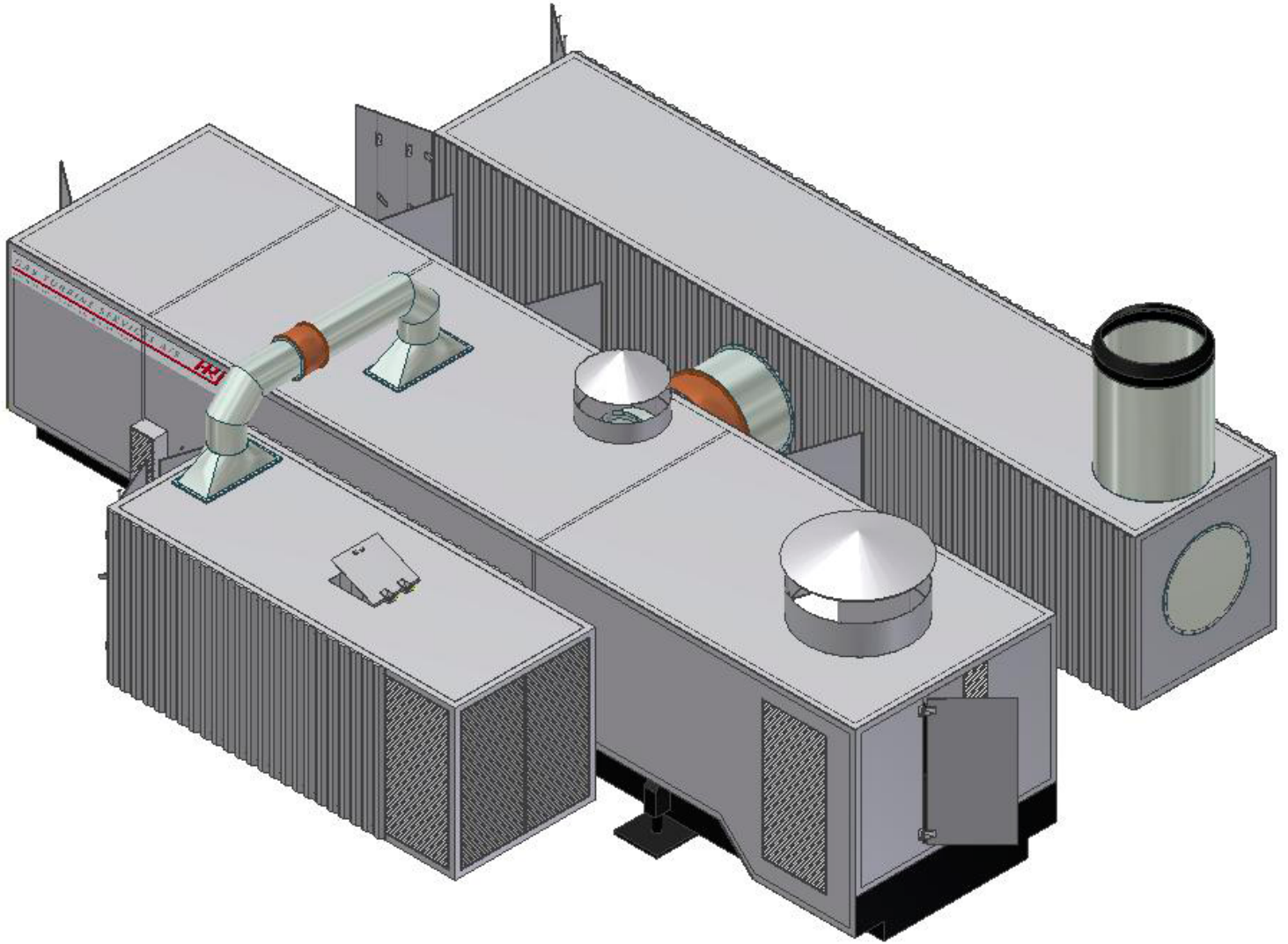


D & S Turbine International LLC
281-333-5652



MOBILE POWER GENERATION EQUIPMENT
Nomad 5 – 3.8 MW / 4875 KVA 50Hz 11KV Mobile Power Station



MOBILE POWER GENERATION EQUIPMENT

Nomad 5 – 3.8 MW / 4875 KVA 50Hz 11KV Mobile Power Station

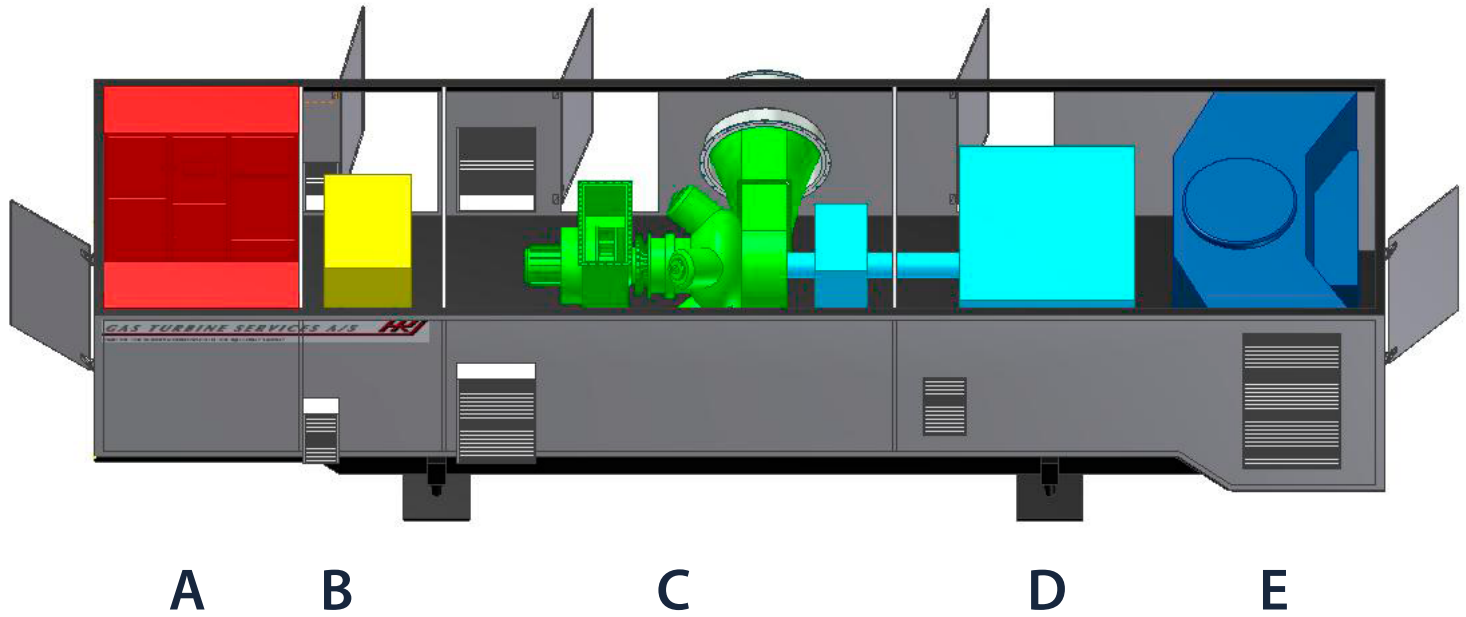
PURCHASE OPTIONS

The equipment is currently undergoing refurbishment. Based entirely on the purchaser's needs, location and regulatory compliance, it will be possible to choose between several refurbishment options.

EQUIPMENT OVERVIEW

The Nomad 5 is a complete, single-trailer power package, capable of generating up to 3.8MW ISO. It can easily and quickly be moved on a standard flatbed truck unit, transferring from one location to another as changing circumstances dictate and made operational less than 48 hours after arrival on site.

- Proven Reliability
- Liquid Fuel (Dual Fuel Capability, as an option)
- Black Station Start Capability
- Generator 3.8 MW, 4875 KVA 50HZ, 11KV
- Robust Design Operational in Extreme Climatic Conditions
- Acoustic Treatment



POWER STATION TRAILER EQUIPMENT PLAN COMPRISING

On Board Control Room – A

The air-conditioned control room houses the generator control and protection system, auxiliary and control batteries, system battery charger, motor control center and a selectable 400 VAC distribution board.

The distribution board inputs provide the facility for external customer supply, on board diesel generator supply for "Power Station Black Start Capability" and auto transfer to auxiliary transformer supply derived from the trailer alternator once the turbine driver is running.

Diesel Compartment – B

A 500 liter diesel fuel tank is integrated to the trailer chassis, housing a turbo charged diesel engine. Thus providing starting capability for the turbine and auxiliary power generation to provide power to the trailer 400VAC distribution board.

Turbine Compartment – C

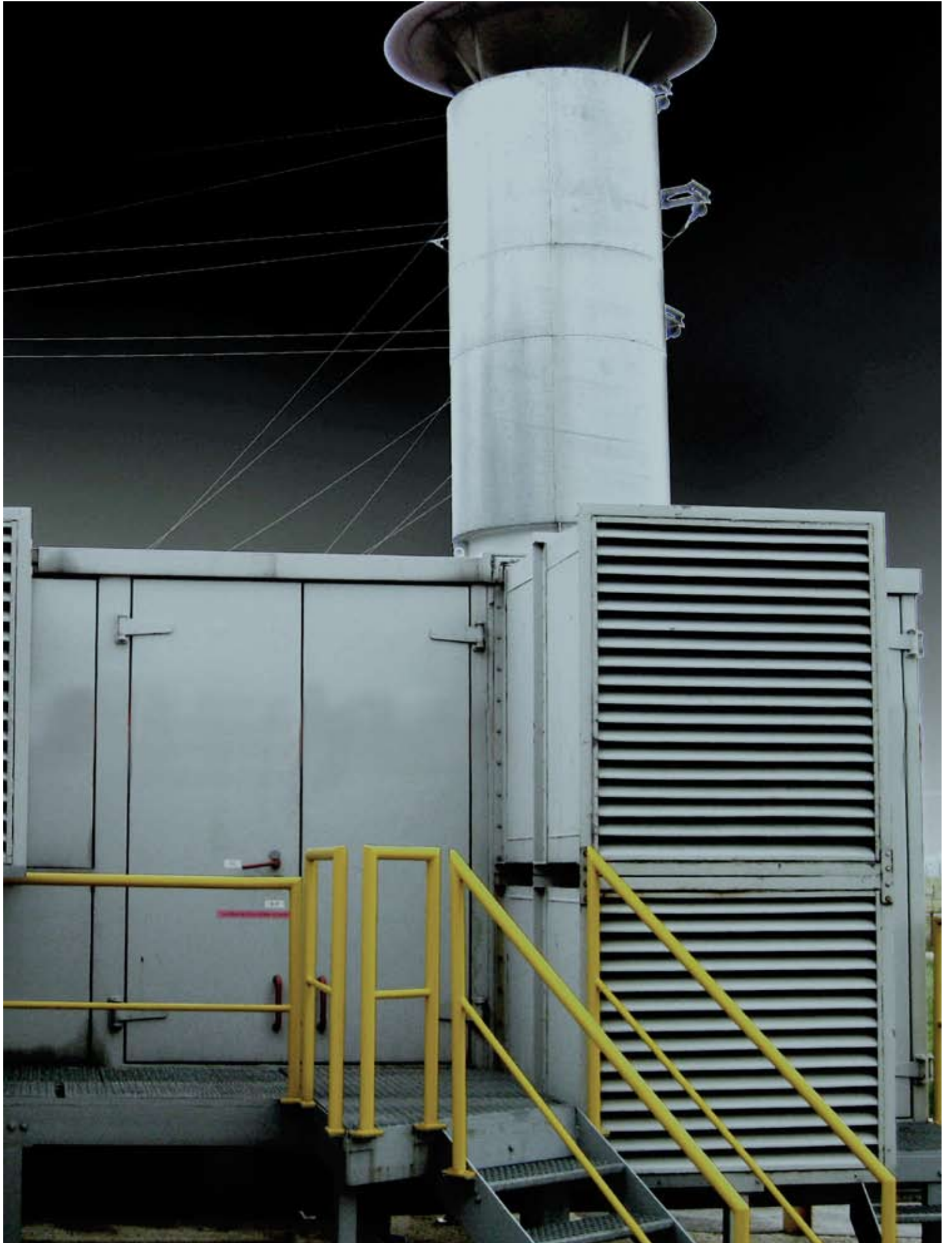
This compartment houses a TB5000 model gas turbine prime mover, turbine fuel and fluid systems, control devices, instrumentation, turbine lubrication oil tank and Allen type speed reduction gearbox.

Alternator Compartment – D

In this compartment is the GEC-Unipac alternator rated at 4875KVA and auxiliary transformer 11KV to 415VAC for trailer internal power distribution.

Cooler and Switchgear Compartment – E

The 11KV generator circuit breaker, the HV terminal chamber for connection to the customer's load, the turbine lubrication system air blast cooler and firefighting equipment are housed in this compartment.



TECHNICAL AND PERFORMANCE FEATURES OF THE NOMAD 5 MOBILE POWER STATION

STANDARD NOMAD 5 CONFIGURATION

Turbine Engine Core

Model TB5000 (5000 BHP ISO Base Load rating on gas fuel), twin shaft, heavy duty industrial gas turbine complete with:

- Air inlet casing phased upwards air inlet flexible joint
- Gas generator assembly
- Combustor assembly incorporating 4 combustion chambers
- Power turbine assembly
- Exhaust outlet casing phased vertically upwards
- Exhaust outlet flexible joint

Under Base

- Turbine underbase of fabricated carbon steel construction, designed for four-point mounting on full automatic hydraulic installation support jacks
- Hydraulic jacks designed for quick installation and easy moving of unit without crane work
- Mobile Unit can be placed on an uneven surface due to the adjustable hydraulic support jacks
- Turbine mounting, allowing thermal expansion
- Retractable lifting tubes to facilitate heavy lift handling
- Lubricating oil and auxiliary diesel fuel tanks integral to underbase

Acoustic Enclosure

Fitted over the turbine, gearbox and alternator and bolted to the turbine under base. Reduce package noise to an acceptable level. Enclosure incorporating:

- Internal lighting steel construction
- Access doors for personnel maintenance access
- Removable panels for maintenance access
- Acoustic enclosure ventilation inlet damper
- Acoustic enclosure ventilation outlet damper
- Acoustic enclosure ventilation air flow detector
- Acoustic enclosure ventilation system

Ventilation Filter

- High efficiency cleanable pad type combustion air filter

Ventilation Fan

- AC electric motor-driven ventilation outlet fan to Zone 1 classification, duct-mounted (Ex 'd' type)

Combustion Air Inlet System

- Standard 2 stage combustion air inlet filter with particle extraction louver integral to trailer housing

Combustion Exhaust System

- Exhaust diffuser with flexible joint and transition ducting to enclosure roof. (Exhaust stack as an option)

Lubricating Oil System

- Integral lubricating oil system, including all pipe work, serving the gas turbine, gearbox and driven unit
- Lubricating oil tank integral to trailer underbase
- Lube oil pressure and temperature transmitters
- Main pump, gearbox-driven
- Auxiliary pump, AC electric motor driven (pre start and post shutdown lubrication)
- Emergency pump, DC electric motor driven (emergency cooling)
- Lubricating oil supply piping in stainless steel downstream of filters
- Duplex filters with manual changeover valve; differential pressure gauge and differential pressure transmitter
- Lubricating oil pressure gauge and transmitter oil tank temperature transmitter
- Oil tank level gauge
- Oil tank low oil level transmitter

Lubricating Oil Cooler

- Air blast simplex vertical matrix lubricating oil cooler, suitable for high ambient temperature range

STANDARD NOMAD 5 CONFIGURATION

Lubricating Oil Breather

- Breather system internal to Acoustic Enclosure (including a carbon steel Sand Trap)
- Lube oil breather piping external vent
- Stainless steel flame trap for mounting in the external breather piping

Starting System

- Diesel engine driven hydraulic start system

Ignition System

- High tension igniters (4)
- Fully piped ignition system utilizing propane gas fuel supply

Gearbox and Coupling

- Direct coupled Epicyclic type gearbox manufactured by Allen Gears giving an output shaft speed of 1,500 RPM.
- Low maintenance output coupling between gearbox and AC generator.

Gas Fuel System Only

- Gas fuel piping in stainless steel
- Gas fuel pressure gauges for fuel valve and burners
- Gas fuel pressure relief valve
- Gas fuel pressure transmitter
- Gas fuel shutoff valve, emergency, rapid acting
- Gas fuel shutoff valve, manually operated
- Gas Fuel Valve

Liquid Fuel System Only

- Liquid fuel piping in stainless steel
- On trailer Duplex fuel filter permitting on line duty filter replacement
- AC motor driven liquid fuel boost pump, gearbox driven main fuel pump
- Governor-actuated fuel valve
- Solenoid-operated fuel shut-off valve
- Manual emergency shut-off valve
- Burner pressure gauge
- Gas ignition system
- Combustion chamber auto-drain valves

Fire Protection and Gas Detection System

The old firefighting system is upgraded by installing a new high quality fire fighting system, incorporating:

- DBI approved control panel.
- Detection, operation and surveillance are operated by the control panel
- The system is provided with emergency power for 30min operation, and change automatically to emergency power when power failure appears.
- 2 Ultra-violet flame detectors in the turbine section
- 2 Heat detectors in the engine starter section
- 2 Heat detectors in the generator section
- 2 Smoke detector in the control room
- 3 Gas detectors
- Energen fire protection system, approved for use in crew area
- Automatic extinguisher release and visible alarms

Turbine Compressor Cleaning System

- Cold turbine compressor wash system
- Mobile wash trolley, incorporating cleaning fluid/rinse tank fitted with integral pressure relief valve, air pressure control solenoid valve, air/ wash fluid flexible hose with quick release connections, and electrical cable
- Drain system incorporating automatic drain valve
- Pressure transmitter to monitor intermediate stage blow-off valves closing air pressure

AC Generator

- Brushless AC generator, voltage 11kv and frequency to 50Hz, to sound attenuation of 85dba
- Generator cooling type CACA
- Generator bearing temperature detectors
- Class F insulation / F total temperatures
- AC generator lube oil system provided by the gas turbine
- Underbase of fabricated steel construction
- Generator alignment jacking screws.
- The generator is suitable for a non-hazardous area.



STANDARD NOMAD 5 CONFIGURATION

HV Generator Circuit Breaker

- New Schneider Electric 630A 11KV Generator breaker and outgoing feeder

- Emergency 'Stop' push-buttons externally mounted on turbine under base
- Local stop push-buttons on turbine AC motors

Generator Control Panel

- New Automatic voltage regulator
- New Generator metering equipment
- New Generator electrical protection relays
- New Automatic and manual synchronizing facility with check synch

Motor Control Centre

- New Motor control center for supply to AC and DC motors and solenoids

Electrical Equipment

- New On-package AC and DC interface cabling
- Integral earth protection bonding

STANDARD NOMAD 5 CONFIGURATION

UPS System/Batteries

- New UPS is running online with “double conversion” technology with the following operation:
AC input is filtered and then converted into DC that is used to recharge the batteries.
Should a power failure occur on the AC system, the UPS design maintains emergency DC-power to the DC-controller that controls the turbine DC supply
- New Batteries 150 AH and 120 AH. Maintenance free batteries are mounted within a carbon steel battery storage cabinet located externally adjacent to control room

Instrumentation

- Air inlet temperature thermocouples
- Exhaust outlet and power turbine exit temperature thermocouples
- Gas generator speed probe
- Power turbine speed probe
- Mechanical overspeed protection trip
- Casing mounted seismic sensor to turbine, gearbox and driven unit

Control system/Sequencer

New PLC system of Siemens or Alan Bradley origin with local I/O chassis

- PLC Controller for sequencing and turbine control and supervision
- Overspeed protection unit
- Emergency stop relay
- Industrial Ethernet switch
- Watchdog relay
- Hours run indicator
- Fired starts counter
- Operator control panel
- Fault Monitoring
- Temperature Monitoring
- Turbine Casing Vibration Monitoring
- Turbine Gearbox Casing Vibration Monitoring
- Driven Unit Vibration Monitoring
- Driven Unit Bearing Temperature Monitoring
- Control for standard Gas Detection Monitor

- English language on front panels
- 17” monitor, SCADA system
- Remote control and troubleshooting via VPN router (Requires Acces to internet)

Warranty

The Contractor shall be liable for defects in the goods in accordance with the contract conditions for a period of 12 months from first use.

OPTIONS

Turbine Engine Core

Model TB5400, twin shaft heavy duty industrial gas turbine. This is the latest TB engine variant with

air cooled first stage turbine, upgraded 5400 BHP power unit.

Starting System

An upgraded system with AC-start replaces the old hydraulic starting system. The upgraded system

comes with a suitably sized AC generator driven by a Perkins diesel engine.

Upgraded starter system, incorporating:

- Standard 2/4 pole electric starter motor
- Revised drive coupling
- Starter gear box arrangement
- AC starting is a simple and reliable start system
- Generator data: Olympian model – LL3014H, 165 KVA, 132 KW
- Engine data: Perkins model - 1106C-E66TAG3, 6cyl
- 3 Phase, 400V AC, 50HZ

Dual Fuel Capability

The engine can be fitted with duplex fuel system so that either gas or liquid fuel may be used.

Capability:

- The changeover from one fuel to the other is automatic during operation and is initiated by pressing the appropriate push button
- Provision is also made for when the engine is running on gas, for an automatic changeover to liquid fuel if the supply gas pressure falls below a site determined figure

Ventilation silencing

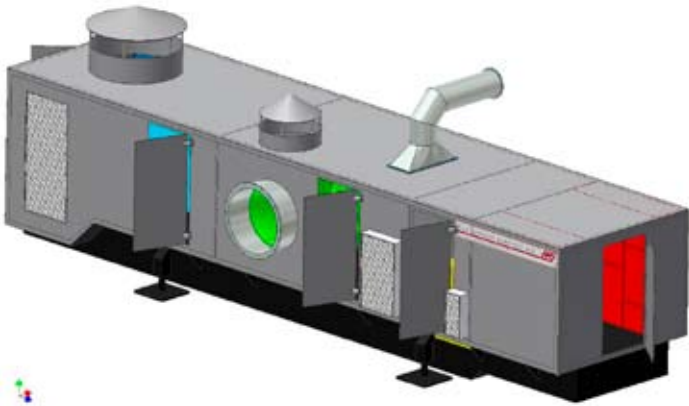
For average sound attenuation to 85dB (A) SPL at 1m distance measured at 1.2m above ground level.

Special made enclosure incorporating:

- Ventilation for oil cooler, intake and blowers
- Generator ventilation, intake and blowers
- Enclosure ventilation, intake and blowers
- Diesel engine, intake and blower



OPTIONS

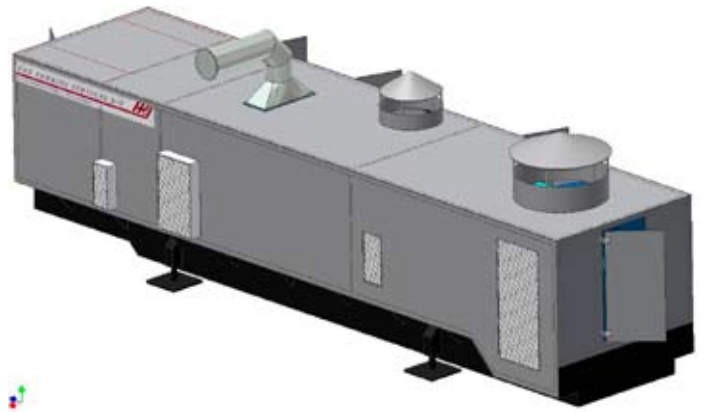


Acoustic Enclosure

Fitted over the turbine, gearbox and alternator and bolted to the turbine underbase, for average sound attenuation to 85dB (A) SPL at 1m distance measured at 1.2m above ground level.

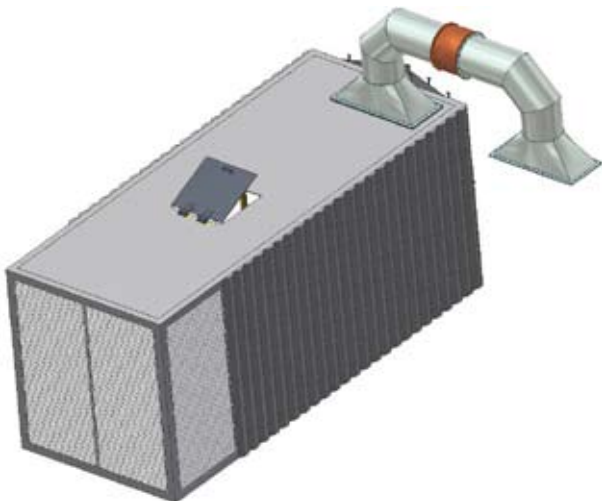
Special made enclosure, incorporating:

- The enclosure has been enlarged from 2.40m to 3.50m wide
- Extra silencing of the enclosure makes it easy to get authority approval in western countries
- Comfortable and easy servicing, also in bad weather conditions, due to the enlarged enclosure



- Removable sections for maintenance access
- Access doors provide for personnel maintenance access
- Internal lighting steel construction
- Acoustic enclosure ventilation inlet damper
- Acoustic enclosure ventilation outlet damper
- Acoustic enclosure ventilation air flow detector
- Acoustic enclosure ventilation system

Note: The enclosure is specially made and can be made to order on the basis of the customers' request.

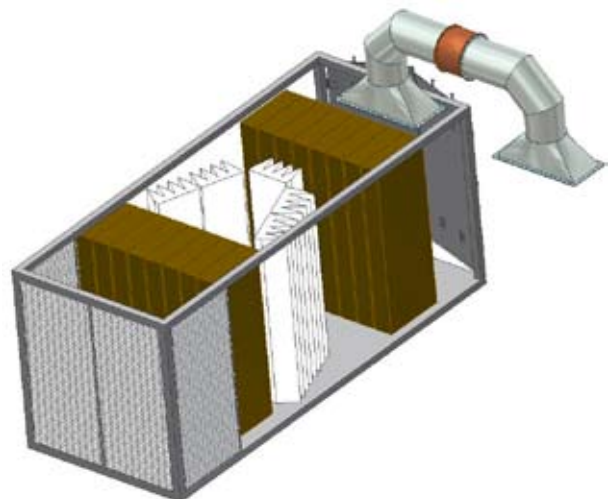


Combustion Air Inlet System

Multi-stage offskid 20'container combustion air inlet filter, for average sound attenuation to 85dB (A) SPL at 1m distance measured at 1.2m above ground level.

Special made combustion air inlet filter system incorporating:

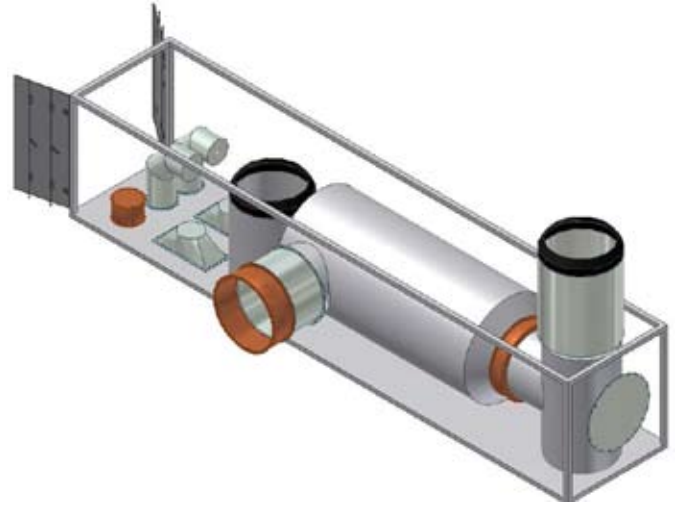
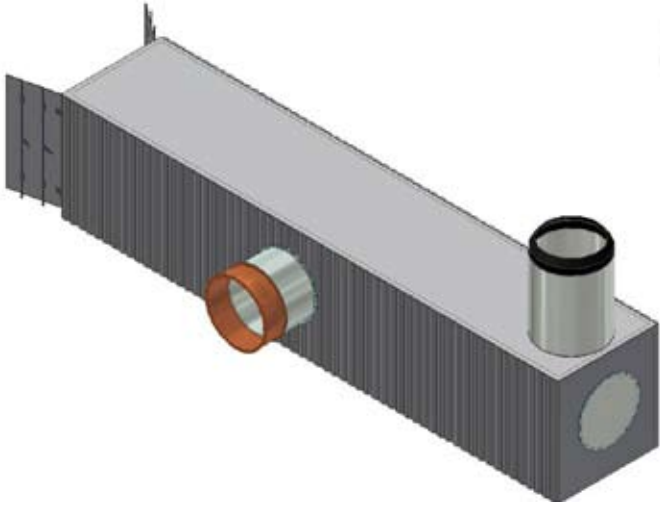
- Sand filter made of corrosion-resistant material
- Turbine filter elements, type F7 with pre-filter type CAM GT, EN 779
- Multi-stage silencer



- Inspection manhole for filter change
- Compensator and steel spacer from turbine to 20' container
- Extra silencing of the combustion air inlet filter system makes it easy to get authority approval in western countries
- Easy to relocate and a quick set up solution.

Note: The Inlet container is specially made and can be made to order on the basis of the customers' request.

OPTIONS



Combustion Exhaust System

Exhaust system is built on a 40' offskid container with exhaust ducting stack to elevation of approximately 4m above ground level, for average sound attenuation to 85dB (A) SPL at 1m distance measured at 1.2m above ground level.

Special made exhaust system incorporating:

- Silencer for an overall 85dB (A) rating
- Silencer mounting allowing for thermal expansion
- Compensator and steel spacer from turbine to 40' container

- Two-piece exhaust stack for easy transport
- Easy to relocate and a quick set up solution
- Extra silencing of the exhaust system makes it easy to get authority approval in western countries
- Exhaust diffuser mounted sideways with flexible joint and transition ducting to enclosure side
- Prepared for installation with permanent exhaust ducting stack. (foundation necessary)

Note: The Exhaust system is special made and can be made to order on the basis of the customers' request.

For compliance with local grid code:

- Grid Code Compliance UCTE/ENTSO-E
- Block diagrams and dynamic system documentation according to IEEE Specification



D & S Turbine International LLC
281-333-5652
Houston, Texas