2.0 SCOPE OF SUPPLY

2.1 General

The scope of supply listed below are based on single engine unless otherwise specified

Engine rotation viewed fr. rear of flywheel CCW

Engine service side viewed fr. rear of flywheel Right Hand

Power supply on board 480V/60Hz/3ph

230V/1ph

24V DC

2.2 Air Intake System

Front mounted turbocharger, BASIC 297, engine oil lubricated

Aftercooler, fresh water, corrosion resistant coated (air side)

Air inlet adapter (90 deg.), mounted to turbocharger inlet

Air cleaner, vertical, standard duty, normal volume

Air vertical support bracket

Air inlet shutoff

2.3 Control System

Woodward 2301D electronic governor with load sharing interface, hydraulic actuator, 24VDC power, loose supplied

Load sharing control is not our scope of supply

2.4 Cooling Water System

Separate cooling circuit suitable for sea water 32°C max

Plate type heat exchanger for JW circuit, titanium 0.4 mm, accessory module mounted, based on 32°C SW and sized to supply JW

Plate type heat exchanger for AC/OC/fuel/alternator cooler, titanium 0.4 mm, accessory module mounted, based on 32°C SW and size to supply these components with 38°C freshwater

Plate-type oil cooler, stainless steel

Plate-type fuel cooler, stainless steel

Jacket water pump, gear driven

AC/OC pump,gear driven

Boost pump, gear driven, not self-priming

Expansion tank, accessory module mounted

JW thermostat, 90°C

AC/OC thermostat, 32°C

Heat recovery connection, including thermostat, loose supplied

JW/LO heater, 480V /3ph/60Hz, base mounted

Cooling connections will include a single seawater inlet and a single seawater outlet

ANSI connection incl. a single sea water inlet and a single seawater outlet

Flexible connection

Sea water pump not included

2.5 Exhaust System

Dry gas tight exhaust manifolds with soft shields

Exhaust adapters, rectangular to round, vertical orientation, loose supplied
Exhaust expander, 14”-18”, loose supplied
Exhaust flexible fitting, 18”, loose supplied
6Exhaust weld flange, 18”, loose supplied
Exhaust silencer not included

2.6 Fuel Oil System

Fuel unit injectors at each cylinder
Fuel transfer pump, gear driven
Manual fuel priming pump
Duplex fuel filter, engine mounted
Duplex fuel strainer, shipped loose, customer remote mounted
Flexible conn, At least 500mm long hose, incl. fuel pump inlet and return oil out let, loose supplied, with type approved or certificated by class

2.7 Alternator & Accessories

Alternator & Accessories
♦ Basler DECS 200 digital voltage regulator (supplied loose). 0.25% regulation, field over volt & over current, Exc. Diode Monitor, Under/Overolt, Loss of Sensing, Under/Over-exc. Limiter, Auto Tracking & Switching to Manual Control, VAR/PF Control, with reactive load sharing interface
♦ Reactive load sharing control in not our scope of supply
♦ PMG (300% SC 10 Sec) for Regulator Power
♦ Kato shall supply & mount coupling hub suitable for Caterpillar 3600 series engine
♦ Primary bearing lube oil pump for both exc. and drive end sleeve bearings. Oil. Oil Cooler, Pre-lube pump, and all piping by others
♦ Sleeve Bearing oil line connection fittings for external lubrication (per bearing). 60 Deg C maximum oil to be supplied by customer
♦ Drive End Sleeve Bearing -non-insulated - self lubricating
♦ Exciter End Sleeve bearing - insulated - self lubricating
♦ Stand-Off Terminal Connectors, mounted in outlet box.
♦ (6) Kato supplied CT's for differential protection. Three mounted in outlet box, three furnished loose for customer mounting.
♦ Oversized Outlet Box
♦ Double Tube copper-nickel air to water heat exchanger w/water leak detector. External Maximum 38°C water is required and to be supplied by others.
♦ Special frame for water cooled totally enclosed alternators.
♦ Six - 100 ohm RTD's embedded in stator windings for temperature monitoring, 2 per phase.
♦ Two - 100 ohm RTD's installed in bearing housing for temperature monitoring (1 per brg)
♦ Thermostat for commercial space heaters
♦ Commercial Space Heater, Single Phase 250V or less.
♦ ABS Test & Certification. Includes Air-gap, Over-speed Test, Overload Test, and Steady state short circuit Test. Heat Test on first unit may be required.

♦ Heat test per IEEE 115 for first unit only.
♦ Witness of Tests by Customer or Customers Agent per day for one unit only.
♦ Calculated X"D =0.137 saturated per request
♦ IP 55 Terminal Box located LHSFEE with bottom cable entry
♦ 2/3's Stator Winding Pitch
♦ Inrush current reduction module for AVR, mounted in switchboard, shipped loose

Spares

♦ Spare Rectifier/Suppressors (2), one (1) set per shipset
♦ Spare Bearing Liners, one (1) set per shipset

72.8 Lube Oil System - Generator

Primary mechanical lube oil pump, generator driven
Lube oil module:
♦ Pre-lube/standby electrical lube oil pump, 480 V, 3 ph, 60 Hz
♦ Lube oil tank
♦ Heat exchanger, 38C fresh water
♦ Lube oil filter
♦ Lube flow divider
♦ Module incl. wiring of the unit, motor starter, 24VDC controls, NEMA 4 enclosure, mounting bracket for mounting the unit to the base, lines group for connecting to the generator bearings
♦ Redundant air pre-lube pump for black start

2.9 Lube Oil System - Engine

Breather, crankcase top-mounted
Custom dry sump base assembly with an integral sump in the base assembly for 15 deg. static and 22.5 deg dynamic tilt capability
Lube oil pump, gear driven
Duplex lube oil filter, paper element, accessory module mounted
Centrifugal oil filters with single shutoff, service side engine mounted
Oil filter and dipstick valve
Oil pressure regulating valve
Crankcase explosion relief
Prelube pump, continuous mode, electrical driven, incl. 24VDC motor starter, engine base mounted
Backup/black start prelube pump, intermittent mode, air driven, base mounted
Lube oil is not scope of supply

2.10 Monitoring System

2.10.1 Genset Monitoring System (GMS)
Providing protection, monitoring and control, housed in a NEMA 4 (IP66) enclosure, sensors are wired to GMS
Control panel on accessory module
10 inch color monitor, displays all engine parameters and alarm annunciation
Start / prelube control switch
Fuel control switch

Emergency stop button
Speed control switch
Contacts are available for customer use.
♦ Selection of local/remote control of engine
♦ Selection of idle/rated control of engine
♦ Equipped for remote communication
♦ Four 4-20 mA outputs (programmable)
♦ Relay contact signals to the remote monitoring system
Gauge
♦ Engine hour meter
♦ Digital tachometer
♦ Starting air pressure gauge
Light
♦ Pre-lube status light
♦ Summary alarm light
8♦ Summary shutdown light
♦ PLC failure light
Engine sensors
Contactors:
♦ Lube oil pressure (hi/low speed)
♦ Jacket water pressure
♦ AC/OC pressure
♦ Start air pressure
♦ Crankcase pressure
4-20 mA transducers:
♦ Lube oil pressure (to filter/to engine)
♦ Fuel pressure (to filter/to engine)
♦ Inlet air manifold pressure
RTD (PT100):
♦ Lubricating oil to engine temperature
♦ Inlet air manifold temperature
♦ Fuel to engine temperature
♦ AC/OC inlet temperature
♦ Jacket water outlet temperature (alarm)
♦ Jacket water outlet temperature (shutdown)
♦ Generator rear bearing temperature
♦ Generator front bearing temperature
♦ Generator stator A temperature
♦ Generator stator B temperature
♦ Generator stator C temperature
Switches:
♦ Jacket water detector
♦ Metal particle detector
♦ Starting oil pressure or detector

Thermocouples:
* Exhaust thermocouple temperatures (one per cylinder plus inlet to turbine and stack)
MODBUS communication
All monitored parameters and status available except engine start/stop control witch is connected by hardwire
Alarms
Pressures:
♦ Low oil pressure
♦ High oil filter differential
♦ Low fuel pressure
♦ High fuel filter differential
♦ High inlet air manifold pressure
♦ Low starting air pressure
♦ Low jacket water pressure
♦ Low AC/OC water pressure
♦ Low raw/sea water pressure (customer supplied contact)
Temperatures:
♦ High lube oil temperature
♦ High inlet air manifold temperature
♦ High fuel temperature
♦ High AC/OC inlet temperature
♦ High jacket water outlet temperature
9♦ High generator rear bearing temperature
♦ High generator front bearing temperature
♦ High generator stator A temperature
♦ High generator stator B temperature
♦ High generator stator C temperature
♦ High individual exhaust port temperature
♦ High turbine inlet temperature
♦ High exhaust stack temperature
♦ High exhaust port deviation temperature
Other:
♦ Low battery voltage
♦ Low oil level
♦ Sensor failure
♦ Jacket water detection
♦ Low coolant level (switch is supplied with expansion tank)
♦ Metal particle detection
Shutdowns
Pressure:
♦ Low oil pressure
♦ High crankcase pressure
♦ Temperature:

♦ High jacket water temperature
♦ High lube oil temperature
♦ High generator bearing temperature
♦ Other:
♦ Metal particle detector
♦ Engine overspeed
♦ Customer shutdown (normally open contact customer supplied)
Programmable Inputs
2 of customer supplied RTD's
2 of customer supplied 4-20mA (0-10 VDC) sensors
3 of discrete alarms, and 3 of discrete shutdowns
Beacon and horn
Oil mist detector incl. drain GP
Engine mounted gauges
Fuel pressure
Lube oil pressure
Inlet air restriction
Other engine protection
Cylinder pressure relief valve
Mechanical cylinder press GA valve
2.10.2 Remote Monitoring
The items of remote monitoring, alarm and protection are complied with ABS class notation of ACCU.
All monitored parameters, alarms, protection and engine status are available on communication port (RS232, RS422 or RS485 are available).
10**2.11**
Mounting and Base
Skids mounted, three point mounting, 36" I-beam base
Vibration isolators, shipped loose
2.12 Starting Air System
Air start motors, vane type, incl. silencer, lubricator, air strainer, shutoff valve and flexible hose, max. air pressure 1575 kPa
Air pressure reducing valve containing relief valve, 3100-850 kPa, loose supplied, shipyard installed
Flexible hoses
Starting air vessel not included
2.13 General Items
High inertia flywheel
Electric barring device, 480V/3ph/60Hz motor, equipped with a pendant switch on a 40 ft. cord. Incl. 50:1 manual barring device and a 24 VDC motor starter
Standard damper guard
Flywheel and coupling guard
Torsional coupling for two bearing generator, ABS certificafied

Engine lifting eyes
Custom accessory module
Paint, CAT yellow
Shrink wrap and tarpaulin protection for transportation and storage
Approved custom genset TVA, one per shipset
Noise and vibration technical data
Test/commissioning procedure
Factory Acceptance Test for one gen-set per shipset

2.14 Spare Parts & Tools

Spare parts kit
As per ABS recommened for unrestricted voyage zone and CAT standard, one (1) set per shipset
Service tool group
3600 specialized tooling, one (1) set per shipset
Manuel service pump, one (1) per shipset
Protection system calibration kit, one (1) set per shipset
Oil mist detector tool kit, one (1) set per shipset

2.15 Drawing & Document

Drawing & Document for approval 7 paper+1CD per shipset
Drawing & Document for working 7 paper+1CD per shipset
Parts Book 7 paper+7CD per shipset
Service Manual 7 paper per shipset
Technical. Manual 7 paper per shipset
ABS Engine Certificates 1 per engine
ABS Generator Certificates 1 per generator
IMO EIAPP Certification 1 per engine
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