

# **35MW HFO/Diesel POWER PLANT EQUIPMENT & SYSTEMS**

## **SUMMARY**

Complete set of 35MW HFO/Diesel power plant, modular based for ease of installation, only requiring interconnecting piping and cabling and very minimum amount of loose equipment outside of the main modules.

The station was designed to serve captive isolated system (**3 running + 1 hot standby**) with no alternative source of power and therefore has an extremely high level of redundancy for all systems and controls built in. Most controls and equipment are duty/standby with fail safe controls.

It is essentially a complete plant ready to go, requiring only site specific engineering and purchase of buildings / piping / tanks / installation accessories. Materials for tanks and structural steel for buildings are available as options, as are complete designs and engineering documents for those if Seller's designs are followed.

## **DETAILS OF SCOPE OF SUPPLY**

### **GENERATING SETS (4 of)**

- ENGINES - 4 x MAN 18V32/40 CD engines. New, manufactured in 2010 (**modified in 2017 by MAN**) but have never left factory, never been installed or used, stored at OEM's facility in Germany under ongoing preservation and maintenance by OEM. complete with all necessary proprietary flexible connections, instrumentation, special tools etc.
- ALTERNATORS: 2 x ABB AMG 1120MP08 DSE alternators and 2 x ABB AMG 1120LT08 DSE alternators. 11kV, 50Hz. New, made in 2016/17.
- Engines and Alternators are coupled and mounted on a common base frame/lube oil tank for each pair.
- Available with vibration dampers and spring packs to be installed under generating set foundations for protection in case of high-seismic zone location.

### **CRITICAL BALANCE OF PLANT-MECH**

- Fuel and Lube Oil separators are GEA Wesfalia make. (6 of)
- HFO, DFO and sludge unloading, distribution pumps, booster modules and filters are Marine Technik (Germany) make. (22 of)
- Engine Cooling Water radiators are Kelvion (GEA) make. (12 of – 3 units per engine)
- Selective Catalytic Reactors (SCR) system for NOx removal/scrubbing are H+H Engineering (HuHES – Germany) make. (4 of, plus 1 of continuous emissions monitoring system and UREA solution injection)
- Combustion air intake filters are AAF make. (4 of)
- Building intake ventilation filters are AAF make. (4 of)
- Air Compressors – (Start, Inst, Work, SCR) locally manufactured modules employing Ingersoll Rand Compressors. (4 of)
- All Critical BOPs are new.

### **MINOR BALANCE OF PLANT-MECH**

- All remaining balance of plant have been assembled locally in Jakarta but using quality European components (pumps, instrumentation, actuated valves etc).
- All BoP equipment are skid mounted modules complete units.

- Waste Heat Recovery Boiler for each engine exhaust system.
- Thermal oil system (heated by waste exhaust heat) for heat tracing of fuel and sludge tanks and piping.
- Cooling water pumps, flow control modules, preheaters and expansion tanks for each engine.
- Combustion air and Exhaust ducting, silencers for each engine
- Water Treatment plant – very comprehensive (Sand and carbon filtration, sulphate removal, ultrafiltration, distribution pumps)
- Urea Mixing and storage module (for SCR NOx system) (1 of)
- Sludge Treatment Module (1 of)
- Firefighting system – Diesel and Electric pumps, foam system, water sprays, Notifier Detection system, FM200 and CO2 system, extinguishers / hose reels.

### **ELECTRICAL & INSTRUMENTATIONS, CONTROL (E&IC) SYSTEMS**

- Medium Voltage Switchgear
  - Make: Tamco Indonesia
  - 11kV, 50Hz, 2500A, 31.5kA/3s
  - 5 x genset incomers
  - Low Voltage Switchgear
  - Make: Larsen and Toubro (L&T), India.
  - 400V, 50Hz, 2500A, 65kA/1s
  - 3Phase-4wire – TP + 50% Neutral.
  - Assorted Small Lighting and Electrification panels
- Battery Systems and UPS
  - 2 x 110VDC, 200Ah battery systems and distribution panels
  - 2 x 400VAC, 400Ah UPS systems and distribution panels
  - Voltage Servo Stabiliser
- Control Panels
  - Make: Larsen and Toubro (L&T), India.
  - Incorporating Siemens S7 PLC's and Simatic HMI local touch screen display panels with high level of in built redundancy
  - Profibus communication
  - 36 x control panels in total
  - Fully FAT tested in Factory with extensive simulation boxes used for PLC inputs/outputs simulating complete station functions, interconnections, startup, shutdown, emergency scenarios.
- Control System. – SCADA
  - Siemens WINCC system
  - Control system has been fully developed and programmed.
  - Dell redundant servers / client workstations, printers etc.
  - Fully FAT tested with as part of Control Panels FAT
  - Automated reporting and data logging
- Auxiliary Transformers
  - 2 x 1250kVA 11kV/400V Step-down Tx (station services), Vector Group – Dyn5, Make: VoltAmp Transformers – India

### **ENGINEERING**

- Fully developed and final System P&ID's
- Fully developed and final module P&ID's
- Fully developed and final electrical and control engineering
- Fully developed and programmed, PLC and SCADA control system
- Partly developed, piping GA's and Isometrics, Mech GA's etc
- Generally, P&ID's, electrical and control engineering and mech module engineering is to a high standard.

- Existing Civil, Structural and Piping installation engineering are fit for purpose but developed locally to local standards and norms.
- We can provide contact details for current and past engineers, suppliers etc who would be available to provide installation, commissioning and ongoing support.

#### **ADDITIONAL EQUIPMENT/COMPONENTS:**

- 150kV Switchyard - Complete
- Double bus 5 Bay
- Components: Crompton Greaves
  - Step-up Transformers 2 x 30/35MVA 11kV/150kVA Step-up Tx, Vector Group – YNd11, Make: VoltAmp Transformers – India
- Structures, Towers and Gentries – Hot Dipped Galvanised
- All insulators, conductors etc. to effect complete switchyard
- 5 x Marshalling Kiosks (1 per bay)
- 2 x 20m lighting masts
- Complete fabricated structural steel (except cladding/roofing) available for the Main Power House Building c/w 5t Demag OH crane
- All rolled and cut plates for the tank farm tanks (all fuel and water tanks) - ready for erection.
- Raw materials for pipe spool fabrication (carbon steel, stainless steel pipe lengths, flanges, elbows), LV, MV and HV power cables.

#### **DELIVERY POINTS & CURRENT EQUIPMENT LOCATIONS**

Generally, most equipment is still in OEM packaging and ready for immediate dispatch/delivery.

Delivery term is as-is where-is:

- Generating Sets – the 4 x MAN generating sets are in storage at a MAN facility in Mannheim, Germany.
- Fuel treatment Modules – There are 4 x 40' containers of fuel treatment, pumping and booster modules from Marine Technik in Jakarta, near port.
- Electrical Control Panels – There are 4 x 40' containers of electrical control panels in bonded storage in Jakarta, near port
- Electrical Control Panels – There are 2 x 40' containers of electrical control panels in Jakarta, near port.
- Cooling Radiators – The 12 cooling radiators are at the project site but still packed in containers (as packed by OEM). The steel frame has been erected and can be easily disassembled and repacked.
- Additional equipment: 150kV Switchyard steel towers and gentries – The steel structures as part of the 150kV switchyard are at Martabe site and have been partly erected and can be easily disassembled and repacked.
- Additional equipment: 11/150kV Step-up transformers. These are at the project site and would need to be drained of oil and transported back to Jakarta.
- Locally fabricated mechanical modules. There are about 40-45 modules still being fabricated/assembled in Jakarta. (estimated 6-8 weeks works left to complete FAT and packing)
- All other items are in OEM packaging in a clean dry warehouse in Jakarta.
- Rough estimate of 60-80 x 40' containers worth of equipment in Jakarta.