NITIN CORPORATION
402, 4th Floor,
BezzolaCommercial Complex,
Sion – Trombay Road,
Chembur,
Mumbai – 400071,
India.

WEB :www.corponit.com

E – MAIL : enquiry@corponit.com
nitincorporation@yahoo.com

Contact No. : +91 - 9920404345

THE FOLLOWING DIESEL POWER PLANT IS AVAILABLE FOR SALE WITH US WITH IMMEDIATE DELIVERY:

3 Nos. – 19,305 kW each,MAN (2014) make, type 18V48/60 DieselPower Plant, having the following technical specifications:

BRIEF INFORMATION OF POWER PLANT:

Three (3) Units Of Man 18V48/60 TS Diesel Power Plant With Total Generating Capacity Of 57.9 MW (ISO Condition). Year of Manufacture: 2014. Running Hours: 5,000
Model: MAN 18V48/60 TS Diesel Generating Sets (The 3 Units have been operated on Diesel. For HFO Operation, a HFO Fuel System Module would have to be purchased separately.

Number of Units	: Three (3)
Year of Manufacture	: 2014
Running Hours	: 5,000 Hours
Rated Output	: 19,305 KW
Engine Speed	: 500 RPM
Alternator	: ABB AMG 1600 Air-cooled
Rating	: 11 KV, 50 HZ

Fuel: Diesel. The Diesel Generating Set can also be operated on HFO (350 cSt) with the addition of a HFO Fuel System Module which can be supplied separately.

Present Status of Plant: The Plant and has been in shutdown status for last 3 years due to end of Contract. Plant has been kept in maintenance status in conformity with OEM recommendations. Full operating Records available during inspection and survey. During inspection, start-up of the Plant can be initiated.

Scope of Supply Mechanical:

- 3 pcs Engine MAN18V48/60TS
- 3 pcs Alternator ABB AMG 1600

- 6 pes Turbochargers ABB intercooled
- 3 pcs Charge Air System with air filters
- 6 pcs Ventilation Fans
- 2 pcs Diesel Fuel Separators
- 3 pcs Fuel Boosters, FHE
- 2 pcs Starting Air Compressors
- 18 pcs Engine Cooling Radiators
- 3 pcs LT and HT Heat Exchangers

Scope of Supply Controls & Electrical:

- 3 pcs SaCoS One Control & Interfacing
- 3 pcs Engine Auxiliary Panels
- 3 pcs Engine Control Modules
- 1 pc Common Control Module
- 10 pcs 415V Breaker Panels to run all auxiliaries
- AC/DC Panels, UPS
- 7 pcs 11kV Siemens SF6 Breakers
- 3 pcs NGR Cobicles
- Radiator Control Panels
- 2 pcs Auxiliary Transformers (2000kVA)

Scope of Sale: Scope of Sale is of the entire Power Plant and Buyer to undertake dismantling of the Plant and transport to the nearest seaport for shipment to the Project Site.

EPC Contractor: Can be arranged for undertaking the dismantling of the Plant, installation, erection, testing & commissioning at Project Site.

Price: US$11,000,000 FOB nearest Port (Negotiable) + 5% commission to be covered for us. Price is excluding EPC Contractor, HFO Fuel System Module and necessary modification to fuel injection system.

Technical Description of the Generating Sets & Plant together with pictures is as under:

TECHNICAL SPECIFICATION:

1 Design data and performance guarantees

Our quotation is based on the following design data as well as the

- Drawing of the generating set (Drawing Nr. 11745001770, Version D)

1.1 Design data

1.1.1 Site conditions

Site conditions

All offered equipment is designed to operate within the following ambient conditions:

– Altitude above sea level	100 m
– Wet bulb temperature	28 °C
– Minimum ambient air temperature	10 °C
– Maximum ambient air temperature	40 °C

Operation outside of these limits is without guarantee.

1.1.2 Generating sets

Generating sets

Under consideration of your request, this quotation provides for 3 generating sets based on the MAN 18V48/60TS engine.

– Number of generating sets	3
– Engine type	18V48/60TS
– Engine speed	500 min^{-1}
– Lube oil pump	engine driven
– HT cooling water pump	engine driven
– LT cooling water pump	engine driven

Electrical system

The offered equipment is based on the following electrical values:

– Operation mode	grid parallel
– Frequency	50 Hz
– Power factor Cos φ (lagging)	0.8
– High voltage	In customer's scope of supply
– Medium voltage	11 kV
– Low voltage	400 V

4 Mechanical scope

Item Q'ty Description

4.1 Auxiliary systems, plant related

4.1.1 Starting air system

040.070.140 -1 3 Start-up air blower
MJQ61 AN020

Screw compressor with e-motor to provide supplementary air for the two-stage engine during start-up, shut-down and part load operation below 20% load:

- Prevents visible smoke and soot
- Keeps valve temperatures in the specified limit in order ensure long live time and service intervals.

Excluded from our scope of supply

Item Q'ty Description

tion against overvoltage
- Droop current transformer installed in main terminal box
- Star point current transformers for protection purposes installed in main terminal box
- Painting similar to engine color
- Foundation bolts

Final series test report according to manufacturer's standard is included.

3.2.2 Foundation system

025.030.010 3 Steel foundation frame
MJA10 BF010

The engine is rigidly mounted and bolted on a steel foundation frame which is resiliently seated on the foundation. The steel foundation frame is used as lube oil service tank.

025.030.030 3 Grouting material for seating of alternator

025.030.050 3 Foundation frame seating
MJA10 BF021

Spring elements for resilient, vibration-isolated mounting of the steel foundation frame with engine on the concrete foundation including equipment for lining (balancing aids) and fixing.

3.2.3 Genset add-ons

025.035.010 3 Frame auxiliaries and frame assembly

Engine and steel foundation frame are mounted at the MAN Diesel & Turbo workshop. Attachment of turning gear, terminal boxes, piping and cabling is included. Additionally an installation drawing is provided.

025.035.060 3 Lube oil tank level monitoring

3.2 Genset

3.2.1 Alternator system

025.020.010 -1 3 Three phase synchronous alternator
MKA10 AG010

Design:

The stator frame is a rigid, welded steel structure construction. The stator core is built of thin electric sheet steel laminations which are insulated on both sides with heat-resistant inorganic resin. The radial cooling ducts in the stator core ensure uniform and effective cooling of the stator.

The rotor consists of a forged steel shaft, a hub and sheet steel poles fixed on the hub. The pole laminations are pressed together with steel bars fixed to the end plates.

The windings, epoxy resin impregnated, are provided with very strong bracing which withstand all expected mechanical and electrical shocks and vibrations.

Engine-independent, self lubricated bearing design, to avoid possible lube oil contamination by the engine.

The alternator is self-ventilated and needs no external forced air flow. The surrounding air is used for cooling. The cooling air is drawn in through air filters and blown out to the surrounding environment.

Rated technical data:

– Output approx.	24131 kVA
– Voltage	11 kV
– Current approx.	1267 A
– Frequency	50 Hz
– Power factor	0,8
– Temperature rise stator/rotor	F/F
– Insulation class	F
– Mounting design	IM1001 or IM7201
– Protection class alternator	IP23
– Protection class terminal box	IP54
– Cooling method	IC0A1 (Air cooled)
– Operation	S1, continuous
– Operation mode	
– Applicable standard	IEC 60034

The alternator is optimized for voltage-stability in case of load variation.

Accessories:

- Anti-condensation heater
- Pt100 sensors for winding temperature detection
- Pt100 element and lubrication oil sight-glass for monitoring, for each bearing
- Main terminal box (terminals U/V/W/N) and auxiliary terminal box (for accessories) inclusive suitable cable glands for bottom entry
- Brushless self-excitation system including rotating diodes and protec-

3.1 Connecting elements

3.1.1 Coupling arrangement

020.010.010 MJK10 AU010	3	Flexible coupling The flexible coupling is mounted between engine flywheel and alternator shaft. The scope includes a connection hub for the alternator shaft and fixing bolts for connection to the flywheel. A standard coupling is used. Size and rubber quality are determined by the torsional vibration calculation.
020.010.040 MJP10 AU011	3	Flywheel cover

3.1.2 Engine seating

020.020.020	3	Engine seating Set of foundation bolts for rigid seating of the engine.

3.1.3 Pipe adapters

020.030.025	3	Flexible pipe connections for the engine
020.030.080	3	Rubber expansion joint for intake air duct to be installed upstream of turbocharger, delivered with counter flange.
020.030.090	3	Adapter for exhaust gas duct to be installed downstream of turbocharger, without counter flange

3.1.4 Low pressure turbo charger ducts

020.035.010 -1	3	Intake air ducting interconnecting ducts for intake air between low pressure- and high pressure turbo charger
020.035.020 -1	3	Exhaust gas ducting interconnecting ducts for exhaust gas between low pressure- and high pressure turbo charger
020.035.030 -1	3	LP Turbocharger Steel Support

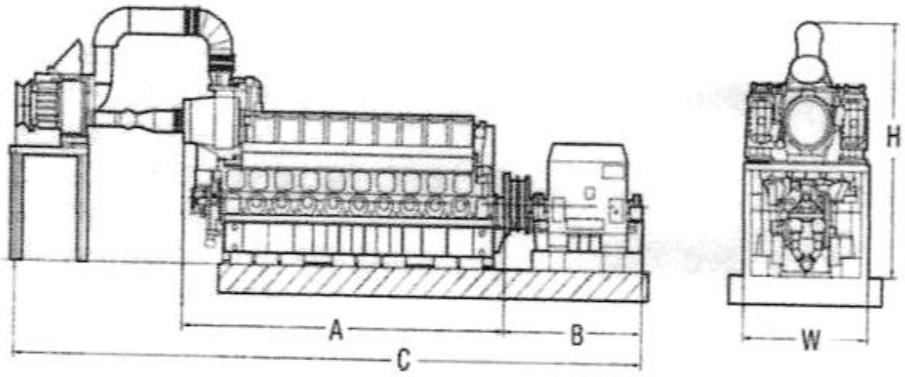
3 Generating set

General description

Our generating sets are designed for power generation in continuous, durable and safe operation. The area of application comprises ranges from supplies of basic loads in public mains or coverage of peak loads to isolated applications for industrial consumers.

The engine is rigidly mounted on a steel frame, acting as the lubricating oil service tank, which is resiliently seated on a simple concrete foundation by spring isolators. The alternator is connected to the engine by a flexible coupling, rigidly mounted and grouted onto a separate and elevated concrete foundation.

Outline dimensions



Dimensions and weight[5] of the generating set:

– Height (H)	9023 mm
– Length (C)	24925 mm
– Width (W)	4694 mm
– Weight (dry)	413000 kg

	– Splash oil temperature monitoring – Main bearing temperature monitoring – Lube oil temperature and pressure monitoring – Cooling water temperature and pressure monitoring – Charge air temperature and pressure monitoring – Exhaust gas temperature monitoring – Speed monitoring and over speed protection – Engine control – Electronic speed governing
	Local operating panel,
	resiliently mounted on engine, with TFT-touch screen for: – Indication of engine operating data – Indication of status and alarm messages – Engine start/stop – Control station changeover – Increase/decrease of speed set point – Emergency stop
	Oil mist detector, make Schaller VN115
Temperature measuring	Thermocouples for measuring the exhaust gas temperature after each cylinder, before and after turbocharger, with terminal box and cabling on the engine.
Start and stop equipment	Compressed air starting equipment with main starting valve and with starting valve on each cylinder of one cylinder bank
Lubricating and cooling	Cylinder lubrication oil pump with attached electrical motor (IP 55)
	Forced-feed lubrication for all bearing points of running gear, camshaft, timing gear, governor drive and turbocharger
	Pressure control valve for engine lube oil
	Cylinders, cylinder heads, fuel injection valves, and charge-air cooler are water-cooled, pistons are oil cooled
Flywheel and turning gear	Flywheel with teeth for turning gear
	Bolts connecting the flywheel with the crankshaft
	Turning gear for the running gear, with electric motor (reversible; IP 54)
	Push button switching equipment, control cable
	Starting interlock when turning gear engaged, with limit switch (not cabled; 24 V DC; IP 65) for display
Engine painting	The outer surface of the engine is covered with paint "white aluminum" RAL 9006. Painting consists of one finishing coat, approx. 20 µm.
Acceptance	Works acceptance / factory approval.
Calculation	Torsion vibration calculation

2.2 Detailed Technical Specification of one engine 48/60TS

Design features	One-part crankcase with safety valves on crankcase covers
	Crankshaft made of forged steel with torsion vibration damper at free end
	Main bearings and big-end bearings with two-part thin-walled bearing shells and main bearings cross-braced by tie-rods
	Connecting rod (split with flange) drop-forged of steel
	Three-ring piston with forged steel crown and nodular cast-iron skirt
	Piston with forged steel crown and nodular cast-iron skirt
	Cast-iron cylinder liners with fire land ring
	Nodular cast-iron cylinder head with armor-plated inlet and exhaust valves, valve seat rings for the inlet and exhaust valves. Rotocaps on the inlet valves and exhaust gas valves with shaft propellers. Indicator valve on each cylinder
	Multi-part camshaft for enhanced Miller timing
	Pipes on the engine with counter flanges or connecting screws
Fuel injection system	Injection pump on each cylinder
	Rocking levers between camshaft and pump plungers, on an eccentric shaft, adjustable from outside for optimizing the injection timing
	Variable injection timing (VIT), with automatic adjustment
	Injection pipes, double walled
	2 buffer pistons at the fuel admission and return pipes
Speed control	Woodward EM300 electronic speed governor with actuator
	Electric speed transmitter for engine speed and turbocharger speed
	Electro-pneumatic emergency shutdown device on the engine for manual remote emergency stop and for automatic stop at over speed and other stop criteria within the safety system
Turbo charging and charge-air cooling	2 exhaust gas turbochargers, installed in sequence:
	1 low pressure turbocharger TCA88, free-standing. Dry cleaning device for the exhaust gas turbine and wet cleaning device for the compressor.
	2 Charge-air cooler after low pressure stage in fresh water and two-stage design; with counter flanges
	1 high pressure turbocharger TCA77, mounted on the engine. Wet cleaning device for the exhaust gas turbine and compressor.
	2 Charge-air cooler after high pressure stage in fresh water and two-stage design; with counter flanges
	Waste gate to increase the exhaust gas temperature after engine
	Air pipe sound insulated between compressor and charge air cooler (including air intake casing)
	Exhaust gas piping on the engine, un-cooled, thermally insulated and lagged
	Steel structure for the free-standing turbo-charger
Operation and control	Engine safety and control system $SaCoS_{one}$, comprising of:
	$SaCoS_{one}$ Control unit
	resiliently mounted on engine, consisting of high integrated control modules, one for safety system and one for alarm handling and control, including the following functions:

2.1.5 Engine control system SaCoS One

010.285.070	3	SaCoSone Interface cabinet The Interface Cabinet is the interface between the engine electronics and the plant control system. It is the central connecting point for electric power supply to the engine from the plant power distribution. Besides, it connects the engine control system with the power management and other periphery parts. Properties: Each interface cabinet is located in the engine hall next to the engine. This floor-standing cabinet (H 2,200 mm x W 1,200 mm x D 400 mm) has lockable front doors with rubber gasket. Cable insert from bottom through plinth. Panel protection degree is IP55, color light grey (RAL7035) with plinth in umbra grey (RAL7022). It is equipped with a gateway module for plant communication via interfaces to the plant automation system.
010.285.080	3	SaCoSone Auxiliary Cabinet The Auxiliary Cabinet contains the driver unit for the speed governor as well as the starters for the engine attached motors. Properties: Each Auxiliary Cabinet is located in the engine hall next to the engine. This floor-standing cabinet (H 2,200 mm x W 1,200 mm x D 400 mm) has lockable front doors with rubber gasket. Cable insert from bottom through plinth. Panel protection degree is IP55, color light grey (RAL7035) with plinth in umbra grey (RAL7022). Starters for engine attached cylinder lubrication pump, valve seat lubrication pump as well as temperature control valves for cooling water.
010.285.130	3	Turbocharger control unit

2.1 Engine System

2.1.1 Engine System

010 MJA10 AV010	3	Engines 18V48/60TS, suitable for operation on Diesel oil, as per following detailed Technical Specification

2.1.2 Lubrication system

010.220.010 MJV21 AP050	3	Engine attached lube oil pump(s) Capacity approx. 504 m³/h, including pressure control valve and connecting pipe between pumps

2.1.3 Cooling water system

010.230.010 MJG31 AP030	3	Engine attached HT cooling water pump Capacity approx. 220 m³/h
010.230.020 MJG32 AP030	3	Engine attached LT cooling water pump nominal capacity 280 m³/h. The cooling water flow through the charge air cooler will be adapted to 280 m³/h by installation of orifices.

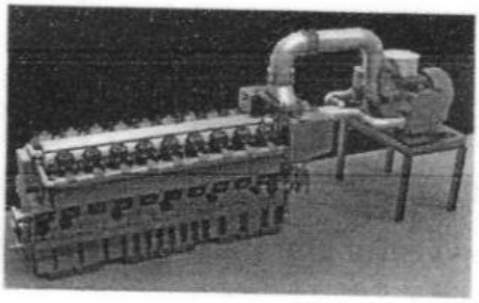
2.1.4 Special equipment of the engine

010.250.030	3	Slow-turn facility on the engine. The engine is automatically turned slowly prior to engine start with being monitored by the engine control. If the engine does not reach the expected number of crankshaft revolutions within the specified period of time, an error message is issued. Slow-turn serves as an indication that there is liquid (oil, water, fuel) in the combustion chamber.

2 Diesel engine 48/60TS

General description

The MAN engine 18V48/60TS is a four stroke, medium speed Diesel engine, turbocharged and charge-air cooled. The engine is prepared for operation on diesel oil (dmb). Compared to other medium speed engines, covering the same power range, the 18V48/60TS produces high power from a compact, efficient design.



Technical data

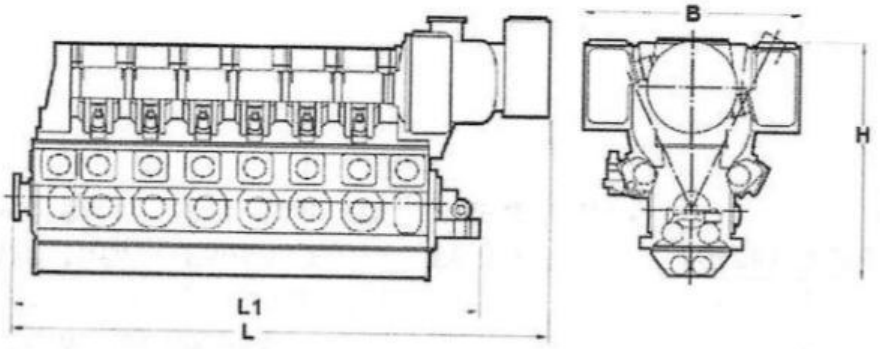
The technical data of the engine at ISO conditions[3] is summarized in the following table:

– Cylinder bore	480 mm
– Piston stroke	600 mm
– Engine speed	500 min^{-1}
– Piston speed	10.00 m/s
– Mean effective pressure	24.32 bar
– Power per cylinder	1100 kW/cyl
– Power of the engine (at crankshaft)	19800 kW_m

Continuous development

This new engine type is a development for power plant applications, based on the well-proven 48/60 engine. The engine is equipped with a sequential, two stage turbo-charging system to provide a new dimension in engine performance, operational flexibility and reduced NO_x-emissions.

Outline dimensions



Dimensions and weight[4] of the engine 18V48/60TS:

– Height (H)	6530 mm
– Length (L)	9625 mm
– Width (B)	4694 mm
– Weight (dry)	259000 kg

1.2.2 Specific fuel oil consumption (SFOC)

The specific fuel oil consumption at continuous power as per section 1.2.1 and at above defined reference conditions will not exceed the following value:

Specific fuel oil consumption **182.1 g/kWh$_{el}$**

+ 5 % tolerance.

The specific fuel oil consumption is related to a Net Calorific Value (NCV) of 42700 kJ/kg. Separation and leakage losses are not included in the above consumption rates.

The stated guaranteed value is based on ISO 3046-1:2002. Corrections to other than the above mentioned site reference conditions have to be executed according to the MAN standard procedure. The above stated value is the average of all generating sets.

1.2.3 Lubricating oil consumption

The lube oil consumption of one generating set at above defined reference conditions will not exceed the following value:

Lube oil consumption **9.9 kg/h**

+ 20 % tolerance.

Above stated value without any losses caused due to cleaning of filter or lube oil charge replacement.

The stated guaranteed value is based on ISO 3046-1:2002. Corrections to other than the above mentioned site reference conditions have to be executed according to the MAN standard procedure. The stated value is the average of all generating sets.

1.2 Performance data

The guarantee data are shown in **underlined bold letters**. Other values are for information only and without guarantee.

Our stated performance data is based on the design data as per section 1.1 and calculated for the following reference conditions:

Site Reference conditions

– Air Inlet temperature (before air inlet filter)	35 °C
– Air Inlet pressure (before air inlet filter)	1001 mbar
– Charge air temperature before cylinder	58.7 °C
– Relative humidity at above mentioned temperature	59 %
– Exhaust gas back pressure	≤ 30 mbar
– Intake air pressure loss	≤ 20 mbar

In case the site conditions / technical parameters at performance test are different from the site reference conditions defined above, the performance guarantees will be adapted in accordance to MAN standard procedure.

Measuring tolerances

Tolerances in the measuring equipment shall be considered additionally and are not included in the guarantee figures stated below. Tests will be done according to ISO 15550:2002 (ISO 3046-3:1989).

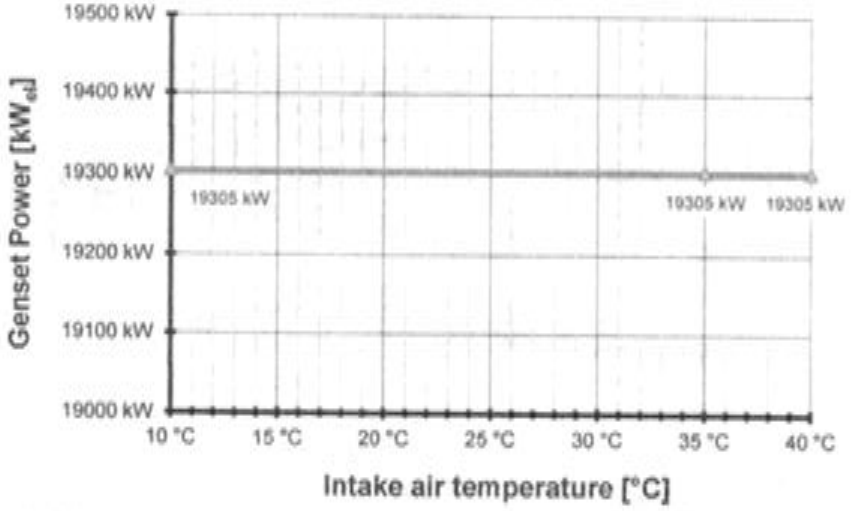
1.2.1 Continuous power of the generating set

The continuous power of one generating set 18V48/60TS at above defined reference conditions is:

Continuous power of the generating set **19305 kW_{el}**

The abovementioned power is the electrical output of the generating set as measured at the generator terminals at alternator efficiency of 97.5% (at power factor 0.8). The stated value is the average of all generating sets.

Applicable standard is ISO 3046. The continuous power of the generating set at other ambient conditions as defined above is shown in the following diagram.



Corresponding to ISO 3046-1:2002, clause 11.3 and ISO 8528-1:2005, clause 13.3, the engine will be blocked at 110 % load of the MCR, whereas the 10 % overload will be used for governing purposes only; it shall not be used for the supply of electrical consumers.

Permissible frequency limits in grid parallel operation

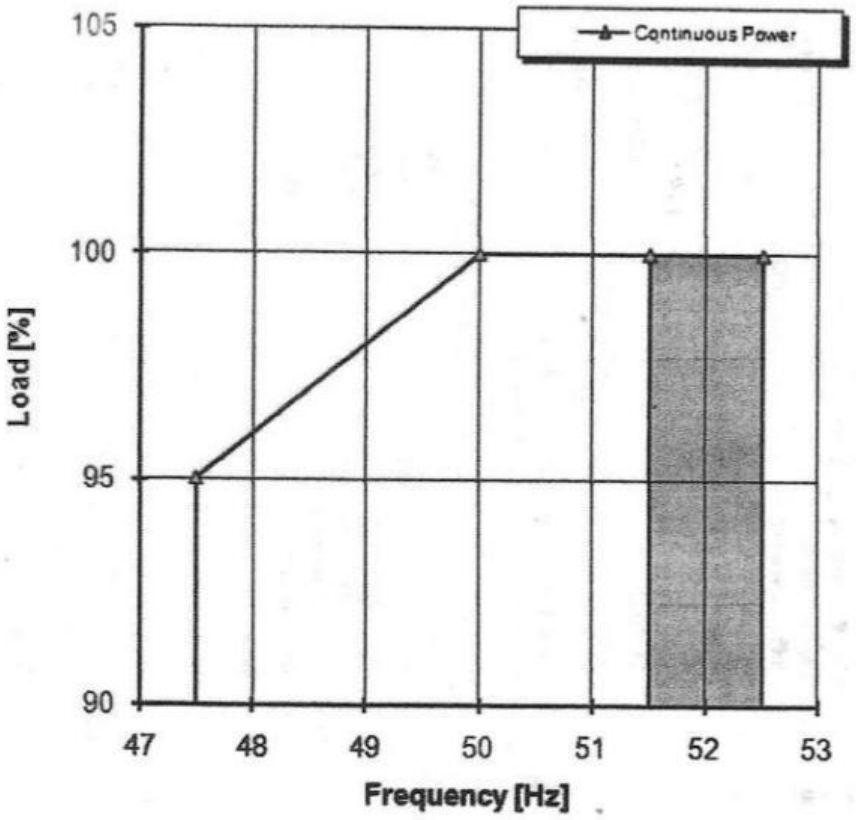


Table 1: Diagram of permissible frequency and load limits in grid parallel operation

Table 1 show that the maximum continuous engine output is ensured at a mains grid frequency exceeding up to max. +3%, whereas at a frequency drop to max. -5%, the power output is continuously reduced to 95% MCR. We permit operation of the engines up to +5% frequency fluctuations for maximum 120 seconds. In any case, the maximum permissible mains grid frequency deviation is ±5%.

In grid parallel operation, the frequency of the grid varies according to the current consumer load and the input from power suppliers. The plant responds as described above.

Load application in island mode

When load is suddenly applied to a generating set there will be a transient deviation in voltage and frequency. The maximum permissible load increase is limited to steps of 25% of the nominal power of all generating sets in operation. Further, it depends on the base load before load increase.

The offered generating sets comply with ISO 8528-5 class G2.

1.1.3 Other design data

Foundation

– Soil bearing capacity[1] > 200 kN/m²

Earthquake design according to Peak Ground Acceleration

– PGA[2] 0.2 g

Lube oil

Engine lube oil has to be in accordance to the requirements as stated in section 9.1.1

Requirements for viscosity:

– Viscosity-class (40°) SAE40

Cooling method

The cooling system of the engine is designed for cooling water in accordance to the requirements as stated in section 9.1.2.

Features of the cooling water system:

– Type of cooling system radiator

Fuel system

The engine fuel oil system is designed based on Diesel oil in accordance to the requirements as stated in section 9.1.3. Diesel oil according to ISO-F DMB is MAN standard.

Intake air

Ambient air free of dust, salt and sand, aspirated from outside power house

Intake air has to be in accordance with the requirements as stated in section 9.1.4.

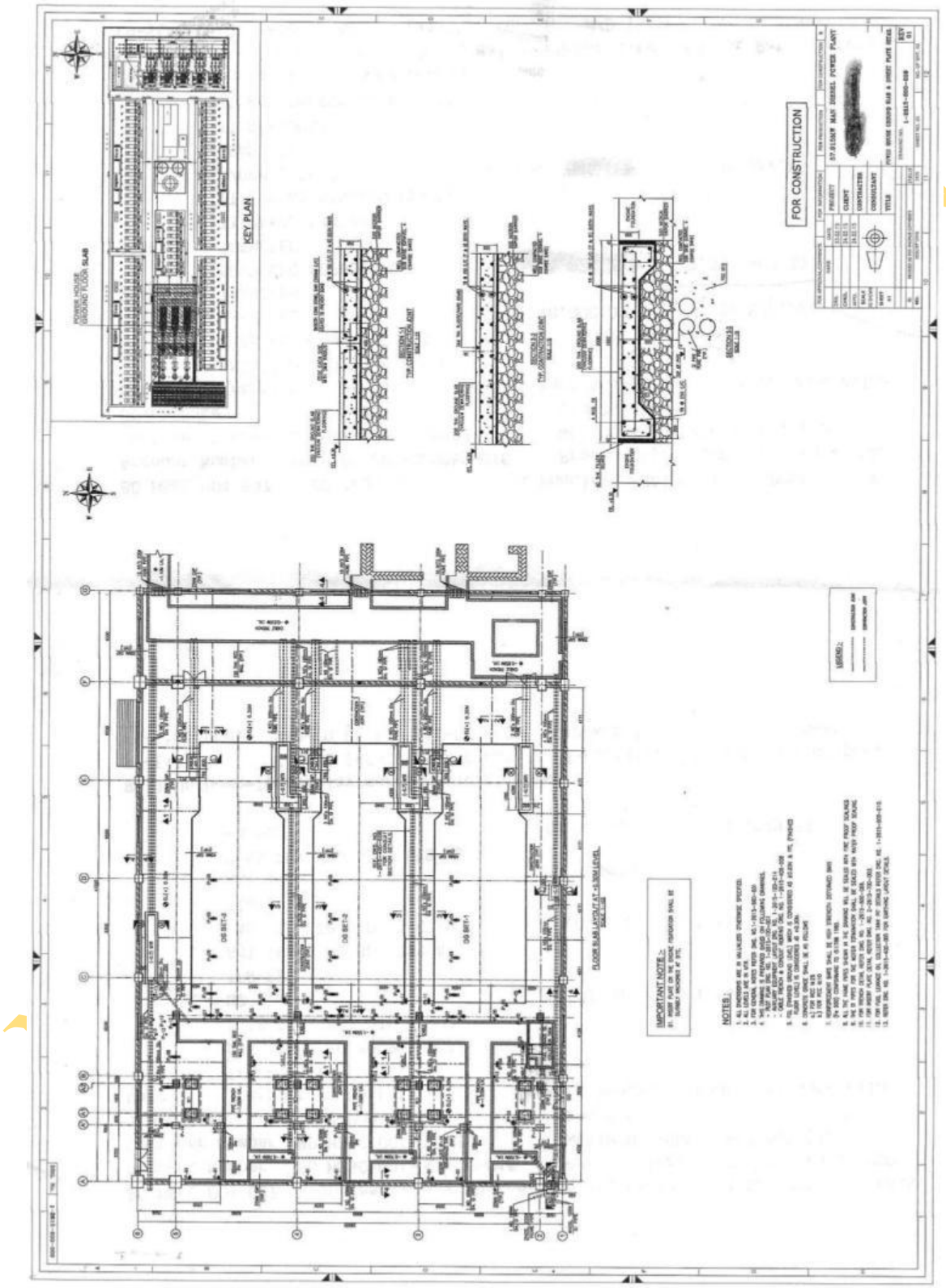
Power house ventilation

The powerhouse ventilation air is blown directly onto the alternator.

The maximum temperature inside power house, measured at floor level, next to engine / alternator is 50 °C ($t_{ambient}$ + 10 K). At gallery level a temperature of 55 °C ($t_{ambient}$ + 15 K) is permissible.

The alternator design temperature is 43 °C.

DRAWING:



PHOTOS:


MAN Diesel & Turbo
MAN
Type
18V48/60TS
Power [kW]
19.800
Engine No.
1135658
Speed [rpm]
500
Feature Ident.
2014
Clockwise rotation from main coupling side view
X
Counter clockwise rotation from main coupling side view
Firing order
(A) A1-B1-A3-B3-A5-B5-A7-B7-A9-B9-A8-B8-A6-B6-A4-B4-A2-B2
MAN Diesel & Turbo SE • Stadtbachstr. 1 • 86153 Augsburg • Germany