



NATIONAL PETROCHEMICAL COMPANY STANDARDS

MATERIAL STANDARD FOR INTERNAL COMBUSTION DIESEL ENGINES & GENERATORS

NPCS-MS-RE-16

REVISION : 0

1 MBER 1992



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- 17 AUXILIARY POWER SUPPLY (DURING NORMAL
STAND-BY CONDITIONS).
- 18 PERFORMANCE GUARANTEES
- 19 SPARE PARTS, SPECIAL TOOLS AND MANUALS



1 GENERAL INFORMATION

1.1 This standard covers the general requirements for Diesel Generation Package.

1.2 In case of any conflict between document **listed** below, the ones appearing first in sequence of this listing will proceed over the following ones.

- a) Purchase order.
- b) Data sheets.
- c) Requirements of the requisition.
- d) This standard.
- e) Other standards and specifications referred to in the above documents.
- f) Vendor drawings.

1.3 Compliance by the manufacturer with the provisions of this standard does not relieve him of the responsibility of furnishing unit of proper design, mechanically suited to meet operating guarantees at the specified operating conditions. Any deviations from this standard shall have written approval of the purchaser.

1.4 Vendor shall only supply equipment of proven design and **construction**, of which satisfactory operation over at least a two year period can be proven in similar service and operating conditions.

1.5 The English language shall be used for all correspondence documents drawings and nameplates.

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2 STANDARDS AND CODES

- 2.1 Diesel engines and its auxiliary equipment shall comply with the latest edition of "Diesel Engine Manufacturer Association" (DEMA). The governor shall comply with NEMA Standard.
- 2.2 The generator shall satisfy the recommendation of IEC Publication NO. 34 and other electrical equipment and materials shall comply with the latest editions of relevant IEC recommendations. Other recognised national standards may be used, provided they meet or exceed the IEC recommendations.
- 2.3 Standards and codes which the diesel generating set comply, shall be listed in the proposal.

3 SERVICE CONDITIONS

- 3.1 Site Data and utilities characteristics will be as what in the Requisition.
- 3.2 Unless otherwise stated, the diesel generating set will be installed indoors, in an enclosed building.
- 3.3 The Vendor shall ensure and certify that equipment and materials supplied are suitable for the ambient temperatures at job site.
- 3.4 Vendor shall stated in his proposal the noise level of the whole set as per project noise Specification. The maximum permissible sound level shall not exceed 85 dBA measured at 1 m from diesel engines & generators surface for the recommended range of operation.



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CONSTRUCTION

4.1

The engine-generator set together with ancillary equipment shall be mounted on a common base frame for mounting on the purchaser's concrete foundation. Suitable vibration isolators shall be provided for isolating engine and generator vibration from the foundation.

Holding down bolts shall also be provided.

The base frame, engine and generator, shall include 4 point lifting lugs and/or Jacking pads.

The generator enclosures shall provide the necessary protection according to Service Conditions of **section 3**. Enclosure degree of protection for generator and control panels mounted within this building and generator cooling method, shall be as specified on data/requisition sheets.

4.2

The set will normally be on stand-by duty and therefore shall be capable of standing idle for long periods without suffering **deterioration** or damage to bearings, windings, insulation and auxiliaries.

4.3

The diesel-generator service **duty**- shall be IEC-34-1. In addition the set shall have a short time overload rating of 110% for one hour every- twelve hours continuous running, occasional excess current according to IEC-34-1, paragraph 18.1 and to withstand any excessive stresses. The water and oil cooling systems shall be designed and built for 110% duty in the worst ambient **temperatures of Service Conditions**.

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5 DIESEL ENGINE

- 5.1 The engine shall be of the water cooled type. Preferred maximum engine speed is 1,000 i-pm, but in any case will not exceed 1,500 rpm.
- 5.2 The engine shall have a rated output of at least 10% greater than that required by the driven equipment plus transmission losses at rated speed and after de-rating for the ambient conditions within the enclosure during full load operation. The engine shall also be capable of providing an output 10% in excess of the rated power for one hour in any period of 12 hr continuous running. The engine Manufacturer shall declare the fuel consumption of the engine at its rated power output at site and at three quarters and half of the power output on the basis of the diesel oil which will be specified on data sheet. Fuel consumption shall be stated in kg/h. Oil consumption shall be indicated and guaranteed in liter/day and time interval of changing shall be indicated in both cases, operation and idle.
- 5.3 The type of governor and the NEMA Class shall be specified on engine data sheets.
- 5.4 The torsional natural frequencies of the engine and driven equipment system, including coupling and gear units, shall not be within 10% of any normal operating shaft speed. Constant speed applications shall be considered to have a speed range of 10%. Torsional analysis of the engine driven system to be carried out by the manufacturer of diesel engine.
- 5.5 The engine, together with driven equipment, shall be capable of starting, from cold start, running up to full speed and accepting full load within 20 seconds from first receiving external start signal under all conditions of ambient temperature. Particular notice is to be taken of the possibility of condensation in the fuel feed lines making starting difficult after a long period of disuse. Vendor shall state, in his quotation, details of methods he will adopt to avoid this problem.
- 5.6 Engine generator set shall be provided with the necessary device to permit manual or autostart for periodic maintenance and/or testings.

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ENGINE AUXILIARY EQUIPMENT

All equipment necessary for the correct operation and control of the engine shall be included in the vendor's scope of supply.

The engine shall be supplied complete with at least the following equipment :

- a) Including pump cooling water system.
- b) Lube oil system.
- c) Fuel oil system.
- d) Air inlet and Exhaust System.
- e) Starting system.
- f) Governor.
- g) Instrumentation.
- h) Miscellaneous engine accessories.

6.1 COOLING WATER SYSTEM

6.1.1 engines shall be furnished with a primary closed-jacket water system and a **centrifugal**, engine-driven jacket water pump.

6.1.2 Cooling water heat exchangers shall be of finned radiator type. Radiator fans, shall be engine-driven or motor-driven. Remote radiators, with motor-driven fans, are preferred where high capacity ventilation is required.

6.1.3 Engine jacket water shall also be used to dissipate heat from lubricating oil systems and from air intake blower intercoolers.

6.1.4 An automatic thermostat control with by-pass valve shall be used to control engine jacket water temperature. The by-pass valve shall operate so that the cooling water flow is never throttled at any position of the valve.

6.1.5 Expansion or surge tanks may be integrally or separately mounted. Expansion tanks shall be equipped with fill connections for addition of make-up water or additives.

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- 6.1.6 Jacket water shall be used for inlet air, after/intercooling, and exhaust manifold cooling, whenever such cooling requirements specified on the Engine Data Sheets.
- 6.2 LUBRICATION SYSTEM
- 6.2.1 The lubrication system shall be a pressure-type system. It shall consist of, but not be limited to, the following :
- wet-type sump.
 - Circulating pumps.
 - Filters.
 - Cooling equipment.
 - Valves for relief and pressure regulation.
 - Instruments.
 - Alarms.
 - Automatic shut-down device.
- 6.2.2 The sump shall contain an airspace above the surface of the oil equal to a minimum of 15% of the volume of the oil. The airspace shall be vented to the atmosphere with a suitable breather cap. The sump shall be equipped with sloping drain and fill connection.
- 6.2.3 Lube oil requirements for intake air blowers shall be combined with the main engine lubrication system.
- 6.2.4 Lubricating pumps shall be positive displacement type. Pumps may be engine driven or motor driven.
- 6.2.5 Engine-driven pumps shall have sufficient capacity to maintain the minimum allowable pressure when the engine is operating at idling speed.
- 6.2.6 All lube oil pumps shall be designed to provide oil flow in excess of the maximum flow required. Excess oil shall be returned to the sump through a pressure-regulating valve. Oil from bearings shall be returned to the sump by gravity flow.
- 6.2.7 The pumps shall be equipped with a high-pressure relief valve.