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NATIONAL IRANIAN OIL REFINING & DISTRIBUTION COMPANY
NATIONAL IRANIAN OIL ENGINEERING
& CONSTRUCTION COMPANY

NIOEC SP

NIOEC SPECIFICATION FOR EMERGENCY DIESEL GENERATOR

FIRST EDITION

JULY, 2005

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IN THE NAME OF GOD**FOREWORD**

By their very nature, technical standard specifications are continuously subject to modifications and revisions. To strengthen their merit and usefulness, continuous improvements, addendum, deletion of disparate information and consequently provision of updated revisions are to be made in order to ascertain that such standard specifications meet the current requirements, inclusive of Iranian Petroleum Standards (IPS) and the recognized and acceptable national and international standards, as well as the optimal codes and practices based on the accumulated in-house know-how and plant knowledge and experiences.

However, in reality, due to several reasons, not to mention the complexity of the matter, the ultimate goal of continuous direct embedment of the required changes on the relevant standard specifications may be far reaching. Therefore, in the interim periods between the officially issued revisions, the required changes will appear in other documents related to the engineering and design work of the on going projects.

In response to the initiative of the Design Division of the Engineering and Construction Directorate, and considering that the task of the execution of several important and mega projects for the realization of the new oil refineries, pipelines and oil terminals as well as improvements of the existing facilities, has been assigned to NIOEC, it was decided to update the NIOEC Specifications and to issue new official revisions.

The Design Division of the Engineering and Construction Directorate was itself entrusted to carry out this important task, and as such by forming several special technical committees, working in close co-operation and cohesion and sharing their expertise and knowledge, the updated and revised NIOEC Specifications were successfully prepared and complied.

These Specifications are intended to be used for Oil Refineries, Distribution Depots, Oil Terminals, Pipelines and Pump Stations within NIOEC's projects, and have been proven to be of high value for such purposes. It must however be appreciated that these Specifications represent the minimum requirements and should in no way be interpreted as a restriction on the use of better procedures, engineering and design practices or materials.

We encourage and highly appreciate the users and other clear sighted and experts to send their comments on the Specifications to the Design Deputy of the Engineering and Construction Director of NIOEC for evaluation and consideration.

S. R. KASAEIZADEH


EXECUTIVE DIRECTOR

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NOTES:

- 1) THIS SHEET IS A RECORD OF ALL REVISIONS TO THIS SPECIFICATION.
- 2) REMARKS RELATED TO EACH REVISION SHOW A BRIEF DESCRIPTION. THESE REMARKS SHALL BE INTERPRETED IN CONJUNCTION WITH THE REVISED TEXT MARKED BY REVISION NUMBERS.
- 3) WHEN APPROVED EACH REVISION SHALL BE CONSIDERED AS A PART OF THE ORIGINAL DOCUMENT.
- 4) NUMBER OF PAGES EXCLUDES THIS SHEET AND THE COVER SHEET.

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1. SCOPE

- 1.1** This specification covers the requirements for emergency diesel generator used in petroleum, chemical and gas industry.
- 1.2** Selected diesel generator and accessories shall be, in all respect, well within the range of the manufacturer's proven experience.
- 1.3** Compliance by the manufacturer with the provisions of this specification does not relieve him of the responsibility of furnishing diesel generator and accessories of proper design, mechanically suited to meet operating guarantees at the specified service conditions.
- 1.4** Unless specific exception accompanied by a description of the proposed substitute is recorded under the heading "Exception" in the manufacturer's proposal, it shall be mutually understood that the proposal is based on equipment which complies strictly with the requirements of this specifications, and such statement of compliance shall be given.
- 1.5** Where the manufacturer feels it is important to point out his interpretation of the specifications, these shall be listed under a separate heading "Clarifications".
- 1.6** This specification supplements the specification sheets of each individual diesel generator on which the operating conditions and special requirements are listed in detail. In case of conflict between data sheet and the documents relating to this specification, the former shall govern.

2. REFERENCES

Throughout this Specification the following dated and undated standards/ codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this Specification.

For undated references, the latest edition of the referenced document (including any supplements and amendments) applies. For dated references, the edition cited applies.

The applicability of changes in dated references that occur after the cited date shall mutually be agreed upon by NIOEC and the Vendor/Contractor.

ISO (INTERNATIONAL STANDARDIZATION ORGANIZATION)

ISO 3046, Reciprocating Internal Combustion Engines.

ISO 8528, Reciprocating Internal Combustion Engine driven Alternating Current Generating Sets.

IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION)

IEC 34, Rotating Electrical Machines

API (AMERICAN PETROLEUM INSTITUTE)

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS.)

Boiler and Pressure Vessel Code:

Section II, Pressure casing: design and construction: Material

Section V, Non destructive examination

Section VIII, Division I, Rules for construction of pressure vessels

Section IX, Welding and brazing

ASTM (American Society for Testing Materials)

BS (British Standard Institute)

BS5514, Reciprocating internal combustion engines.

NIOEC (NIOEC SPECIFICATIONS)

[NIOEC-SP-00-10](#) "NIOEC Specification for Units"

[NIOEC-SP-60-02](#) "General Specification for Motors"

3. UNITS

International system of units (SI) shall be used in accordance with [NIOEC-SP-00-10](#), unless otherwise specified.

4. DEFINITION & TERMINOLOGY

Employer: National Iranian Oil Engineering and Construction Company (NIOEC).

Contractor: The person, firm, Company or consortium whose tender has been accepted by the Employer or legal successors in title to such person.

Purchaser: National Iranian Oil Engineering & Construction Company in cases where this Specification is part of a direct purchase by National Iranian Oil Engineering & Construction

Company: In cases where this Specification is part of Contract Documents, "Purchaser" means the Contractor.

Vendor: The manufacturer's from which the equipment is to be purchased.

5. DESIGN

5.1 GENERAL

5.1.1 Diesel engine shall complete with all necessary auxiliaries including starting, cooling, lubricating, combustion air intake, exhaust and fuel systems.

5.1.2 AC synchronous generator shall complete with excitation equipment.

5.1.3 Combined engine-generator control panel shall be furnished with the diesel generator set.

5.1.4 Site condition and the rating of the diesel generator shall be specified by the purchaser on the specification datasheet. A local control panel shall be required for automatic start. The service rating of the engine shall be suitable for the generator output in accordance with the site conditions specified on the specification datasheet.

5.1.5 Diesel generator set shall be mounted on a common baseplate with anti-vibration pads.

5.1.6 The diesel generator shall be automatically started when receiving a breaking off signal on the normal power supply. The diesel engine shall be designed to reach operating speed and

full load capability within 15 seconds. The vendor shall provide the automatic start logic switch schematic.

- 5.1.7 Design and construction of the diesel generator set shall provide accessibility for all components requiring routine operational attention and maintenance.
- 5.1.8 The diesel generator shall be designed and configured to optimize inspection or maintenance and overhaul activities. Components with weight/mass greater than 25 kgs shall be provided with lifting lugs. Generators shall have jacking bolts or facilities to lift the generator with the aid of a mechanical jacking device and jacking bolts or facilitate to align the generator with the diesel engine.
- 5.1.9 All material shall be new and unused, and of proven quality. Materials for main components of the diesel generator shall be specified by the vendor on the specification datasheet.
- 5.1.10 The diesel engine noise shall be not more than 102 dB at 1 meter from the equipment surface.
- 5.1.11 Vibration isolators shall be provided for mounting the engine and generator on the fabricated steel supports or sub-base. The torsional natural frequencies of the diesel generator set, including the couplings and gear units, shall not be within 10% of any normal operating shaft speed ranges. Critical speed above 120% of the rated speed for three minutes shall not cause any damage. Automatic over/under speed trip with time delay element shall be provided.
- 5.1.12 The voltage dip when starting the largest motor with other loads in operation, shall not exceed 20% at the motor terminals.
- 5.1.13 The rating shall be such that the engine shall deliver an output of 10% in excess of the rating for 2 out of any 24 hours without injurious heating.
- 5.1.14 The Diesel Generator shall be capable of starting and accelerating to rated speed and to accept all the loads specified herein. At no time during the loading shall the steady frequency variation and steady voltage variation be more than 3% of nominal and 5% of nominal respectively.
- 5.1.15 All live parts and terminals shall be adequately screened or shrouded, and warning labels shall be provided, giving clear instructions regarding live parts and their means of isolation. All equipment shall be arranged in a logical manner. Where practicable, the enclosure shall be segregated by compartment to prevent faults in one section from spreading to other sections.
- 5.1.16 Reliability in terms of high Mean Time Between Failure (MTBF) factors is essential for this equipment. To achieve this objective, the Manufacturer shall examine the rating factors applied to all components used in manufacture, and guarantee that the ratings for this application will be modified as necessary to ensure long term reliability.
- 5.1.17 Removable guards for engine flywheel, engine-generator coupling and any other exposed moving parts shall be furnished for personnel protection. The guards shall be of non-spark materials.

- 5.1.18 The engine shall trip when the generator has tripped on fault or AVR has failed.
- 5.1.19 A tachometer shall be supplied and mounted on the engine. Speed range shall be 0 to 115% of the rated speed.
- 5.1.20 Anti-condensation heaters shall be provided for the generator and control panel, within the enclosures to limit the effect of changes in temperature and humidity. The leads from the heater shall be brought to an isolator which shall be mounted on the generator baseplate. Heaters shall be connected to a 230 Volt AC supply.

5.2 ENGINE DESIGN

5.2.1 GENERAL

- 5.2.1.1 The diesel engine shall be selected from the manufacturer's standard range of products. Prototype equipment shall not be acceptable.
- 5.2.1.2 The rated output for the engine shall meet the requirements noted on the diesel generator specification sheet. Site condition will be specified by Purchaser.
- 5.2.1.3 The engine shall be full diesel type. Engine speed shall not exceed 1500 r/min.
- 5.2.1.4 All bearings shall be capable of withstanding cylinder over a long period. The life of all bearings shall be no less than 8000 hours.
- 5.2.1.5 An over speed trip shall be necessary for the engine.

5.2.2 FUEL SYSTEM

- 5.2.2.1 The fuel system for diesel generator set shall comprise of a day tank, fuel pumps, strainers or filters, valves and fittings, etc.
- 5.2.2.2 An engine driven fuel pressure pump shall be provided. The pump shall draw oil from the day tank to the engine for operation.
- 5.2.2.3 A day tank with a minimum 8 hours operating capacity shall be supplied with the unit. This tank shall be provided with all accessories like sight glass, strainers, externally mounted level guage, filling connection/assembly, nozzles, high/low level alarm switch with status indication displayed on its local control panel, earthing bosses and nameplate. The tank shall be of heavy duty welded construction type and shall be vented and drained. The tank shall be designed to operate under pressure from full vacuum to barometric pressure and shall be installed indoors.