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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

JUNE, 2017

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IN THE NAME OF GOD

FOREWORD

By their very nature, technical 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 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 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 ongoing projects.

In response to the initiative of the Design and Engineering 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 and Engineering 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 and Engineering Director of NIOEC for evaluation and approval.

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NOTES:

- 1) THIS SHEET IS A RECORD OF ALL REVISIONS TO THIS SPECIFICATION.
- 2) WHEN APPROVED EACH REVISION SHALL BE CONSIDERED AS A PART OF THE ORIGINAL DOCUMENT.
- 3) NUMBER OF PAGES EXCLUDES THIS SHEET AND THE COVER SHEET.

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1	JUNE, 2017	M.R.DEILAMI	GH.R.ANVARI	M.R.FARZAM	M. KARGAR NAJAFI
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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.
- 1.7. Deviations from this specification will only be permitted on obtaining written approval from NIOEC.
- 1.8. Resolution on cases not explicitly stipulated in this Specification, or on cases where conflicts may arise among the requirements of the referenced IPS and the international standards, shall be made through written consent and approval of NIOEC.

2. REFERENCES

The following standards, codes, and specifications, to the extent specified hereinafter, shall constitute a part of this NIOEC Specification. Latest edition of the undated referenced documents and the cited edition of the dated references shall apply. The applicability of changes made to the dated references, after the cited date shall be mutually agreed upon between NIOEC and the Vendor /Contractor.

NIOEC (NIOEC SPECIFICATIONS)

NIOEC-SP-00-10	"NIOEC Specification for Units"
NIOEC-SP-40-03	"NIOEC Specification for Spare Parts Requirements"
NIOEC-SP-40-04	"NIOEC Specification for Lubricating, Sealing and Controlling Oil"
NIOEC-SP-46-04	"NIOEC Specification for Rotary Pumps for General Refinery Services"
NIOEC-SP-47-10	"NIOEC Specification Noise Control and vibration"
NIOEC-SP-60-02	"General Specification for Induction Motors"
NIOEC-SP-70-19	"NIOEC Specification for Miscellaneous Instruments"
NIOEC-SP-90-52	"NIOEC Specification for Packing and Packages"

NIOEC-SIP (NIOEC SHOP INSPECTION PROCEDURES)

NIOEC-SIP-46-04	"Shop Inspection Procedures for Rotary Machines"
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ISO (INTERNATIONAL STANDARDIZATION ORGANIZATION)

ISO 3046, Reciprocating Internal Combustion Engines-Performance.

IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION)

IEC 34, Rotating Electrical Machines

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

Boiler and Pressure Vessel Code:

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

ASME B16.5, Pipe Flanges and Flanged Fittings

AWS Welding Codes (AMERICAN WELDING SOCIETY)

AWS D1.1 Structural Welding Code.

ASTM (American Society for Testing Materials)**BS (British Standard Institute)**

BS EN 1834-1

Reciprocating internal combustion engines – Safety requirements for design and construction of engine for use in potentially explosive atmospheres

3. UNITS

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

4. DESIGN**4.1. General**

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

4.1.2. The engine shall be designed to reach operating speed and full load capability within 10 seconds after receiving a short signal.

4.1.3. AC synchronous generator shall complete with excitation equipment.

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

4.1.5. 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 equipped 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.

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

- 4.1.7.** 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 10 seconds. The vendor shall provide the automatic start logic switch schematic.
- 4.1.8.** Design and construction of the diesel generator set shall provide accessibility for all components requiring routine operational attention and maintenance.
- 4.1.9.** 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.
- 4.1.10.** 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 or respect drawings. All materials shall conform to reputable international material specifications.
- 4.1.11.** The diesel engine noise shall be not more than 92 dB at 1 meter from the equipment surface. The equipment furnished by Vendor shall conform to the noise level requirements of NIOEC-SP-47-10.
- 4.1.12.** 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.
- 4.1.13.** The voltage dip when starting the largest motor with other loads in operation, shall not exceed 20% at the motor terminals.
- 4.1.14.** 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.
- 4.1.15.** 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.
- 4.1.16.** 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.
- 4.1.17.** 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.
- 4.1.18.** 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.
- 4.1.19.** The engine shall trip when the generator has tripped on fault or AVR has failed.
- 4.1.20.** A tachometer shall be supplied and mounted on the engine. Speed range shall be 0 to 115% of the rated speed.