

NIOEC-SP-43-13(0)							
DOCUMENT CODE							NO. OF PAGES: 24
PLAN/PRJ/SUB	UNIT	PHASE	DISCIPLINE	DOCUMENT TYPE	SERIAL NO.	REV. NO.	DATE
NIOEC	000	EG	PM	SP	4313	A1	JUNE, 2006



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

NIOEC SP

NIOEC SPECIFICATION FOR GAS TURBINE GENERATORS

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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REV.	DATE	PREPARED	CHECKED	APPROVED	AUTHORIZED

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1 SCOPE

- 1.1 NIOEC Specifications cover the general requirements for detailed engineering, procurements, testing inspection & construction of refinery/ oil plant, distribution depots, pump stations and pipelines.
- 1.2 The self-contained gas turbine generator unit and all associated electrical and auxiliary equipment shall be supplied in accordance with this Specification. The Specification is intended to cover the requirements for a gas turbine in exhaust heat recovery cycle type.

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.

AGMA (AMERICAN GEAR MANUFACTURERS ASSOCIATION)

421.06 "High Speed Helical and Herringbone Gear Units"

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

API (AMERICAN PETROLEUM INSTITUTE)

API 613 "Special Purpose Gear Units"

API 616 "Gas Turbines for the Petroleum, Chemical, and Gas Industry Services"

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

PTC 22 "Gas Turbine Power Plants"

DIN (DEUTSCHES INSTITUT FÜR NORMUNG)

EU/EC (EUROPEAN UNION/COMMISSION)

IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION)

IEEE (INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS)

IEEE 115 "Test Procedures for Synchronous"

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDS)

ISO 2314 "Gas Turbine Acceptance Tests"

NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)

NIOEC-SP (NIOEC SPECIFICATIONS)

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

[NIOEC-SP-47-37](#) "NIOEC Specification for Air Pollution Control"

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 GENERAL

5.1 Introduction

The gas turbine shall be designed and constructed for safe, long, economical and uninterrupted continuous service with exception from short intermediate and scheduled shutdown for inspection and cleaning.

The gas turbine shall be capable of operation under the site conditions specified herein.

5.2 Design conditions and construction requirements

The gas turbine and its auxiliaries shall be of well proven design and data shall be submitted to demonstrate successful operation of units of the same type and rating installed for electrical power generation at similar operating conditions.

The gas turbine shall be of industrial heavy duty type.

For good part load efficiency and performance, a concept with a free power turbine is preferred if available.

To allow compressor and turbine replacement at site the design shall be of modular type with horizontally or vertically split compressor/turbine casings.

The gas turbine shall have good accessibility and also allow inspection of the hot parts within the GT enclosure.

The gas turbine shall be furnished with adequate facilities to meet Emission standard requirements as per NIOEC-SP-47-37 and also the latest standard of Environmental Protection Organization of Iran.

The Vendor/Contractor is required to carry out complete function and performance tests on site. The tests will be witnessed and approved by the Purchaser.

The design shall allow long running periods, at least 10 000 equivalent hours between inspections and overhauls. All scheduled maintenance, shall be done at site.

When evaluating the proposals, the following shall be taken into consideration:

Efficiency (full load and part load)

Earlier experience

Price

Delivery time

Serviceability on site

Time Between Overhaul (TBO)

Maintenance cost

Service concept

5.3 Supply Scope

The Supply Scope shall include the following main items:

- Gas Turbine package
- Spares
- Tools and Appliances
- Training
- Documentation

5.3.1 Gas turbine package

Packaged heavy duty industrial gas turbine generating set complete with all necessary auxiliaries including the following items:

- Starting equipment

- Lubricating oil system, common for gas generator, power turbine, gear and AC Generator.

- Ventilation systems

- Fire detection and suppression system with CO2 extinguisher.

- Gas detection system

- Fuel system

- Compressor washing system

- All necessary pipework and valves within the terminal points

- AC Generator with excitation equipment

- Gear box

- MCC and switchgear for auxiliaries.

- Batteries and Charger, DC Distribution system and UPS

- Lighting and small power systems

- Turbine and AC Generator control and protection equipment

- Instrumentation including cables, and piping.

- Cabling and earthing

- Weatherproof enclosure over the turbine, auxiliaries and control room, noise 65db(A)/100m

- Air intake louvers, filtration equipment, silencing equipment and intake ducting, supports for gas turbine and AC Generator.

- Exhaust stack, ducting, supports and silencing equipment.

- Adequate facilities to meet Emission standard requirements as per NIOEC-SP-47-37 and also the latest standard of Environmental Protection Organization of Iran.

- Ladders and platforms

- Transport (FOB)

- Supervision of erection, commissioning and test

- Delivery limits

- Inlet flange of the gas fuel pipe, at the external filter unit

- Inlet flange of the diesel fuel pipe, at gas turbine base frame

- Inlet/outlet flange for cooling water supply/return at GT- base frame

- Connection for instrument air at GT- base frame

- Drain connections at GT- base frame

- Connections in the neutral/lineside cubicle for outgoing MV cables

- Terminals in the LV-switchgear for incoming LV supply

- Terminals in the Control panel for signal exchange with the generator circuit breaker and the bus VT.

- Earthing connections at GT- base frame and – AC-Generator

- Interface to foundation at lower end of GT- base frame

5.3.2 Spares

The vender shall include a recommendation of spare parts required for 2 years operation.

For the control system sufficient replacement plug-in elements for two years normal operation shall be supplied and shall be available prior to initial commissioning. Any elements used during commissioning shall be replaced.

5.3.3 Tools and Appliances

Needed tool list for erection, inspection and maintenance to be given.

5.3.4 Training of

The Vendor/Contractor shall submit a proposal for training of necessary number of Purchaser's personnel on site.

5.4 Language

The English language shall be used in all documents and in all correspondence between the Vendor/Contractor and the Purchaser.

5.5 Compliance with Spec.

Notwithstanding any description, drawings or illustrations which may have been submitted with the Tender, all details will be deemed to be in accordance with the Specification and the standard specifications and codes referred to therein, unless deviations have been made and agreed upon.

5.6 Packing

Each item is to be packed properly or protected for transport

6 GAS TURBINE AND AUXILIARY EQUIPMENT

6.1 Mechanical

6.1.1 General

This section of the Specification covers the gas turbine prime mover and unit auxiliaries.

The turbine generating set shall be the standard product of the Vendor/Contractor and each set shall be delivered as a package plant complete with buildings, auxiliary-, control- and electrical systems.

It is essential that the gas turbine unit and all ancillary equipment should have been fully proven by extensive and successful operation in commercial service under similar operating conditions and on similar fuels to those specified for this application. If the Vendor/Contractor is unable to comply with these requirements, specified details of the components concerned shall be entered in the List of Deviations.

The gas turbine generating set should fulfil the following basic requirements:

Good accessibility: the complete inspection of hot parts shall be possible within the gas turbine enclosure.