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

NIOEC SP

NIOEC SPECIFICATION FOR GENERAL DESIGN REQUIRMENTS OF MACHINERIES

FIRST EDITION

JULY, 2005

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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.

REVISION INDEX

REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5
1						26						51						76					
2						27						52						77					
3						28						53						78					
4						29						54						79					
5						30						55						80					
6						31						56						81					
7						32						57						82					
8						33						58						83					
9						34						59						84					
10						35						60						85					
11						36						61						86					
12						37						62						87					
13						38						63						88					
14						39						64						89					
15						40						65						90					
16						41						66						91					
17						42						67						92					
18						43						68						93					
19						44						69						94					
20						45						70						95					
21						46						71						96					
22						47						72						97					
23						48						73						98					
24						49						74						99					
25						50						75						100					

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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CONTENTS:	PAGE NO.
INTRODUCTION.....	2
1. SCOPE.....	2
2. REFERENCES.....	2
3. UNITS.....	6
4. DEFINITION & THERMINOLOGY.....	6
5. ADDENDUM TO IPS STANDARD (IPS-E-PM-100).....	6

INTRODUCTION

To satisfy the requirements of this NIOEC Specification, Iranian Petroleum Standard [IPS-E-PM-100](#)(2) with the modifications as specified herein after shall be strictly followed.

Articles 0 through 4 of this document replace entirely the related articles in the referenced IPS Standard.

1. SCOPE

This Specification gives general design requirements, Specifications and guidance for rotating machineries (i.e. compressors, pumps, fans, blowers, steam and gas turbines); for use in oil plants.

The Contractor shall determine by careful security which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, economic and legal aspects.

Compliance with the requirements of this Specification and the Standards and codes referred to herein shall not relieve the contractor or manufacturer of their responsibility to follow safe.

Resolution on cases not explicitly stipulated in this Specification, or on cases where conflicts may arise among the requirements of the referenced/relevant consent and approval of NIOEC.

Deviation from this specification will only be permitted on obtaining written approval from NIOEC.

2. REFERENCES

The following standard, codes and specification, 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 dated references, after the cited date shall be mutually agreed upon between NIOEC and vendor/contractor.

API (AMERICAN PETROLEUM INSTITUTE)

- 610 “Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries “
- 611 “General Purpose steam Turbine for Petroleum, Chemical and Natural Gas Industry services”.
- 612 “Special Purpose Steam Turbine for Petroleum ,Chemical and Natural Gas Industry services”
- 614 “Lubrication, Shaft Sealing and Control Oil System and Auxiliaries for Petroleum, Chemical and Natural Gas Industry services”.
- 615 "Sound Control of Mechanical Equipment for Refinery Services"
- 616 “Gas Turbines for Petroleum, Chemical and Natural Gas Industry services”
- 617 “Axial and Centrifugal Compressors and Expander – Compressors for Petroleum, Chemical and Gas Industry services”
- 618 “Reciprocating Compressors for Petroleum, Chemical and Natural Gas Industry services”

- 619 "Rotary Type Positive Displacement Compressors for Petroleum, Chemical and Natural Gas Industry services"
- 670 "Machinery Protection Systems"
- 671 "Special Purpose Couplings for Petroleum, Chemical and Natural Gas Industry services"
- 672 'Packaged, Integrally Geared Centrifugal Air Compressor for Petroleum, Chemical and Natural Gas Industry services"
- 673 Special Purpose Fans"
- 674 "Positive Displacement Pumps-Reciprocating"
- 675 "Positive Displacement Pumps-Controlled Volume"
- 676 "Positive Displacement Pumps-Rotary"
- 677 "General Purpose Gear Units for Petroleum, Chemical and Gas Industry Services"
-
- 682 Pumps – Shaft Sealing System for Centrifugal and Rotary Pumps

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)**IPS (IRANIAN PETROLEUM STANDARD)**

- IPS-E-PM-100 "General Design Requirements of Machineries"
- IPS-M-PM-105 "Centrifugal Pumps for Process Services"
- IPS-M-PM-115 "Centrifugal Pumps for General Services"
- IPS-M-PM-125 "Centrifugal Fire Water Pumps"
- IPS-M-PM-130 "Positive Displacement Pumps - Reciprocating"
- IPS-M-PM-140 "Positive Displacement Pumps - Rotary"
- IPS-M-PM-150 "Positive Displacement Pumps - Controlled Volume"
- IPS-M-PM-170 "Centrifugal Compressors for Process Services"
- IPS-M-PM-180 "Packaged Integrally Geared Centrifugal Compressor for Utility and Instrument Air Services"
- IPS-M-PM-190 "Axial Flow Centrifugal Compressors"
- IPS-M-PM-200 "Reciprocating Compressors for Process Services"
- IPS-M-PM-210 "Reciprocating Compressors for Utility and Instrument Air Services"
- IPS-M-PM-220 "Positive Displacement Compressors - Rotary"
- IPS-M-PM-230 "Special purpose Centrifugal Fans "
- IPS-M-PM-235 "General purpose Centrifugal Fans "
- IPS-M-PM-240 "General Purpose Steam Turbines"
- IPS-M-PM-250 "Special Purpose Steam Turbines"
- IPS-M-PM-260 "Combustion Gas Turbines"
- IPS-M-PM-300 "Special Purpose Gear Units"

IPS-M-PM-310	"Special Purpose Couplings"
IPS-M-PM-320	"Lubrication, Shaft Sealing and Control Oil Systems for Special Purpose Applications"
IPS-M-PM-330	"Mixers"
IPS-E-SF-900	"Noise and Vibration Control"
IPS-E-EL-110	"Hazardous Area "
IPS-G-ME-220	"Shell and Tube Heat Exchangers"

NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)

No. 20

NIOEC-SP (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-43-13](#) "NIOEC Specification for Gas Turbine Generators"

[NIOEC-SP-43-14](#) "NIOEC Specification for Centrifugal Fans"

[NIOEC-SP-43-15](#) "NIOEC Specification for Positive Displacement Compressors Rotary"

[NIOEC-SP-44-01](#) "NIOEC Specification for Shell and Tube Heat Exchangers"

[NIOEC-SP-46-01](#) "NIOEC Specification for Centrifugal Pumps for General Refinery Services"

[NIOEC-SP-46-02](#) "NIOEC Specification for General Purpose Steam Turbines"

[NIOEC-SP-46-03](#) "NIOEC Specification for Reciprocating Pump"

[NIOEC-SP-46-04](#) "NIOEC Specification for Rotary Pumps for General Refinery Services"

[NIOEC-SP-46-07](#) "NIOEC Specification for Lubrication, Shaft Sealing, Control Oil System for Special Purpose Application"

[NIOEC-SP-46-08](#) "NIOEC Specification for Centrifugal Compressors in General Refinery Services"

[NIOEC-SP-46-09](#) "NIOEC Specification for Reciprocating Compressors for General Refinery Services"

[NIOEC-SP-46-10](#) "NIOEC Specification for Centrifugal Plant and Instrument Air Compressor Packages"

[NIOEC-SP-46-12](#) "NIOEC Specification for Centrifugal Pumps for General Services"

[NIOEC-SP-46-16](#) "NIOEC Specification for Fire Water Pumps"

[NIOEC-SP-46-17](#) "NIOEC Specification for Mechanical Agitators(Mixers)"

[NIOEC-SP-47-10](#) "NIOEC Specification for Noise Control and Vibration"

[NIOEC-SP-50-08](#) "NIOEC Specification for Winterizing and Heat Conservation"

[NIOEC-SP-60-00](#) "NIOEC Specification for General Design Philosophy for Electrical System"

TEMA (TUBULAR EXCHANGER MANUFACTURER'S ASSOCIATION)

Class C

2.1. Equivalent to IPS Standard

Substitute the following IPS Standards as referred to throughout IPS-E-PM-100 to relevant NIOEC's Specifications as follows:

<u>IPS Standard</u>	<u>Relevant NIOEC Specification</u>
IPS-M-PM-105	NIOEC-SP-46-01
IPS-M-PM-115	NIOEC-SP-46-12
IPS-IPS-M-PM-125	NIOEC-SP-46-16
IPS-M-PM-130	NIOEC-SP-46-03
IPS-M-PM-140	NIOEC-SP-46-04
IPS-M-PM-150	-
IPS-M-PM-170	NIOEC-SP-46-08
IPS-M-PM-180	NIOEC-SP-46-10
IPS-M-PM-190	-
IPS-M-PM-200	NIOEC-SP-46-09
IPS-M-PM-210	-
IPS-M-PM-220	NIOEC-SP-43-15
IPS-M-PM-230	-
IPS-M-PM-235	NIOEC-SP-43-14
IPS-M-PM-240	NIOEC-SP-46-02
IPS-M-PM-250	-
IPS-M-PM-260	NIOEC-SP-43-13
IPS-M-PM-300	-
IPS-M-PM-310	-
M IPS--PM-320	NIOEC-SP-46-07
IPS-M-PM-330	NIOEC-SP-46-17
IPS-E-SF-900	NIOEC-SP-47-10

IPS-E-EL-110

[NIOEC-SP-60-00](#)

IPS-G-ME-220

[NIOEC-SP-44-01](#)

IPS-E-PR-420

[NIOEC-SP-50-08](#)

3. UNITS

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

4. DEFINITION & THERMINOLOGY

Vital duty: Vital duty is a duty where failure of an equipment to operate correctly results in an unsafe condition which puts the lives of personnel at risk or jeopardizes equipment.

Essential duty: Essential duty is a duty where failure of an equipment to operate correctly when required renders a plant or process unacceptable as a production unit.

Critical service: Critical service can be either a vital or an essential duty or service, according to the text and its intent.

Continuous operation: Continuous operation is an uninterrupted operation by an equipment and its auxiliaries, and its installed spare, for a period of at least 16,000 hours at the specified operating conditions.

Intermittent operation: Any operation which is not classed as continuous operation.

API Standards: In the API Standards referred to in this specification several clauses are marked with a bullet(C) in the margin, indicating that a decision is required by the principal.

These decisions shall be indicated directly on the relevant data sheets when provision is made for them, otherwise they shall be stated in the purchase order.

5. ADDENDUM TO IPS STANDARD (IPS-E-PM-100)

This addendum revises the below listed articles of the referenced standard as follows :

6. DESIGN REQUIREMENTS

6.1. General

6.1.1. Noise Levels (Modification)

The first paragraph shall be modified as follows:

Noise level emitted from each piece of equipment shall be restricted to meet requirements specified in [NIOEC-SP-47-10](#).

6.1.5. Lubricants and Lubrication (Modification)

The whole paragraphs shall be modified as follows:

Lubricant including grease to be used for rotary machinery shall be selected from NIOEC-SP-40-04.

7.0 INSPECTION AND TESTING (Addition)

Add the following paragraphs:

7.1. All tests and inspections shall be performed in accordance with relevant NIOEC inspection and test procedure including Shop Inspection Procedure (SIP).

7.2. Mill certificates of the following constituent parts, when made of alloy steel, shall be submitted as applicable.

7.2.1. Centrifugal Pumps

Casing, impeller, shaft, shaft sleeve, wearing ring, interstage bushing, balance piston

7.2.2. Positive Displacement Pumps

Casing, piston, plunger, rotor

7.2.3. Reciprocating Compressors

Cylinder head, cylinder, piston, piston rod, connecting rod, crank shaft, valve, pressure vessel

7.2.4. Fans

Casing, impeller, shaft, shaft sleeve

7.2.5. Diesel Engine

Cylinder, Cylinder Head, Cylinder liner, Piston, Piston rod, Piston ring, Connecting rod, Crank, Cam, Crank shaft.

8.0. DRAWINGS AND DOCUMENTS (Addition)

Add the following paragraphs:

8.1. Data sheets attached herewith shall be used in order to unify the format of each category of machinery. Vendor shall complete and fill in these data sheets electronically and submit them to the purchaser.

8.2. Drawings and documents shall be submitted to NIOEC as follows.

8.2.1. Equipment technical data sheets.

8.2.2. Inquiry package – for information

8.2.3. Bid tabulation with at least the following – for approval (at commitment stage)

- List of exceptions & deviations from Job specifications & other Requirements.
- Equipment data sheets
- Expected performance curves

- Vendor's recommended priced spare parts lists for 2 year's operation

8.2.4. Operation & maintenance manuals – for information

Note: In case of pumps the full dimensioned drawing of stuffing boxes shall be included in the manual.

8.2.5. Test/inspection records – for information.

8.2.6. Lubricant schedule – for information.

8.2.7. Vendor's drawings – for information.

Such as – Flow diagrams of lube and seal oil system (where applicable)

Unit outline drawings.



IRANIAN PETROLEUM STANDARDS

استانداردهای نفت ایران

IPS

IPS-E-PM-100 (2)

ENGINEERING STANDARD
FOR
GENERAL DESIGN REQUIREMENTS
OF
PROCESS MACHINERIES

SECOND REVISION
OCTOBER 2009

استاندارد مهندسی
برای

الزامات عمومی طراحی ماشین آلات فرآیندی

ویرایش دوم

مهر ۱۳۸۸

DEPUTY MINISTER
OF
ENGINEERING & LOCAL MANUFACTURING
RESEARCH & STANDARDS

معاونت مهندسی و ساخت داخل



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