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

NIOEC SP

NIOEC SPECIFICATION FOR INCINERATORS

FIRST EDITION

JULY, 2005

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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

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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INTRODUCTION

To satisfy the requirement of this NIOEC Specification, Iranian Petroleum Standard IPS No. [IPS-G-ME-253](#)(1)FEB(2005) with the modifications as specified herein shall be strictly followed.

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

1. SCOPE

- 1.1. This Specification defines NIOEC's minimum requirements for the refractory lining which will be used in equipment (e.g. furnaces, boilers, incinerators, vessels).
- 1.2. Deviations from this specification will only be permitted on obtaining written approval from NIOEC.
- 1.3. Resolution on cases not explicitly stipulated in this specification, or on cases where conflicts may arise among the requirements of the referenced international standards, shall be made through written consent and approval of NIOEC.
- 1.4. If conflict is discovered between the items listed, it shall be the responsibility of the Vendor to call attention to the conflict.

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 agreed upon between NIOEC and the Vendor/Contractor.

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

ASME B 31.3	"Process Piping"
Section IX	"Welding & Brazing Qualifications"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

C 20	"Test Methods for Apparent Porosity, Water Absorption, Apparent Specific Gravity, and Bulk Density of Burned Refractory Brick and Shapes by Boiling Water"
C 410	"Specification for Industrial Floor Brick"
C 573	"Method for Chemical Analysis of Fireclay and High-Alumina Refractories"
C 583	"Standard Test Method for Modulus of Rupture of Refractory Materials at Elevated Temperature"

FM (FACTORY MUTUAL)**NIOEC-SP (NIOEC SPECIFICATIONS)**

NIOEC-SP-00-01	“NIOEC Specification for Civil Design Criteria”
NIOEC-SP-00-10	“NIOEC Specification for Units”
NIOEC-SP-00-11	“NIOEC Specification for Site Conditions”
NIOEC-SP-10-04	“NIOEC Specification for Concrete Used For Fire Proofing
NIOEC-SP-45-07	“NIOEC Specification for Refractory Lining ”
NIOEC-SP-45-14	“NIOEC Specification for Procedure for Refractory Lining”
NIOEC-SP-47-10	“NIOEC Specification for Noise Control & Vibration”
NIOEC-SP-50-04	“NIOEC Specification for Piping Material”
NIOEC-SP-60-00	“NIOEC Specification for Electrical design Criteria”
NIOEC-SP-70-01	“NIOEC Specification for Instrumentation”
NIOEC-SP-80-02	“NIOEC Specification for Painting”
NIOEC-SP-47-37	“NIOEC Specification for Air Pollution Control”

IPS (IRANIAN PETROLEUM STANDARD)

IPS-G-ME-253 "Incinerator"

UL (UNDERWRITERS LABORATORIES)**2.1. Equivalent to IPS Standard**

Substitute the following IPS Standards as referred to throughout IPS-G-ME-253 to relevant NIOEC's Specifications as follows:

IPS Standard	Relevant NIOEC Specification
IPS-C-TP-102	NIOEC-SP-80-02
IPS-E-EL-110	NIOEC-SP-60-00
IPS-E-PI-221/1	NIOEC-SP-50-04
IPS-E-PI-221/2	NIOEC-SP-50-04
IPS-E-SF-400	NIOEC-SP-10-04
IPS-G-SF-860	NIOEC-SP-47-37
IPS-M-IN-280	NIOEC-SP-70-01
IPS-E-GN-100	NIOEC-SP-00-10
IPS-G-SF-900	NIOEC-SP-47-10

3. UNITS

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

4. ADDENDUM TO IPS STANDARD ([IPS-G-ME-253](#))

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

4.3. (Modification)

Incineration is to take place such that sufficient fuel gas and air are used to burn all sulfur bearing compounds to sulfur dioxide and to dilute the incinerated products such that the concentration of sulfur dioxide in the incinerator exit gas does not exceed the values mentioned in NIOEC-SP-47-37 .

5. PROCESS DATA (Addition)

Add the following paragraphs at the end of article:

5.1.The incinerator shall completely burn and dissipate the stream and gases defined in Process Data Sheet.

5.2.Composition and rate of gases, design outlet gas conditions & design fuel gas operating data shall be specified in Process Data Sheet.

6. DESIGN

6.1. General(Addition)

Add the following paragraphs at the end of article:

6.1.12. The incinerator shall be designed to operate trouble free for extended periods at 15 to 100% of the design flow rate.

6.1.13. In any operation including turn down for any cases, the temperature of waste gas to the stack shall be kept at least 30°C above flue gas dew point.

6.1.14. The incinerator and stack shall comply with Process Data Sheet.

6.1.15. Material shall comply with appropriate ASTM Specifications. Materials not covered by ASTM Specifications shall be in accordance with standards generally accepted internationally for this class of equipment. ASTM or equivalent material of country of origin is permissible, subject to NIOEC approval.

6.1.16. Vendor's standard or recommended design shall be submit to NIOEC for approval.

6.1.17. The stack shall be guyed and have a minimum height above grade of 76.2 meters. The incinerator must be able to burn all the disposed gases at all times. The stack height must be high enough to dispose the gases to atmosphere with no environmental problem when the incinerator is out of service.

6.1.18. Stack shall be completely designed including painter's trolley, access ladder, rain shield, and 18/8 Cr/Ni Stainless Steel refractory anchors for it's entire height. Stack shall be shop fabricated in sections, including installation of Stainless Steel refractory anchor for its entire height.

- 6.1.19.** A painter's trolley and ring shall be provided for access to outside surface of stack. Ring and trolley shall be designed for a 1000 kg load.
- 6.1.20.** Configuration of stack-rain shield top shall be such that rain water entrance to the clearance space between stack/rain shield plate is avoided.
- 6.1.21.** Damper shall be operable from grade and to be provided with external position indicator readable from grade. Damper shall have position transmitter to indicate position in control room monitors.

6.7. Refractory (Addition)

Add the following paragraphs at the end of article:

- 6.7.3.** Refractory thickness shall be designed as per operating condition and Site Condition. For site condition, reference shall be made to [NIOEC-SP-00-11](#).
- 6.7.4.** All refractory materials as recommended by the incinerator manufacturer for the incinerator, breeching and stack shall be furnished by the incinerator manufacturer and installed by others in field.
- 6.7.5.** The design of refractory/insulation/rain shield etc shall be such that to have rain shield outside surface temperature around maximum ambient temperature.
- 6.7.6.** Details for refractory installation in the field (by others) shall be shown on incinerator manufacturer's drawings.

6.9. Instrumentation (Modification)

The following paragraphs shall be added to the article:

- 6.9.3.** The natural draft incinerator shall be equipped with instrumentation and control system to meet the requirements of Class I, Group C & D, Division II area.
- 6.9.4.** Instrumentations & controls system and components shall be of manufacturer's highest quality, and shall be subject to NIOEC approval.
- 6.9.5.** Instrumentations and controls shall provide for the safe and efficient operation of the unit.

Tail gas and sour gas main burners and pilots shall be equipped with scanners & audio/visual alarms.

Limit and alarm switches shall be adequately used to provide for a safe interlock system of operation.

Instrumentations and controls shall as a minimum consist of the following items:

- 6.9.5.1.** Flame failure system for tail gas and acid gas/sour gas burners and pilot burners shall be provided including the following:

a) Flame scanner

- Flame scanner for pilot burner; Req'd No: 2.

Flame scanner for main burner; Req'd No: 2.

Scanners to be ultra violet light sensitive and weather proof (min IP65).

Scanner sight tube to have 3/4" NPT male connection

b) Control unit (failure switch)

- 4 numbers required.
- Control units to be constructed to Underwriters Laboratories (U.L). and Factory Mutual (FM) standard and to be weather proof (min IP65).
- Primary control to have a continuous self-checking circuit. Control units to be installed in the incinerator control panel.

Green “Flame on” and red “Flame Failure” lights to be mounted on the front of the incinerator control panel for each scanner.

c) Sequence of operator is as follows:

Flame off at both scanners: both red lights on, both scanner alarm contacts open and common shutdown and common alarm contacts open.

Shutdown system shall be provided with first out indication.

Flame on at scanner #1, #3, Flame off at Scanner #2, #4:

Scanner #1, #3 green light on, alarm contact closed and common shutdown and common alarm contacts closed. Scanner #2, #4 red light on, alarm contact open.

Flame off at Scanner #1, #3, Flame on at Scanner #2, #4:

Scanner #1,#3 red light on and alarm contact open. Scanner #2, #4 green light on, alarm contact closed and common shutdown and common alarm contacts closed.

Flame on at Scanner #1, #3, Flame on at Scanner #2, #4:

Scanner #1, #3 green light on, alarm contact closed and common shutdown and common alarm contact is closed. Scanner #2, #4 green light is on and alarm contact is closed.

6.9.5.2. The incinerator control panel shall be provided including the following:

- The interlock system of start-up shall be provided to automatically control the following sequence of operation:
 - a)** Purging completion
 - b)** Pilots ready
 - c)** Pilot gas ignition
 - d)** Pilot burners flame scanners in operation.
 - e)** Fuel gas to the main burners ready
 - f)** Main burners flame on
 - g)** Main burners flame scanner in operation
 - h)** Tail gas and sour gas to their relevant burners ready
 - i)** Oxidizer temperature control in operation
 - j)** Shut-down system provided for any failure in normal operation with first-out indication.