

NIOEC-SP-50-10(1)							
DOCUMENT CODE							NO. OF PAGES: 6
PLAN/PRJ/SUB	UNIT	PHASE	DISCIPLINE	DOCUMENT TYPE	SERIAL NO.	REV. NO.	DATE
NIOEC	000	EG	PI	SP	5010	A1	SEPTEMBER 2016



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

NIOEC SP

NIOEC SPECIFICATION FOR PIPING MATERIAL PURCHASE STEEL PIPE FLANGES AND ORIFICE FLANGES

SECOND EDITION

SEPTEMBER, 2016

THIS SPECIFICATION IS THE PROPERTY OF NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED TO THE OWNER. NEITHER WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF THE NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY.

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 on going 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.

5					
4					
3					
2					
1	SEPTEMBER, 2016	M.ASKARI	G.ANVARI	M.R.FARZAM	M.KARGAR NAJAFI
0	JULY, 2005	A. NAVARCHI	M. KHEZRI	M.R.FARZAM	M.A.A. SAJEDI
REV.	DATE	PREPARED	CHECKED	APPROVED	AUTHORIZED

CONTENTS:	PAGE NO.
INTRODUCTION.....	2
1. SCOPE.....	2
2. REFERENCES	2
3. UNITS.....	5
4. DEFINITIONS AND TERMINOLOGY	5
5. ABBREVIATIONS	5
6. MODIFICATION TO IPS-M-PI-150-PART1.....	6
7. MODIFICATION TO IPS-M-PI-150-PART2.....	6

INTRODUCTION

To satisfy the requirements of this NIOEC Specification, Iranian Petroleum Standard IPS-M-PI-150(2) Revision 2013 Part 1&2 with the modifications as specified herein after shall be strictly followed.

Articles 0 through 5 of this document replace entirely the related articles in the referenced IPS Standard.

1. SCOPE

This NIOEC Specification covers minimum requirements for the procurement of steel flanges in sizes ½” through 60” and also orifice flanges. The flanges shall be manufactured according to the following standards:

- a) Flanges ½” to 24” as per ASME B 16.5.
- b) Flanges 26” to 60” as per ASME B16.47, series A.
- c) Orifice flanges as per ASME B16.36.
- d) Copper-Nickel Alloy flanges and stud ends as per EEMUA publication No. 145.
- e) Metallic Gaskets for Pipe Flanges as per ASME B16.20a.
- f) Non Metallic Gaskets for Pipe Flanges as per ASME B16.21.

Cast iron and bronze flanges are not covered by this Specification.

For flanges in diameters and series greater than limits set by standards ASME B16.5 and ASME B16.47, series A, the Supplier shall submit dimensioned document and calculation notes to the Employer for approval.

This Specification isolates the flange material requirements from NIOEC-SP-50-04 hence reducing the need for that Specification to be issued with a flange enquiry or order.

This Specification is intended to supplement the purchase description shown on the purchase requisition for specific requirements. If the purchase description differs from, or is in conflict with any requirements of this Specification, then the purchase description shall govern.

Resolution on cases not explicitly stipulated in this specification, or on cases where conflicts may arise among the requirements of the referenced / relevant IPS and international standards shall be made through written consent and approval of NIOEC.

Deviations from this specification will only be permitted in obtaining written approval from 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.

API (AMERICAN PETROLEUM INSTITUTE)

API 5L

“Specification for Line Pipe”-45rd Edition (December 2012)

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

B 1.20.1	"Pipe Threads, General Purpose"
B 16.5	"Pipe Flanges and Flanged Fittings"
B 16.20	"Ring Joint Gaskets and Grooves for Steel Pipe Flanges "
B 16.21	"Non Metallic Flat Gaskets for Pipe Flanges"
B 16.36	"Orifice Flanges"
B 16.47	"Large Diameter Steel Flanges"
B 31.1	"Power Piping"
B 31.3	"Process Piping"
B 36.10	"Welded and Seamless Wrought Steel Pipe"
B 36.19M	"Stainless Steel Pipe"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

A 105	"Specification for Forgings, Carbon Steel, for Piping Components"
A 181	"Specification for Forgings, Carbon Steel, for General-Purpose Piping"
A 182	"Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Services"
A 350	"Specification for Forgings Carbon and Low Alloy Steel, Requiring Notch Toughness Testing for Piping Components"
A 351	"Specification for Steel Casting, Austenitic for High Temperature Service"
A 370	"Mechanical Testing of Steel Products"
A 387	"Specification for Pressure Vessel Plates, Alloy Steel Chromium Molybdenum"
A 576	"Specification for Steel Bars, Carbon, Hot Wrought Special Quality"
A 694	"Specification for Forgings, Carbon and Alloy Steel, for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Services"
B 164	"Specification for Nickel-Copper Alloy, Rod, Bar and Wire"
B 466	"Seamless Copper-Nickel Pipe and Tube"
B 467	"Welded Copper-Nickel Pipe"
E 92	"Test Method for Vickers Hardness of Metallic Materials"
E 709	"Standard Guide for Magnetic Particle Testing"

BS (BRITISH STANDARD INSTITUTION)

BS 1600	"Specification for Dimensions of Steel Pipe for the Petroleum Industry"
BS 3799	"Steel Pipe Fittings, Screwed and Socket-welding for the Petroleum Industry"

EN (EUROPEAN NORMS)

BS EN 10204	"Metallic products – types of inspection documents"
-------------	---

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-M-PI-150	"Material Standard for Flanges and Fitting"
--------------	---

ISO (INTERNATIONAL STANDARD ORGANIZATION)

ISO 10474	"Steel and Steel Product, Inspection Documents" Type 5.1 B&C
ISO 8501	"Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness"

MIL (US MILITARY STANDARD)

MIL-C-15726 F	"Copper-Nickel Alloy, Sheet, Plate, Strip, Bar, Rod and Wire"
---------------	---

MSS (MANUFACTURERS STANDARDIZATION SOCIETY)

SP-6	"Standard Finishes for Contact Faces of Pipes Flanges and Connecting-ends Flanges of Valves and Fittings"
SP-25	"Standard Marking System for Valves, Fittings, Flanges and Unions"
SP-44	"Steel Pipeline Flanges"

NACE (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)

MR 0175/ISO 15156	"Standard Material Requirement Sulfide Stress Cracking Resistant Metallic Material for Oil Field Equipment"
-------------------	---

NIOEC-SP (NIOEC SPECIFICATIONS)

NIOEC-SP-00-10	"NIOEC Specification for Units"
NIOEC-SP-50-04	"NIOEC Specification for Piping Material"
NIOEC-SP-50-27	"NIOEC Specification for Identification of Piping Material"
NIOEC-SP-50-64	"NIOEC Specification for Pipeline and Piping Material"
NIOEC-SP-90-52	"NIOEC Specification for Packing and Packages"
NIOEC-SP-80-24	"NIOEC Specification for Cathodic Protection of Buried and Submerged Structures"

NIOEC-SP-90-51

"NIOEC Specification for Welding of Transportation Pipeline"

NIOEC-SIP (SHOP INSPECTION PROCEDURE)

NIOEC-SIP-50-10

"NIOEC Shop Inspection Procedure for Pipe, Fitting and Flange"

3. UNITS

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

4. DEFINITIONS AND TERMINOLOGY

This section contains definitions for the terms as they are used in this document.

Flange Edge: The reference plane, coincident with the front of a flange, from which the height of any type of flange facing and also the minimum flange thickness is measured.

Flange Thickness: The distance from the flange edge to the back face of a flange or, if the bolt holes are spot-faced, from the flange edge to the spot-facing.

Flange Facing: The profile of the connecting end of a flange. It is beyond the flange edge, except for a flange of 3/4" (class 150) or 2" (class 300) having a 1.6 mm high raised facing, in which case the raised facing is formed by cutting into the minimum flange thickness.

Contact Surface: That part of a flange facing upon which the gasket is actually compressed. In the case of flanges of 3/4" (class 150) and 2" (class 300) having 1.6 mm high raised facing, and in all nominal pressures (classes) having female and groove facings, the contact surface is coincident with the flange edge as defined above. "Contact Surface" is not applicable to ring-joint facing.

Full-Faced: Applies only to female, groove and ring-joint facings and defines the resultant profile when the raised portion of such facing is extended to the full diameter of the flange.

Killed Steel: Thoroughly deoxidized steel for example by addition of aluminum or silicon, in which the reaction between carbon and oxygen during solidification is suppressed.

5. ABBREVIATIONS

HAZ: Heat Affected Zone

HV 10: Hardness Vickers 10

SSC: Sulfide Stress Cracking

GHSC: Galvanically Induced Hydrogen Stress Cracking

NDT: Nondestructive Test

6. MODIFICATION TO IPS-M-PI-150-PART1

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

11. REPORTS (Addition)

- 11.1 The manufacturer shall submit certificates for chemical composition, physical properties and any particular certificates (such as sour services) together with details of any tests and heat treatments applied.
- 11.2 Unless otherwise specified in the purchase requisition, the Manufacturer shall provide inspection certificates or test report in accordance with EN10204 Type 3.2. The certification shall include NIOEC Purchase Order number and shall be signed by the Supplier's authorized personnel.
- 11.3 The frequency, extent and authorized inspectors for of all required tests and inspections (stipulated in the purchase requisition, product specification, design code and project specifications) shall be in accordance with the pertinent NIOEC-SIP-50-10.

12. PROTECTION (Addition)

- 12.1 All items shall be provided with mill's standard coating for corrosion prevention during transportation.
- 12.2 Packing shall be in accordance with NIOEC-SP-90-52 "Specification for Packing and Packages", contained within the enquiry/purchase order documentation.
- 12.3 All austenitic stainless steel fittings shall be protected from exposure to chloride containing environment such as salt water or salt spray during shipment or storage.
- 12.4 The threading of threaded flanges shall be oiled or protected by a non-peel varnish.
- 12.5 The beveled ends and contact faces of the flanges shall be protected by a peel-off varnish.

13. COLOR CODING(Addition)

- 13.1 Unless otherwise specified herein the location, style, symbols, abbreviations, color coding, etc., of all markings shall be accordance with NIOEC-SP-50-27.

7. MODIFICATION TO IPS-M-PI-150-PART2

This modification revises the below article of the referenced standard as follows:

5. MATERIAL(Modification)

- 5.1.7. All carbon steels, including normalized steels, used for fittings shall have a maximum carbon content of 0.23%.

The carbon equivalent of these materials, calculated using the formula:

$$C_E = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

shall be less than 0.42 (check analysis).

If the content of alloying elements other than C or Mn is unknown, the formula to be used shall be:

$$C_E = C + \frac{Mn}{6}$$

and, in this case, the carbon equivalent shall be less than 0.40 (ladle analysis).

MATERIAL STANDARD

FOR

FLANGES AND FITTINGS

SECOND EDITION

JANUARY 2013

FOREWORD

The Iranian Petroleum Standards (IPS) reflect the views of the Iranian Ministry of Petroleum and are intended for use in the oil and gas production facilities, oil refineries, chemical and petrochemical plants, gas handling and processing installations and other such facilities.

IPS are based on internationally acceptable standards and include selections from the items stipulated in the referenced standards. They are also supplemented by additional requirements and/or modifications based on the experience acquired by the Iranian Petroleum Industry and the local market availability. The options which are not specified in the text of the standards are itemized in data sheet/s, so that, the user can select his appropriate preferences therein.

The IPS standards are therefore expected to be sufficiently flexible so that the users can adapt these standards to their requirements. However, they may not cover every requirement of each project. For such cases, an addendum to IPS Standard shall be prepared by the user which elaborates the particular requirements of the user. This addendum together with the relevant IPS shall form the job specification for the specific project or work.

The IPS is reviewed and up-dated approximately every five years. Each standards are subject to amendment or withdrawal, if required, thus the latest edition of IPS shall be applicable

The users of IPS are therefore requested to send their views and comments, including any addendum prepared for particular cases to the following address. These comments and recommendations will be reviewed by the relevant technical committee and in case of approval will be incorporated in the next revision of the standard.

Standards and Research department

No.17, Street14, North kheradmand

Karimkhan Avenue, Tehran, Iran .

Postal Code- 1585886851

Tel: 88810459-60 & 66153055

Fax: 88810462

Email: Standards@ nioc.ir