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

NIOEC SP

NIOEC SPECIFICATION FOR PIPING MATERIAL PURCHASE VALVES

SECOND EDITION

MARCH, 2018

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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 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.

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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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0	JULY, 2005	M.KHEZRI	A.NAVARCHI	M.R.FARZAM	M.A.A.SAJEDI
REV.	DATE	PREPARED	CHECKED	APPROVED	AUTHORIZED



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INTRODUCTION

To satisfy the requirements of this NIOEC Specification, Iranian petroleum standard IPS-M-PI-110(1) (Aug. 2014) with the consideration as specified herein after shall be strictly followed.

Articles 1 through 3 of this document replace entirely the related articles in the referenced IPS Standard.

1. SCOPE

This NIOEC Specification covers the minimum requirements for purchasing conventional valves to be used in Oil Plants/refineries and/or distribution depot. The Specification contains seven parts. Each enquiry consists of two parts; part one general requirements and the other part pertaining to requirements for one of the following valves:

Part 1	General requirements
Part 2	Gate valves
Part 3	Globe valves
Part 4	Plug valves
Part 5	Butterfly valves
Part 6	Check valves
Part 7	Ball valves

Valves contained in this Specification have end connections as follows:

- Flanged end
- Butt welding end
- Socket welding end
- Threaded end
- Special end

Guidance for Use of this Specification

The amendments/supplements to API 6D (2008), API 600 (2009), API 602 (2009) ... Given in this Specification are directly related to the equivalent sections or clauses in these standards.

The following annotations, as specified hereunder, have been used at the bottom right hand side of each clause or paragraph to indicate the type of change made to the equivalent clause or paragraph of reference standards.

Sub. (Substitution)	"The clause in reference standard is deleted and replaced by the new clause in this Specification"
Del. (Deletion)	:"The clause in reference standard is deleted without any replacement".
Add. (Addition)	:"A new clause with a new number is added".
Mod. (Modification)	:"Part of reference standard is modified and/or a new description and/or statement is added to that clause".

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.

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

B 1.20.1	"Pipe Threads, General Purpose"
B 16.1	"Cast-Iron Pipe Flanges and Flanged Fittings"
B 16.4	"Cast-Iron Threaded Fitting"
B 16.5	"Pipe Flanges and Flanged Fittings"
B 16.10	"Face-to-Face and End-to-End Dimensions of Valves"
B 16.11	"Forged Fittings, Socket Welding and Threaded"
B 16.15	"Cast Bronze Threaded Fittings"
B 16.24	"Cast Copper Alloy Pipe Flanges and Flanged Fittings"
B 16.25	"Butt Welding Ends"
B 16.34	"Valves-Flanged, Threaded and Welding End"
B 16.42	"Ductile Iron Pipe Flanges and Flanged Fittings"
B 16.47	"Large Diameter Steel Flanges"
B 31.1	"Power Piping"
B 31.3	"Chemical Plant and Petroleum Refinery piping"
B 31.4	"Liquid Transportation System for Hydrocarbon, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohol"
B 31.8	"Gas Transmission and Distribution Systems"
B 36.10	"Welded and Seamless Wrought Steel Pipe"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

B 650	"Standard Specification for Electrodeposited Engineering Chromium Coatings on Ferrous Substrates"
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API (AMERICAN PETROLEUM INSTITUTE)

594	"Check Valves: Wafer, Wafer-Lug and Double Flanged Type"
598	"Valve Inspections and Testing"
599-2013	"Metal Plug Valves-Flanged and Welding Ends"
600-2009	"Steel Gate Valves, Flanged and Butt Welding Ends, Bolted and Pressure Bonnets"
602-2009	"Compact Steel Gate Valves-Flanged, Threaded, Welding and Extended Body Ends"
603	"Class 150, Cast Corrosion-Resistant, Flanged end Gate Valves"
605	"Large-Diameter Carbon Steel Flanges"
607	"Fire Test for Soft-Seated Quarter-Turn Valve"
608	"Metal Ball Valves-Flanged and Butt-Welding Ends"
609-2009	"Butterfly Valves: Double Flanged, Lug and Wafer Type"

6D-2008	"Pipeline Valves (Gate, Plug, Ball and Check Valves)"
6FA	"Fire Test for Valves"

AWWA (AMERICAN WATER WORK ASSOCIATION)

C 500	"Metal-Seated Gate Valves for Water Supply Service"
C 504	"Rubber Seated Butterfly Valves"
C 507	"Ball Valves, 6 in. Through 48 in. (150 mm. Through 1200 mm.)"
C 508	"Swing-Check Valves for Water Works Service, 2 in. (50 mm) Through 24 in. (600 mm.) NPS"
C 509	"Resilient-Sealed Gate Valves for Water Supply Service"
C 560	"Cast-Iron Slide Gates"

BSI (BRITISH STANDARDIZATION INSTITUTE)

1133	"Packaging Code"
1868	"Specification for Steel Check Valves (Flanged and Butt-welding Ends) for the Petroleum, Petrochemical and Allied Industries"
1873-1975	"Specification for Steel Globe and Globe Stop and Check Valves (Flanged and Butt-Welding Ends) for the Petroleum, Petrochemical and Allied Industries"
BS EN 1171	"Industrial Valves Cast Iron Gate Valves"
BS EN 16767	"Industrial Valves Steel and Cast Iron Check Valves"
BS EN 593	"Industrial Valves Metallic butterfly valves for General Purposes"
BS EN ISO 15761	"Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries"
BS EN ISO 10497	"Testing of Valves Fire Type-testing Requirements"
BS EN 1983	"Industrial Valves Steel Ball Valves"

IPS (IRANIAN PETROLUM STANDARD)

IPS-M-PI-110(1)	"Material and Equipment Standard for Valves"
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MSS (MANUFACTURERS STANDARDIZATION SOCIETY)

SP-6	"Standard Finishes for Contact Faces of Pipe Flanges and Connecting End Flanges of Valves and Fittings"
SP-25	"Standard Marking System for Valves, Fittings, Flanges and Unions"
SP-44	"Steel Pipeline Flanges"
SP-70	"Cast Iron Gate Valves, Flanged and Threaded Ends"
SP-78	"Cast Iron Plug Valves, Flanged and Threaded Ends"

SP-80	"Bronze Gate, Globe, Angle and check Valves"
SP-81	"Stainless Steel, Bonnet less, Flanged Knife Gate Valves"
SP-84	"Steel Valves, Socket Welding and Threaded Ends"

NACE (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)

MR 0103	"Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments."
MR 0175	"Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment"

NIOEC-SP (NIOEC SPECIFICATION)

NIOEC-SP-00-10	"NIOEC Specification for Units"
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NIOEC-SIP (NIOEC SHOP INSPECTION PROCEDURE)

NIOEC-SIP-50-18	"NIOEC Shop Inspection Procedure for Valves"
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ISO (INTERNATIONAL STANDARD ORGANIZATION)

ISO 8501-1	"Preparation of Steel Substrates before Application of Paints and Related Products Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings"
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3. UNITS

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

MATERIAL AND EQUIPMENT STANDARD**FOR****VALVES****FIRST EDITION****MARCH 2003**

This standard specification is reviewed and updated by the relevant technical committee on Aug. 2014. The approved modifications are included in the present issue of IPS.

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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 is based on internationally acceptable standards and includes 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: 021-88810459-60 & 021-66153055

Fax: 021-88810462

Email: Standards@nioc.ir

GENERAL DEFINITIONS:

Throughout this Standard the following definitions shall apply.

COMPANY:

Refers to one of the related and/or affiliated companies of the Iranian Ministry of Petroleum such as National Iranian Oil Company, National Iranian Gas Company, National Petrochemical Company and National Iranian Oil Refinery And Distribution Company.

PURCHASER:

Means the "Company" where this standard is a part of direct purchaser order by the "Company", and the "Contractor" where this Standard is a part of contract documents.

VENDOR AND SUPPLIER:

Refers to firm or person who will supply and/or fabricate the equipment or material.

CONTRACTOR:

Refers to the persons, firm or company whose tender has been accepted by the company.

EXECUTOR:

Executor is the party which carries out all or part of construction and/or commissioning for the project.

INSPECTOR:

The Inspector referred to in this Standard is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.

SHALL:

Is used where a provision is mandatory.

SHOULD:

Is used where a provision is advisory only.

WILL:

Is normally used in connection with the action by the "Company" rather than by a contractor, supplier or vendor.

MAY:

Is used where a provision is completely discretionary.

0. INTRODUCTION

This Standard covers the minimum requirements for purchasing conventional valves to be used in oil, gas and petrochemical industries. The Standard contains seven parts. Each enquiry consists of two parts; part one general requirements and the other part pertaining to requirements for one of the following valves:

Part 1	General requirements
Part 2	Gate valves
Part 3	Globe valves
Part 4	Plug valves
Part 5	Butterfly valves
Part 6	Check valves
Part 7	Ball valves

Valves contained in this Standard have end connections as follows:

- Flanged end
- Butt welding end
- Socket welding end
- Threaded end
- Special end

Note: This first (1) edition, which is a new revision of this standard with the same title and number, has been technically revised, cancels and replaces the original (0) edition which now is withdrawn.

Guidance for Use of this Standard

The amendments/supplements to API 6D (2008), API 600 (2009), API 602 (2009) ... Given in this standard are directly related to the equivalent sections or clauses in these standards.

The following annotations, as specified hereunder, have been used at the bottom right hand side of each clause or paragraph to indicate the type of change made to the equivalent clause or paragraph of reference standards.

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PART ONE

GENERAL REQUIREMENTS

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1. GENERAL

1.1 Scope

This part of standard covers general requirement(s) for purchasing valves specified in part two thru seven.

Note:

This standard specification is reviewed and updated by the relevant technical committee on Aug. 2014. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 427 on Aug. 2014. These modifications are included in the present issue of IPS.

1.2 Conflict Requirements

The valve(s) offered by the vendor shall be in compliance with the requirement(s) of this Standard. If requirement(s) of this Standard differs from or is in conflict with other purchasing documents, the vendor shall clearly indicate points of conflict and request the Company for clarification and comments.

The Company's comments shall be fully considered and incorporated in the final specifications.

In case that no comment(s) is given by the Company, the followings will take precedence in the order of priority as indicated hereunder:

- a) Purchase order.
- b) This Standard specifications.

1.3 References

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

- B 1.20.1 "Pipe Threads, General Purpose"
- B 16.1 "Cast-Iron Pipe Flanges and Flanged Fittings"
- B 16.4 "Cast-Iron Threaded Fitting"
- B 16.5 "Pipe Flanges and Flanged Fittings"
- B 16.10 "Face-to-Face and End-to-End Dimensions of Valves"
- B 16.11 "Forged Fittings, Socket Welding and Threaded"
- B 16.15 "Cast Bronze Threaded Fittings"
- B 16.24 "Cast Copper Alloy Pipe Flanges and Flanged Fittings"

B 16.25	"Butt Welding Ends"
B 16.34	"Valves-Flanged, Threaded and Welding End"
B 16.42	"Ductile Iron Pipe Flanges and Flanged Fittings"
B 16.47	"Large Diameter Steel Flanges"
B 31.1	"Power Piping"
B 31.3	"Chemical Plant and Petroleum Refinery piping"
B 31.4	"Liquid Transportation System for Hydrocarbon, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohol"
B 31.8	"Gas Transmission and Distribution Systems"
B 36.10	"Welded and Seamless Wrought Steel Pipe"

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B 650	"Standard Specification for Electrodeposited Engineering Chromium Coatings on Ferrous Substrate"
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598	"Valve Inspections and Testing"
599	"Metal Plug Valves-Flanged and Welding Ends"
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603	"Class 150, Cast Corrosion-Resistant, Flanged end Gate Valves"
607	"Fire Test for Soft-Seated Quarter-Turn Valve"
608	"Metal Ball Valves-Flanged, and Butt-Welding Ends"
609	"Butterfly Valves: Double Flanged, Lug and Wafer Type"
6D	"Pipeline Valves(Gate, Plug, Ball and Check Valves)"
6FA	"Fire Test for Valves"

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C 500	"Metal-Seated Gate Valves for Water Supply Service"
C 504	"Rubber Seated Butterfly Valves"
C 507	"Ball Valves, 6 in. Through 48 in. (150 mm. Through 1200 mm.)"

- C 508 "Swing-Check Valves for Water Works Service, 2 in. (50 mm)Through 24 in. (600 mm.) NPS"
- C 509 "Resilient-Sealed Gate Valves for Water Supply Service"
- C 560 "Cast-Iron Slide Gates"

BSI (BRITISH STANDARDIZATION INSTITUTE)

- 1133 "Packaging Code"
- 1868 "Specification for Steel Check Valves (Flanged and Butt-welding Ends) for the Petroleum, Petrochemical and Allied Industries"
- 1873 "Specification for Steel Globe and Globe Stop and Check Valves (Flanged and Butt-Welding Ends) for the Petroleum, Petrochemical and Allied Industries"
- 5154 "Specification for Copper Alloy Globe, Globe Stop and Check and Gate Valves"
- 5157 "Specification for Gate (Parallel Slide) Valves for General Purposed"
- BS EN 1171 "Industrial Valves Cast Iron Gate Valves"
- BS EN 12334 "Industrial Valves Cast Iron Check Valves"
- BS EN 593 "Industrial Valves Metallic butterfly valves"
- BS ISO 7121 "Steel Ball Valves for General Purpose Industrial Applications"
- BS EN ISO 17292 "Metal Ball Valves for Petroleum, Petrochemical and allied Industries"
- BS EN ISO 15761 "Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries"
- BS EN ISO 10497 "Testing of Valves Fire Type-testing Requirements"

MSS (MANUFACTURERS STANDARDIZATION SOCIETY)

- SP-6 "Standard Finishes for Contact Faces of Pipe Flanges and Connecting End Flanges of Valves and Fittings"
- SP-25 "Standard Marking System for Valves, Fittings, Flanges and Unions"
- SP-44 "Steel Pipeline Flanges"
- SP-70 "Cast Iron Gate Valves, Flanged and Threaded Ends"
- SP-78 "Cast Iron Plug Valves, Flanged and Threaded Ends"
- SP-80 "Bronze Gate, Globe, Angle and check Valves"
- SP-81 "Stainless Steel, Bonnet less, Flanged Knife Gate Valves"

NACE (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)

MR 0175 "Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment"

ISO (INTERNATIONAL STANDARD ORGANIZATION)

ISO 8501-1 "Preparation of Steel Substrates before Application of Paints and Related Products Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings"

2. DESIGN

2.1 Primarily this specification covers conventional gate, globe, ball, plug, butterfly and check valves. Other types of valves shall conform to this specification in so far as applicable.

2.2 Where pressure containing parts have been specified as forged, substitution of casting is not permitted without prior approval of the Company.

2.3 Drain taps shall be factory fitted with forged metal plug(s) per ANSI B 16-11 and of the same basic material as the valve body. They shall be made up leak tight.

2.4 All power actuated valves shall have capability of being operated with an auxiliary device such as hand wheel (oriented as specified, hydraulic hand pump etc.

2.5 The maximum operating force for manually operated valves shall not exceed 350 N. However, for DN 200 (NPS8) and larger the maximum operating force may increase to 450 N, during seating and unseating of the valve.

2.6 Valve(s) gear boxes shall be dust and weather-proof, filled with suitable water resistant lubricant. Lubricant SAE No. shall be specified in quotation and shall also be shown on gear-box name plate. Gear operators shall have self-locking gears. The gear operator shall be provided with a torque limiting device on the input shaft that will prevent damage to the drive train.

2.7 If valves are provided with a position indicator, open position shall be shown in the direction of flow and close position shall be shown perpendicular to the direction of flow. The shut and open terms in English shall be permanently indicated in a visible location.

2.8 Clockwise rotation of the hand wheel/wrench shall close the valve. The diameter of the hand wheel or length of the wrench shall not exceed 800 mm.

2.9 Hydraulic, pneumatic or electric actuator shall be supplied by the valve manufacturer when specified. Manufacturer of the actuator and actuating mechanism shall be approved by the Company in advance.

2.10 When chain wheels are specified for valve actuation, chain guide shall be included. Clamp-on type chain wheels are not permitted.

2.11 When extended stem is specified, the valve shall have extended bleed/vent, balancing and lubricating lines.

2.12 Valve of 500 kg and heavier shall be fitted with lifting lugs, valve support and leveling base. Their design and position shall be agreed with the Company.

2.13 The stem and stem head shall be sized to provide adequate strength under the most severe combination of operating condition. The weakest point shall always be outside of the stem seal.

2.14 All flanged gate, globe, ball and check valves with ring joint facing should also have ring joint bonnet, or purchaser approved equal.

2.15 Fire-safe or fire-tested design unless otherwise specified. all valves shall have fire- safe or fire-tested design and capability of meeting the requirements of API 6 FA, BS 6755 part 2 and API 607 as applicable.

2.15.1 The following terminology shall be used:

a) Fire safe design : A design that by nature of its features and properties is capable of passing a fire test.

b) Fire tested design : A design subjected successfully to fire testing.

2.15.2 Soft-seated valves shall have a fire-tested design. Metal-seated valves and hand wheel or gear operator shall have a fire-safe design.

2.15.3 Any special provision for protecting actuator system against fire shall be stated in the purchase requisition.

2.15.4 Fire testing shall be done in accordance with API 6 FA or BS 6755 part 2 or API 607. Existing certificate to these Standard is acceptable.

2.16 Dimensions

2.16.1 Face to face (end to end) dimensions of valves shall be as per related standards. Dimensions of valves not listed in the related standard shall be in accordance with ANSI/ASME B 16.10 or established by agreement.

2.16.2 End flanges dimensions shall conform to the following standards:

- | | | |
|--|-----|-------------------|
| a) Steel and nickle base flanges up to DN 600 (NPS 24) | per | ANSI/ASME 16.5 |
| b) Steel and nickle base flanges over DN 600 (NPS 24) | per | MSS-SP-44 |
| c) Cast iron flanges | per | ANSI/ASME-B 16.1 |
| d) Bronze flanges | per | ANSI/ASME-B 16.24 |

2.16.3 Flanges surface finishing shall conform to standard MSS-SP-6. Where a smooth finish is specified, the gasket contact surface roughness shall be 100-150 Ra in accordance with MSS-SP-6.

2.16.4 Butt welding ends shall conform to standards:

per ANSI/ASME B 16.25,31.1,31.3,31.4,31.8
AS Applicable

2.16.5 Socket welding ends shall conform to standard ANSI/ASME-B 16.11

2.16.6 Threaded ends shall conform to the following standards:

- | | | |
|---------------------------------|-----|--------------------|
| a) Steel and nickel base valves | per | ANSI/ASME-B 1.20.1 |
| b) Cast iron valves | per | ANSI/ASME-B 16.4 |
| c) Bronze valves | per | ANSI ASME-B 16.15 |