ENGINEERING STANDARD

FOR

MACHINERY PIPING SYSTEM

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APPENDIX A MINIMUM STRAIGHT PIPE LENGTH UPSTREAM OF **THE PUMP SUCTION NOZZLE** .... Error! Bookmark not defined.

0. INTRODUCTION

This specification covers the basis for the overall design of process and auxiliary piping within limits of the packaged process machineries and related facilities.

This standard shall be used in conjunction with the specific standard of each equipment and general plant piping system standards as listed in references.

Note: This is a revised version of the Engineering Standard for Machinery Piping for process services, which is issued as edition (2). Edition (1) of the said standard is withdrawn.

1. SCOPE

This standard contains minimum requirements governing the design and installation of piping systems associated with pumps compressors, and turbines, as well as the auxiliary piping associated with them for process services.

2. 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 STANDARDS INSTITUTE)

B 31.1	"Power Piping"
B 31.3	"Petroleum Refinery Piping"

API (AMERICAN PETROLEUM INSTITUTE)

610	"Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries"
611	"General Purpose Steam Turbines"
612	"Special Purpose Steam Turbines"
614	"Lubrication, Shaft Sealing & Control Oil Systems for Special Purpose Application"
617	"Axial and Centrifugal Compressors and Expander-compressors for Petroleum, Chemical and Gas Industry"
618	"Reciprocating Compressors for Petroleum, Chemical and Gas Industry Services"
619	"Rotary-Type Positive Displacement Compressors for Petroleum, Petrochemical and Natural Gas Industries"
672	"Packaged, Integrally Geared Centrifugal Air Compressor for Petroleum, Chemical and Gas Industry Services"
674	"Positive Displacement Pumps-Reciprocating"
675	"Positive Displacement Pumps-Controlled Volume"
676	"Positive Displacement Pumps-Rotary"
680	"Packaged Reciprocating Plant and Instrument Air Compressors for General Refinery Services"
682	"Pumps — Shafts sealing systems for Centrifugal and Rotary Pumps"

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

"Boiler and Pressure Vessel Code"

ASME PTC-10 "Performance Test code on Centrifugal Compressors"

IPS (IRANIAN PETROLEUM STANDARDS)

E-GN-100	"Units"
E-PM-100	"Plant Piping System"
M-PI-230	"Strainers and Filters"
M-PM-105	"Centrifugal Pumps for Process Services"
M-PM-115	"Centrifugal Pumps for General Services"
M-PM-125	"Centrifugal Fire Water Pumps"
M-PM-130	"Positive Displacement Pumps-Reciprocating"
M-PM-140	"Positive Displacement Pumps-Rotary"
M-PM-150	"Positive Displacement Pumps-Controlled Volume"
M-PM-170	"Centrifugal Compressors for Process Services"
M-PM-180	"Packaged Integrally Geared Centrifugal Compressors for Utility & Instrument Air Services"
M-PM-200	"Reciprocating Compressors for Process Services"
M-PM-211	"Reciprocating Compressors for Utility & Instrument Air Services"
M-PM-220	"Positive Displacement Compressors-Rotary"
M-PM-240	"General Purpose Steam Turbines"
M-PM-250	"Special Purpose Steam Turbines"
M-PM-320	"Lubrication, Shaft Sealing & Control Oil Systems for Special Purpose Application"
G-PI-230	"General standards for Strainer and Filters"
C-PI-350	"Plant piping System Pressure Testing"

NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)

SM 23 "Steam Turbines for Mechanical Drive Services"

3. UNITS

SI Unit System, dimension and rating in accordance with IPS-E-GN-100 shall be used, unless otherwise specified.

4. PIPING DESIGN FOR MACHINERIES

4.1 General

4.1.1 Piping at pumps, compressors and steam turbines shall be sufficiently flexible and adequately supported to ensure that under no circumstances the equipment nozzles will be subject to any stress that could disturb the alignment, internal clearances or otherwise affect the equipment and jeopardize its trouble-free operation.
In specifying the nozzle loads, the Contractor shall ensure that they are sufficient for reasonably expected piping loads but shall not specify them so high that they require unnecessary nozzle reinforcement. Piping shall be designed such that the specified nozzle loads are not exceeded. Where possible, the Contractor shall provide more flexibility in the piping rather than require additional nozzle reinforcement. If equipment flanges deviate from the standard sizes selected from the piping classes, the matching pipe flanges shall be ordered with the equipment.
For general requirement on piping system see IPS-E-PM-100.

4.1.2 The surrounding piping and pipe supporting structures shall be designed and routed so that access is provided for maintenance or removal of valves, in-line instruments, casing sections and internal elements from the equipment and for operational reasons (e.g. filter cleaning). Removal or replacement of equipment shall be possible with a minimum dismantling of piping.

Auxiliary piping shall be neatly routed along the base-plate and shall not extend across the operating floor. This piping shall not obstruct inspection covers, bearing caps, upper halves of casings or any other items which require access for operation or maintenance.

4.1.3 The allowable forces and moments on equipment nozzles shall be in accordance with the relevant API/NEMA standards for this equipment as listed in section 2, unless the manufacturer states lower figures.

4.1.4 Piping stress/strain (flexibility) analysis shall be based on the design maximum and minimum temperatures. These temperatures, which are determined from the normal operating temperature and the site temperatures, shall be listed in the Line Designation Table.

4.1.5 For computations of reactions on supports and equipment the appropriate installation temperature (See Notes 1 & 2) shall be used as a reference. Proper temperature values for stress ranges and reactions shall be derived from ANSI B31.3, Paragraph 319.3.1.

Notes:

1) The minimum installation temperature for analysis of loads on equipment shall be the minimum equipment design temperature or the minimum site temperature, whichever is lower.

2) The maximum installation temperature for analysis of loads on equipment shall be the maximum equipment design temperature or the maximum site temperature, whichever is higher.

4.1.6 Auxiliary piping connected to pumps, compressors or turbines shall be in accordance with the relevant API Standards and IPS as listed in section 2. Tapped holes for venting, etc., shall have an NPT nipple, schedule 160 to which a valve is connected. The requisitions and process engineering flow schemes shall state when flanged nozzles are required.

4.1.7 Lube oil and control oil lines shall be separated from hot process and hot utility lines in order to avoid a fire hazard, e.g. auto ignition at 260-320°C. For further information see IPS-M-PM-320.

4.1.8 Cooling water lines to pumps and compressors shall not be less than DN 20 (¾ in.). Lines DN 25 (1 in.) or less shall have the take-off connection from the top of the water main line so as to prevent plugging during operation.

In all cases, drain and vent points which are equipped with valves, shall be plugged or blinded flange, which ever applicable.

4.2 Pumps

4.2.1 General

4.2.1.1 If the suction nozzle of a pump is smaller in size than the connecting piping and a reducer is required in a horizontal line, it shall be eccentric, installed with the belly down. In vertical pipes, eccentric or concentric reducers may be used.

4.2.1.2 A block valve shall be in the suction line of each pump upstream of the strainer. This position enables the strainer to be cleaned without draining the complete suction pipe. The discharge line shall also have a block valve. A non-return valve shall be installed in the discharge line near the discharge nozzle of centrifugal or rotary pumps, unless there is no possibility of reversed flow or pressure surge under any condition. This non-return valve shall be installed upstream of the block valve to enable maintenance of the check valve without draining the discharge pipe. The liquid volume between the check valve and the pump discharge block valve shall be as small as practical. Highly corrosive or hazardous fluids shall have a drain valve in the discharge line between the block and the non-return valve.

4.2.1.3 Suction piping to pumps handling at or close to their vapor pressure shall require special care to suppress flashing. Vertical drop as much as possible shall be provided at the suction source before starting the horizontal run to the pump.

4.2.1.4 Permanent strainers shall be installed in all pump suction lines.

4.2.1.5 Y-type strainers are required for permanent installation in vertical suction lines. In horizontal suction lines Y-type or bucket- type strainers may be used. Bucket-type strainers shall be used for suction pipes DN 450 and larger.

The installation of a Y-type strainer in the suction of double-suction pumps shall not disturb an even flow to the suction nozzle of the pump.

For carbon steel and alloy steel strainers, see IPS-G-PI-230.

The design and material for strainers in chemical services and for special pumps shall fulfill the process and pump requirements, e.g. metering pumps.

4.2.1.6 Pumps shall be protected by adding a temporary conical suction strainer with a fine screen mesh for initial start-up and commissioning. Provision shall be made to measure pressure difference between upstream and downstream of the strainer and also to protect it due to excess value.

For conical screen strainers, see IPS-G-PI-230.

4.2.1.7 A spade or spectacle blind shall be inserted downstream of the suction valve and upstream of the discharge valve to isolate pumps from a common suction and discharge line during maintenance, unless the pump can be isolated by other means.

4.2.1.8 The pump vent shall be connected to the vapor space of the suction vessel for operation under vacuum or with hazardous liquids. This allows of filling the system before the pump is started without opening the discharge valve. The vent line shall have two valves, one at the pump and one at the vessel.

4.2.1.9 To avoid spillage of hazardous or expensive fluids when a pump is dismantled the drain and vent connections shall be connected to a drain or vacuum vessel for this purpose.

4.2.1.10 Pumps handling fluids with a vapor pressure exceeding 5 bar (g) shall have a vent line to the flare system or shall discharge into the process system, e.g. for LPG or naphtha. The vent line shall have a spectacle or spade blind, block-and bleeder and thermal relief valve. Downstream of the relief valve shall be a flanged valve for blinding. Pump vent connections for toxic services shall discharge into closed systems.

4.2.1.11 Pumps handling cryogenic process fluids shall have a vent pipe to the suction drum. The vent pipe shall have a spading point and shall follow the shortest practical route to the suction drum. The vent pipe shall have no pockets. This vent pipe shall be large enough to allow the liquid level to equalize easily with the level in the suction drum without creating vapor pockets in the pipe.

4.2.1.12 Provision shall be made for draining on suction and discharge lines. Suction lines may be drained through pump casing. If discharge line is vertical, the line shall be drained by a bypass around discharge block valve. Pressure gage connection, shall be made in the piping between pump nozzle and the discharge valve. The same provision shall be made for suction nozzle.

4.2.2 Centrifugal Pumps

4.2.2.1 The length of the straight pipe from the last elbow to the suction nozzle shall be sufficient to ensure minimum turbulence at the centrifugal pump suction. Table (1) gives the minimum straight pipe length upstream of the pump suction nozzle, which shall not include any reducer, strainer or stop-flow valve.
Suction piping shall be as short and as direct as possible, avoiding high spots where pockets of gas or air could accumulate. However, if this is unavoidable, venting facilities shall be provided.

Table (1): Minimum straight length requirements at upstream of the pump suction nozzle. "D" stands for pipe diameter.

TYPE OF PUMP	POSITION OF SUCTION PIPING	MINIMUM STRAIGHT LENGTH
Vertical close-coupled	in same plan as pump shaft	1.5 D *
	perpendicular to pump shaft	4 D
Single suction, end suction type	not applicable	4 D
Single suction, top-top connection	at top of pump	4 D
	in same plan as pump shaft	1.5 D
Double suction	perpendicular to pump shaft (preferred situation)	3 D
	any position other than perpendicular **	5 D to 10 D

* For vertical close coupled pumps with 1.5 D straight length, eccentric reducers (bottom flat) are preferred.
** It shall be studied how unequal flow to the impeller eye can best be avoided. The advice of the pump Manufacturer should be sought in this respect.

4.2.2.2 Removable pipe spools shall be provided between the block valves and the pumps or drivers. The piping to the suction end of a pump shall be arranged so that the pump impeller may be removed while the suction block valve is in place. Where pump discharge piping goes to an overhead pipe way, the block and check valves shall be installed in the vertical piping section above the pump.

4.2.2.3 Suction lines carrying sensitive fluids such as hot oil, boiler feed water, and the like must be sloped downward to the pump to provide venting of flashed vapors back to the fluid source.

4.2.2.4 Pumps shall be spaced to allow minimum clearance of 915 mm between flanges of piping and other projections of an adjacent pump.

4.2.2.5 The discharge valve as well as the suction strainer and suction valve may be of the same size as the pump nozzles for economic reasons and also to avoid comparatively heavy attachments, unless the pressure drop is too high. The pressure rating of the suction valve and piping between this valve and the suction nozzle shall be equal to the rating of the discharge piping in order to accommodate overpressure due to backflow from the discharge side. This also applies to multi-stage pumps.

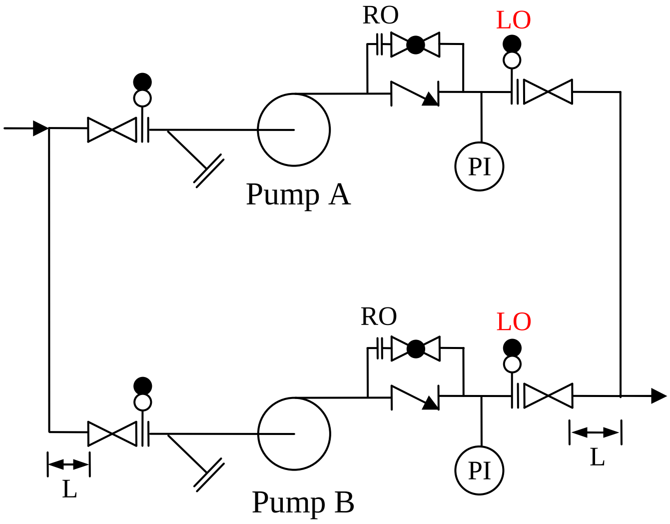

Figure (1):
Bypass around non-return valve of spared pumps.
RO, stands for restriction orifice. LO stands for locked open.

4.2.2.6 For spared centrifugal pumps which have common suction and discharge pipes, a flow across the pump discharge non-return valve is required to keep the spare pump at operating temperature, ready for immediate start-up. That small flow also allows for a controlled warming (or cooling) of the pump and therefore avoids undesirable thermal effects on pipes and equipment during this heating (cooling) process. Plugging of spare pump piping connections will also be avoided.
A bypass with a throttling valve around the discharge non-return valve shall be installed in the following cases:

- if discharge and suction pipe operating temperatures are above 150 °C;
- if the pumped fluid can solidify at ambient temperature, e.g. water pipes in freezing climates;
- if discharge/suction pipe operating temperature is below -10 °C;
- for pumps handling highly volatile liquids at pumping temperatures, e.g. LPG service

When a bypass with a throttling valve around the discharge non-return valve is required, following criteria for sizing shall be followed.

(I) DN 20 pipe with a throttling valve shall be used as a standard except as specified for (II) and (III);

(II) For systems operating at temperatures above 150 °C, DN 25 pipe with a throttling valve shall be used in the following cases to ensure sufficient flow of hot fluid to allow uniform warming of the pump and its suction and discharge piping:
- for large pumps (suction piping ≥ DN 400);
- if the suction and/or discharge pipe has a length L of more than 25 m (see Figure 1 below);
- If the bypass pipe is schedule 80 or heavier;
- for services where severe fouling is expected.

III) For systems operating at temperatures above 150 °C, DN 40 pipe with a throttling valve shall be used for pumps with a suction diameter equal to or greater than DN 600.

4.2.2.7 Cooling water connections and the hook-up of required water lines, if specified on the data/requisition sheets and shown on the diagrams and flow schemes, are generally in accordance with API 610, with the following additional requirements.

If applicable, cooling water harnesses may be connected in series for pumps with the same function. Also cooling water lines to stuffing boxes and pump bearing houses can be lined up in series. However, for pumps operating above 300°C this shall be in parallel.

Cooling water harnesses shall have a thermal relief valve to safeguard the cooling jackets of pumps standing idle in a hot climate, e.g. spare pumps.

Fresh water is preferred as cooling water.

For sea water or other untreated water a duplex strainer shall be installed in the cooling water supply header.

4.2.2.8 Requirements of API 682 on flushing plans shall be complied whenever it is applicable.

4.2.2.9 Sealing systems of Pumps for vacuum service require a sealing liquid and a vent line to the process system to secure against dry-running.

4.2.3 Positive Displacement Pumps

4.2.3.1 Positive displacement pumps shall be safeguarded against a blocked outlet with a reliable pressure-relief device. This shall not be an integrated part of the pump and be in accordance with IPS-E-IN-170. The relief valve should be installed in a bypass between the discharge line upstream of the block valve and the suction vessel. Alternatively the relief valve may be installed in a bypass between the discharge line upstream of the block valve and the suction line downstream of the block valve. However, this may not create an over pressure of the suction system.

4.3 Compressors

4.3.1 General

4.3.1.1 To prevent fatigue failure of compressor piping, the effect of vibrations and pressure surge shall be considered.

Piping shall have a minimum of overhung weight.

4.3.1.2 Pipe and butt-welding fitting shall be lined up accurately and welds shall be internally ground smooth.

4.3.1.3 Inter-stage and discharge piping shall be sufficiently flexible to allow of expansion, due to compression heat.

4.3.1.4 Block valves shall be installed in the suction and discharge lines, except for atmospheric air compressors, which shall have block valves in the discharge lines only.

4.3.1.5 Except for reciprocating compressors, compressor discharge lines shall have a check valve between the block valve and the discharge nozzle as close as practical to the compressor.

4.3.1.6 A suction strainer shall be installed in all compressor suction lines located downstream of the block valve of the compressor and as close as possible to the compressor suction nozzle. Screens and filters shall be reinforced to prevent their collapse or failure and subsequent entry of debris into the compressor, see IPS-G-PI-230. Provision shall be made to measure the pressure difference across the strainer in order to monitor fouling, if it exceeds ~~to~~ the certain value.

4.3.1.7 The suction line between a knock-out drum and the compressor shall be as short as practicable, without pockets, and slope towards the knock-out drum. When a continuous slope is not possible, low points shall be provided with a drain to remove any possible accumulation of liquid.

4.3.1.8 The pressure rating of the suction block valve and piping between this valve and the suction nozzle shall be equal to the rating of the discharge line.

4.3.1.9 If two or more compressors are combined, their suction lines shall be connected to the top of the header, except that suction lines at least one pipe size smaller than the header may be connected concentrically at the side of the header.

4.3.1.10 Compressor lube oil and seal oil piping over the full length shall be of austenitic stainless steel, including valve trim and flange bolting. See IPS-M-PM-320.

4.3.1.11 Flow straightening devices to reduce the required straight length of compressor inlet piping, such as vaned elbows or other piping internals, may be used only with the approval of the Company.

4.3.1.12 Compressors in hydrocarbon or toxic service shall have purge facilities. Possibility of spading shall be provided by spectacle blinds, removable spool pieces or elbows.

4.3.2 Reciprocating Compressors

4.3.2.1 The piping shall have as much free clearance as possible around each machine.

4.3.2.2 In order to prevent transmission of vibrations to a compressor, compressor piping shall not be supported or connected to the compressor foundation, the building structure and other equipment foundation that may have vibration..

4.3.2.3 Detrimental pulsations and vibrations shall be controlled for satisfactory levels of piping vibration, compressor performance, valve life, and operation of equipment sensitive to flow pulsation. Following basic techniques shall be used:

I. System design based on analysis of the interactive effects of pulsations and the attenuation requirements;

II. Utilization of pulsation suppression devices; (such as: pulsation filters and attenuators; volume bottles, with or without internals; choke tubes; orifice systems; and selected piping configurations)

III. Mechanical restraint design; including type, location, and number of pipe and equipment clamps and supports.

4.3.2.4 The design of a compressor inlet system for operation with a gas at or near saturation shall consider the following factors:

- Liquid separator close to the compressor suction;
- Separator efficiency over the operating flow range;
- Sufficient separator volume to handle incoming slugs;
- Sufficient gas velocity in the line from the separator to the cylinder to minimize liquid dropout;
- Elimination of low points between the separator and cylinder;
- Slope of lines;
- Insulation to minimize heat loss;
- Heat tracing to maintain the gas at or above the dew point.

Note 1: During certain atmospheric conditions, air can be at or close to saturated conditions; also, multi-stage air or hydrocarbon gas compressors will usually have saturated conditions following inter-cooling.

Note 2: The purchaser should ensure that the quantity of liquid carried into the inlet system is minimized and that any such carry-over does not collect in the inlet system and form slugs.

4.3.2.5 No cast iron valves shall be used on compressor process piping.

4.3.2.6 Crank case vents and distance piece vents shall be piped to the outside of the compressor building. See IPS-M-PM-200.

4.3.2.7 The design approach choices as specified by API 618 shall be followed:
a. Design Approach 1: Empirical Pulsation Suppression Device Sizing.
b. Design Approach 2: Acoustic Simulation and Piping Restraint Analysis.
c. Design Approach 3: Acoustic Simulation and Piping Restraint Analysis plus Mechanical Analysis (with Forced Mechanical Response Analysis if necessary).

4.3.2.8 Suction and discharge volume bottles greater than 750 mm diameter shall have a 200 mm minimum blinded opening for cleaning and bottle inspection.

4.3.2.9 Reciprocating compressors shall be safeguarded against a blocked outlet with a reliable pressure-reliving device, installed in upstream of the discharge block valve. Inter-stage sections shall also be protected by relief valves See IPS-E-IN-170.

4.3.2.10 The pressure rating of the suction piping, valves and suction pulsation dampeners of a reciprocating compressor shall have the same rating as the discharge of that stage.

4.3.2.11 Onshore reciprocating compressors and integral piping should be supported on a common slab to avoid differences in settlement between the compressor body and the connected piping.

4.3.2.12 For the pre-commissioning and start-up period, temporary start-up strainers for reciprocating compressors shall be provided with maximum screen of 75 micron particles (200 mesh SWG 47 with an open area of approximately 34%).

4.3.3 Centrifugal Compressors

4.3.3.1 For piping requirements on centrifugal compressor see IPS-M-PM-170.

4.3.3.2 Straight length Requirements of tables 1 and 2 shall be considered in centrifugal compressor inlet and outlet piping design.

Note: For further information on this subject see ASME PTC-10, section 4.3.

Table (2): Minimum straight length requirements at centrifugal compressors inlet line. "D" stands for pipe diameter.

Inlet Opening Preceded By:	Minimum Straight Length Before Inlet
straight pipe	3 D
Elbow	3 D
Reducer	5 D
Valve	10 D
Flow Device	5 D

Table (3): Minimum straight length requirements at centrifugal compressors outlet line. "D" stands for pipe diameter.

Outlet Opening Followed By:	Minimum Straight Length After Outlet
straight pipe	3 D

Elbow	3 D
Reducer	5 D
Valve	5 D
Flow Device	10 D

4.3.3.3 Volume of gas entrapped between suction and discharge block valves of centrifugal compressors shall be as less as practical to prevent system surge at shut-down condition. This may be reached by reducing the piping length between suction and discharge block valves.

4.3.3.4 For the pre-commissioning and start-up period, temporary start-up strainers for centrifugal compressors shall be provided with a 40 mesh, SWG 32 to 60 mesh, SWG 40 start-up screen.

4.4 Steam Turbines

4.4.1 If the exhaust side of a turbine cannot withstand the supply steam pressure, a relief valve of adequate capacity shall be installed directly downstream of the turbine.

4.4.2 Warming-up provisions for the turbine inlet piping and the turbine shall be made. This is less important for the impulse-type turbine, but stringent for the reaction-type turbine.

4.4.3 The set pressure of the relief valve shall exceed neither the turbine design pressure nor that of the exhaust piping.

The calculation for the relief valve orifice shall be based on the turbine inlet nozzle.

4.4.4 A suitable strainer shall be installed in the steam inlet line close to the turbine, if not supplied with the turbine.

4.4.5 Piping shall be designed to permit steam-blowing up to the inlet and outlet flanges of the turbine before start-up.

4.4.6 Steam vents shall be routed to a safe location and shall not be combined with any lubricating oil, seal oil or process vent.

4.4.7 Turbine lube oil and seal oil piping should over the full length be of austenitic stainless steel, including valve trim and flange bolting. See IPS-M-PM-320.

4.4.8 For general and specific requirements for steam turbines See IPS-M-PM-240 and IPS-M-PM-250.

5. TESTING

5.1 Prior to initial operation, installed piping shall be pressure tested to assure tightness.

In the event repairs or additions are made following the test, the affected piping shall be retested, except that in the case of minor repairs or additions, the Company may waive retest requirements, or may request alternate methods of determining the "soundness" of fabrication.

5.2 Inspection and testing shall be in accordance with Chapter VI of "ANSI B31.3, Latest Revision, "Process Piping" and IPS-C-PI-350 "Plant piping System Pressure Testing". Requirements of individual IPS standards on specific rotating equipment shall also be followed.

5.3 All piping other than open drain lines, sewers and air lines less than DN 20 OD shall be pressure tested.

5.4 All tape shall be removed from flanges at conclusion of testing.

Note to Users

The IPS Standards 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 publications are based on internationally acceptable standards and include selections from the options 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 or diversity of conditions of each project or work.

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 users of IPS publications are therefore requested to send their views and comments, including any addendum prepared for particular cases to the Ministry of Petroleum, Standards and Research Organization. These comments and recommendations will be reviewed by the relevant technical committee and will be incorporated in the formal revision of the relevant IPS. The IPS publications are reviewed and revised approximately every five years.

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