

MATERIAL AND EQUIPMENT STANDARD**FOR****PIGS****ORIGINAL EDITION****JULY 1997**

This standard specification is reviewed and updated by the relevant technical committee on Dec. 2000(1) & Sep. 2014(2). The approved modifications are included in the present issue of IPS.

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.

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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.

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1. SCOPE

1.1 This Standard specification covers minimum requirement(s) for purchasing various types of non-intelligent pigs generally used in Iranian Oil and Gas Industries.

1.2 The pig(s) offered shall be in compliance with the requirement(s) of this Standard. If requirement(s) of this Standard differs from or is in conflict with purchasing document / vendor's offer, the Vendor shall clearly indicate points of conflict and request the Purchaser for Clarification and comments.

1.3 The Purchaser comments shall be fully considered and incorporated in the final specification. In case no comment(s) is given by the Purchaser, the following will take precedence in the order of priority as indicated hereunder:

- a) Purchase order
- b) Data sheets and drawings
- c) This Standard specification

1.4 The size and temperature/pressure rating of the pig shall fall within the range of the manufacturer's actual experience, only equipment which has proven its-reliability in service is acceptable. Manufacturer shall prepare a list showing the same type and size of pig previously manufactured and operated under similar condition of pigging.

Note 1:

This standard specification is reviewed and updated by the relevant technical committee on Dec. 2000. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 128 on Dec. 2000. These modifications are included in the present issue of IPS.

Note 2:

This standard specification is reviewed and updated by the relevant technical committee on Sep. 2014. The approved modifications by T.C. were sent to IPS users as amendment No. 2 by circular No. 430 on Sep. 2014. These modifications are included in the present issue of IPS.

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.

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

- A 193/ A 193M "Standard Specification for Alloy Steel and Stainless steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications"
- A 194 A 194M "Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both"
- A 216/ A 216M "Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service"
- A 217/ A 217M "Standard Specification for Steel Castings, Martensitic Stainless and Alloy,

	for Pressure-Containing Parts, Suitable for High-Temperature Service"
A 307-12	"Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength"
A 351/ A 351M	"Standard Specification for Castings, Austenitic, for Pressure-Containing Parts"
A 488/A 488M	"Standard Practice for Steel Castings, Welding, qualifications of Procedures and Personnel"

SIS (STANDARDISERINGS-KOMMISSIONEN I SVERIGE)

SIS-05-5900	"Swedish Standards Institution Practice, Surface Preparation Standard for Painting Steel Surface"
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BSI (BRITISH STANDARDS INSTITUTION)

BS 1133	"Packaging Code"
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NACE (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)

ANSI/NACE MR 0175 / ISO 15156	"Petroleum and Natural Gas Industries-Material for Use in H ₂ S-Containing Environments in Oil and Gas Production"
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3. DEFINITIONS AND TERMINOLOGY**3.1 Manufacturer**

The party that manufactures or produces a pig or its Components covered by this Standard.

3.2 Purchaser

The party or parties entering into a contract or agreement to purchase a pig in accordance with the provision of this Standard.

4. GENERAL

4.1 Each pig shall withstand the temperature limits as, specified in the data sheet.

4.2 The manufacturer should state in his proposal, the maximum continuous safe running for the pig.

4.3 Pigs shall be able to travel the sharp bends stated in data sheet with sufficient sealing activity.

4.4 The pig shall be so designed that specified line pressure keeps the pig centered and sealed in the pipeline.

4.5 Different parts of metallic pig body (if applicable) shall be full welded.

4.6 Material

4.6.1 Bodies shall normally be of carbon steel.

4.6.2 Unless otherwise specified, brushes should be made of high carbon tempered steel, stainless

steel or plastic as applicable.

4.6.3 Unless otherwise specified, gaging plate, in gaging pigs, should be brass, bronze or aluminum alloy.

4.6.4 The following table should be followed for material selection of non-metallic cup.

CUP MATERIAL	TEMPERATURE LIMIT (°C)	FLUID
Cast polyurethane	- 18 to 60	Natural gas, refined hydrocarbon and water
Neoprene	- 29 to 138	General chemical and hydrocarbons
Nitrile (e.g. Hycar)	- 7 to 138	Aromatics: crude and fuel oils

Note:

If the proposed material differs from the above table, the Vendor shall clearly state the points of conflicts, the reason for selection of the material and his experience in using the alternate cup material in actual services.

5. PURCHASER’S ACCESS TO MANUFACTURING PLANT(S)

The Purchaser or his nominee(s) shall have free access to the manufacturing plant engaged in fabrication of the pigs to carry out the necessary inspection at any stage of the fabrication and witness the tests. The Vendor shall place at disposal of the Purchaser or his nominee(s), free of charge, such instrument(s) and tool(s) as required at the inspection point to enable the Engineer or his nominee(s) to carry out inspection in this respect; such inspections in no way relieve the manufacturer of his responsibilities under the term of this Standard specification and/or other applicable documents.

6. TESTING

6.1 All pigs shall be tested in accordance with manufacturer’s standard.

7. INSPECTION

Manufacturer shall be prepared for inspection of the pig by the Purchaser.

8. FINISHING, PAINTING AND/OR COATING

8.1 All pigs shall be thoroughly cleaned and suitably preserved on completion of manufacturing.

8.2 All machined or threaded surfaces shall be protected from corrosion with a rust-preventive material which shall not become fluid and run-off at a temperature less than 80°C. The shipment and storage time shall be assumed to be 18 months.

8.3 Unless otherwise specified in purchase documents, non-ferrous parts, stainless steel and non-metallic portion of the pig shall not be painted.

9. IDENTIFICATION

9.1 Manufacturer's Marking

Each pig shall be marked in accordance with manufacturer standard.

9.2 Contract Tagging

9.2.1 Each metallic pig shall be fitted with a rust-resistant metal tag securely attached to it with sufficient twist of stainless steel wire.

9.2.2 Tags shall not be attached through bolt holes of pig flanges.

9.2.3 Non-metallic pigs should be marked with an identification number and tag shall be stamped on the appropriate storage box with same identification number.

9.2.4 The minimum dimension for tags and wires are as follows:

a) Size of tag	Round 40 mm (1½ inches) Rectangular 12 × 70 mm (½ × 2¾ inches)
b) Thickness of tag	16 B & S Gage (1.3 mm) minimum
c) Lettering height	6 mm (¼ inches) minimum
d) Wire diameter	16 B & S Gage (1.3 mm) minimum

Note:

B & S gage is the abbreviation of Brown and sharp gage stating the thickness of wire and sheet metal.

10. PACKING

Pig packing shall meet the requirements of standard BS 1133.

11. HANDLING AND SHIPPING

Packing shall be such that, during handling, shipping (including overland transportation) and storage pig(s) and accessories do not suffer any damage.

12. REJECT CAUSES

The pig may be rejected if measurement, inspection and/or testing reveals discrepancies between quoted figures in purchase-documents and those obtained actually.

13. DOCUMENTATION AND LANGUAGE

All documents furnished by manufacturer shall be in English.

14. APPROPRIATE PIGS SPECIFICATION(S)

14.1 Flexible Bodied, Non-Metallic, One Piece Construction

14.1.1 They shall be adequately flexible, having conical cup with efficient sealing action as the

pressure differential across the pig increases.

14.2 Mechanical Pigs-Articulated Bodied (Multi-Use Pigs)

14.2.1 They shall have the swabbing, cleaning and liquid batching operating capability all together or in consequent by using of different accessories as and when requested in the Purchase documents.

14.2.2 Pig body shall be suitable for installation of electronic pig signaler.

14.2.3 Cup flange shall have suitable bolt circle diameter with adequate number of bolts to provide the better sealing and flexibility for the cup.

14.2.4 Each pig shall have by pass ports based on the following table, unless otherwise specified.

PIG SIZE DN (NPS)	PORT SIZE mm (inches)	No. of PORTS
300 (12) and less	12(½)	4
350 - 500 (14 - 20)	14(9/16)	6
550 - 700 (22 - 28)	20(¾)	7
750 (30) and larger	20(¾)	8

14.2.5 Urethane cups should be fluid pressure expandable for wear compensation.

14.2.6 Wear compensating brushes are preferred. However, the type of brushes will be specified in purchase document.

14.2.7 Scraper blades should be placed on the pig body about 30° to the direction of travel.

14.3 Foam Pigs

14.3.1 Foam pigs shall be tough, abrasion-resistant, polyurethane capable to travel successfully through the bends, valves and tees specified in data sheet.

14.3.2 They shall have self-skinning feature.

14.3.3 They shall not become lodged when come into contact with obstructions in pipeline and should have ability to be forced through by the application of increased fluid pressure.

14.3.4 Unless otherwise specified, low density foam pigs shall be from 16-48 kg/m³ (1-3 lbs/ft³) and high density pigs 96-192 kg/m³ (6-12 lbs/ft³)

14.3.5 Foam pigs shall be oversized as required for their duty.

14.3.5.1 Low density foam pig should have an outside diameter from 12 to 100 mm (½ to 4 inches) larger than the pipe bore depending on the nominal bore of the line.

14.3.5.2 High density foam pigs should be equal or not more than 12 mm (½ inch) larger than the pipe bore, irrespective of nominal pipe size.

14.4 Inflatable Unisphere Pig

14.4.1 Shall be seamless, liquid-cast polyurethane ball.

14.4.2 Pigs shall be equipped with two inflating one way valves and when specified with in flattening pump.

14.4.3 For DN 350 (NPS 14) and smaller, diameter of the ball should be 2.0-2.2 percent higher than nominal pipe inside diameter.

14.4.4 For larger than DN 350 (NPS 14), ball diameter should be 1.5-1.6 percent higher than pipe inside diameter.

14.4.5 Inflated ball diameter shall be 6 to 6.5 percent higher than pipe inside diameters for 14 inches and less.

14.4.6 Inflated ball diameter shall be 5 to 5.7 percent higher than pipe inside diameter for 16 inches and higher.

14.5 Solid (Non-Inflatable) Sphere Pig(s)

14.5.1 A vent hole shall be provided for pressure equalizing purpose.

14.5.2 Ball must be hydrocarbon resistant with minimum swelling, no blister and good tear strength.

14.6 Gaging Pig (Mechanical)

14.6.1 They should be equipped with urethane cups.

14.6.2 Gaging plates diameter shall be 95% of the minimum bore or 25 mm (1 inch) less than the minimum bore of the specified pipe as decided by the Purchaser.

14.6.3 Gaging plate construction and its installation shall be so arranged that the deformed portion of the plate should not move back to the original configuration, with regard to pig sticking, propellant properties and service temperature.

15. DOUBLE-DIAMETER PIPELINE PIG(S)

It shall traverse two or more line sizes. Manufacturer shall fully state the sealing, supporting and flexibility characteristics in the proposal for entire pipeline curvature.

15.1 Acceptable Configurations

15.1.1 Slotted disc

An elastomer disc sized for the smaller diameter, shall be installed in front of a pair of slotted disc(s) to suit the larger diameter.

15.1.2 Slotted discs shall be radially positioned so that the flap of one disc covers the slot(s) of the other.

15.2 Overlapped Segments or Flaps

This type shall be so designed that when mounted, form a conical-shaped Iris.

15.3 Collapsible diaphragm-type cup should not be used.

15.4 Consideration should be given to lightness of the pig to reduce the elastomer pants wear, also

keeping the pig more concentric in the pipe, simpler handling, reducing the risk of damage to the pipe in the event that the pig becomes stuck.

16. PIG SELECTION

Pigs play a significant role, so it is important to select the correct type of pig for a specific application. Following table provides a guide for selecting the types of pigs best suited for particular operations:

PIG TYPE	PRECOMMISSIONING APPLICATION	OPTIONAL ATTACHMENTS
Cup	Cleaning Separation Dewatering Batching	Brushes Blades/scrapers Magnets Pig Tracking Bypass Facility Geometry Measurement Gauging Plate
Disc	Cleaning Separation Dewatering Batching	Brushes Blades/scrapers Magnets Pig Tracking Bypass Facility Gauging Plate
Foam	Cleaning Dewatering Batching Air Drying	Brush/Abrasive Coating Urethane Coating Pig Tracking (with special provision)
Sphere	Dewatering Batching	Pig Tracking (with special provision)
Gel	Dewatering Batching	

As there are many different designs of pigs and many different applications, pig selection guide can only be indicative. Pigs shall be able to pass through pipelines with minimum bore and minimum bend radius and through pipeline valves and fittings as specified in the scope of work.

ATTACHMENTS

**ATTACHMENT 1
DATA SHEET**

1. Type of the Required Pig:

2. Purpose of Pig Operation:

.....

3. Line Conditions:

Pipe Material: Steel b Cast Iron b Aluminum b Concrete b Other b

Nominal Pipe Size(s) $\frac{\text{DN.}}{\text{NPS}}$ Maximum Pipe I.D.

Total Pipe Length Minimum Pipe I.D.

Piping Connections b Flanged b Welded.

Line Contents
 (Crude, Gas, Products, Water, Etc.)

Line Contents while Pigging (if different from above)

Fluid temp. during pigging °C (°F)

Design Press of the Pipeline Bar (Psig)

Normal..... Bar (Psig)

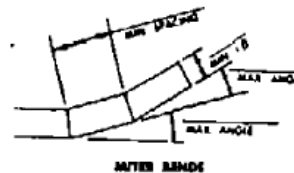
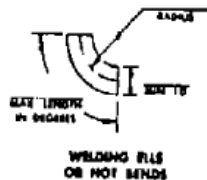
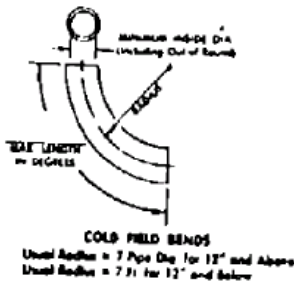
Fluid pressure available for pig propulsion

Max..... Bar (Psig)

Reducers (if any)

I. PIPE BENDS: Specify Min. distance between bends m (ft.)

Type of bend:

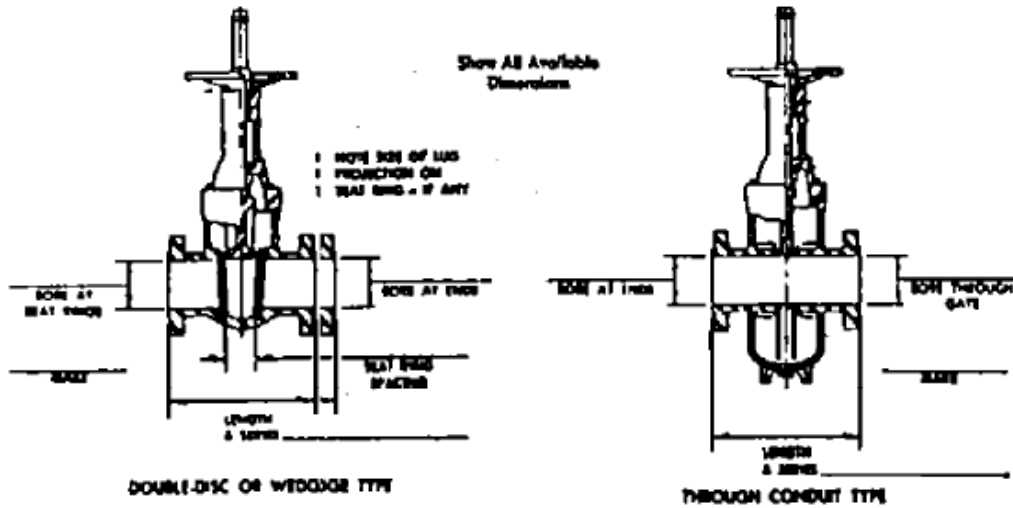


Bends to be traversed: Inside Dia .Min. Radius Max. Angle _____

(to be continued)

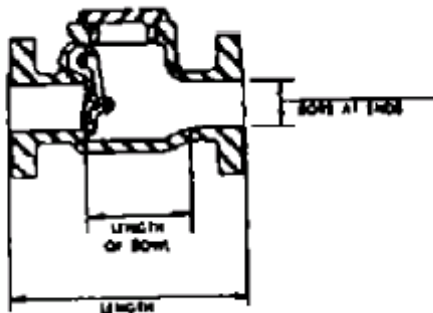
DATA SHEET (continued)

II. GATE VALVES:



Gate Valves to be Traversed: Seat Ring
 Make Type Series Mat' l. Fig. No. Min .I.D. Spacing _____

III. CHECK VALVES:



What, if anything, projects from clapper face?

Depth and slope of bowl at outlet end.

SER MAKE Other Valves (Check or Plug Valves, etc.) to be traversed:

Describe:.....

IV. TEES & BRANCHES:



Yes b Size of Bar _____ Spacing _____
 No b

Side Openings to be passed: Max. Diameter Angle to Pipe Run

Maximum Distance Pig must travel in single run

4. Other Special Requirements or pertinent information;