MATERIAL AND EQUIPMENT STANDARD

FOR

POSITIVE DISPLACEMENT PUMPS - ROTARY

SECOND EDITION

DECEMBER 2012

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.

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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 document.

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.

CONTENTS: **PAGE No.**

0. INTRODUCTION

This Standard gives technical specifications and general requirements for the purchase of "Positive Displacement Pumps-Rotary" for use in oil, Gas and Petrochemical Industries and is based on API standard: 676, Third Edition, Nov. 2009, and shall be read in conjunction with that document.

(Mod.)

Note 1:

This is a revised version of this standard, which is issued as revision (1)-2002. Revision (0)-1993 of the said standard specification is withdrawn.

Note 2:

This is a revised version of this standard, which is issued as revision (2)-2012. Revision (1)-2002 of the said standard specification is withdrawn.

Guidance for Use of this Standard

The amendments/supplement to API Standard 676 given in this Standard are directly related to the equivalent sections or clauses in API Standard 676. For clarity, the section and paragraph numbering of API Standard 676 has been used as for as possible. Where clauses in API are referenced within this Standard, it shall mean those clauses are amended by this Standard. Clauses in API that are not amended by this Standard shall remain valid as written.

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

Sub. (Substitution)	: The clause in API shall be deleted and replaced by the new clause in this Standard.
Del. (Deletion)	: The clause in API shall be deleted without any replacement.
Add. (Addition)	: The new clause with the new number shall be added to the relevant section of API.
Mod. (Modification)	: Part of the clause or paragraph in API shall be modified and/or the new description and/or statement shall be added to that clause or paragraph as given in this Standard.

1. SCOPE

This Standard contains the minimum technical requirements for rotary positive displacement pumps for use in refinery services chemical plants, petrochemical plants, and where applicable in exploration, production and new ventures. Selected equipments shall be in all respect within the range of the manufacturer's proven experience and not involve the use or application of any prototype design or component. **(Mod.)**

Compliance with the provisions of this specification does not relieve the pump manufacturers of the responsibility of furnishing pump and accessories of proper design mechanically suited to meet operating guarantees at the specified service conditions.

No deviation or exception from this Standard shall be permitted without written approval of the Company. Intended deviations shall be separately listed by the Vendor and supported by reasons thereof for Purchaser's consideration. **(Sub.)**

2. NORMATIVE 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. **(Mod.)**

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-GN-100	"Engineering Standard for Units"
IPS-E-EL-110	"Electrical Area Classification and Extent"
IPS-M-EL-131	"Material and Equipment Standard for Low Voltage Induction Motors"
IPS-M-EL-132	"Material and Equipment Standard for Induction Motors"
IPS-M-PM-240	"Material and Equipment Standard for General Purpose Steam Turbines"
IPS-G-PM-250	"General Standard for Petroleum, Petrochemical and natural gas industries- steam turbines -special-purpose applications"
IPS-M-PM-300	"Material and Equipment Standard for Special Purpose Gear Units"
IPS-M-PM-320	"Material and Equipment Standard for Lubrication, Shaft Sealing, and Control-Oil Systems and Auxiliaries for Process Services"
IPS-G-SF-900	"General Standard for Noise Control and Vibration"

4. GENERAL

4.2 Governing Requirements and Units Measurement

4.2.1 In the case of conflict between documents relating to the order, the following priority of document shall apply:

First priority	:	Purchase order and variations thereto
Second priority	:	Data sheets and drawings
Third priority	:	This standard **(Mod.)**

4.2.2 Alternative designs

This standard is based on international system of units (SI), as per IPS-E-GN-100 except otherwise specified. **(Mod.)**

6. BASIC DESIGN

6.1 General

6.1.4 Pumps shall be designed to minimize the generation of noise and shall not exceed the noise limits given in the supplementary clauses bellow.

All definitions, notations, measuring equipment, measuring procedures, test reporting, calculation methods and calculation procedures shall be in accordance with IPS-G-SF-900. **(Sub.)**

6.1.4.1 Unless otherwise specified, the following limits shall be met at any measuring location not less than 1m from the equipment surface:

SOUND PRESSURE LIMIT IN db	
Pump	**87**
Pump + Driver	**90**

If the equipment produces impulsive and/or narrow band noise, the above limits shall be taken 5 dB lower, thus 82 dB for pump and 85 dB for pump + driver.

The above requirements apply in absence of reverberation and background noise from other sources, and for all operating conditions between minimum flow and rated flow. **(Add.)**

6.1.14 All equipment covered by this specification shall be designed for operation outdoors, unless otherwise specified on the individual pump data sheet. **(Mod.)**

6.3 Pressure-Containing and Pressure-Retaining Parts

6.3.3.2 "if Specification" shall be deleted **(Mod.)**

6.4 Casing Connections

6.4.3.3 Flanges that are thicker or have a larger diameter than required by ANSI may be furnished, but they shall be faced and drilled as specified in ASME Standard. **(Sub.)**

6.4.4 Suction and Discharge Nozzles

6.4.4.2 "if Specification" shall be deleted **(Mod.)**

6.4.4.3 Suction and discharge connections DN 40 and larger shall be furnished with flanged suction and discharge nozzles integral with the casing, and orientations shall be indicated on the proposal.

Flanged suction connections shall be suitable for the maximum discharge pressure and pumping temperature. **(Add.)**

6.8 Rotating Elements

6.8.1 Rotors

6.8.1.10 All major rotating elements, and also assembled rotors shall be statically and dynamically balanced to ISO 1940-1. **(Add.)**

6.8.1.11 Dynamic shaft deflection under the worst operating conditions of load shall not exceed 0.05 mm at the face of the stuffing box. **(Add.)**

6.9 Mechanical Shaft Seals

6.9.2 The pump vendor shall be responsible to obtain a full guarantee from the seal manufacturer for seals provided. **(Mod.)**

6.9.9.1 When seal gland plates are used, they shall be of the same material as the pump case except for carbon steel and cast iron casings which shall be 18 Cr 8 Ni. Gland plates retaining mechanical seals shall have at least four bolts. **(Add.)**

6.10 Bearings and Bearing Housings

6.10.6 Bearing housings shall be arranged so that the bearings can be replaced without disturbing the pump drive or the pump mounting. In general internally lubricated type bearings are acceptable when the fluid pumped has no damaging effect on the bearings. In all other cases, pump shall be provided with oil lubricated bearings and timing gears in separate housings. **(Add.)**

6.12 Lubrication

6.12.7 Unless otherwise specified, pressurized oil systems shall conform to the requirement of the "General Purpose" section of ISO 10438-3 as amended /supplemented by IPS-M-PM-320. **(Mod.)**

6.12.8 When pressure lubrication is required or specified for externally lubricated bearings, the pump vendor shall provide a self-contained lubrication system complete with oil pump reservoir, piping, filters, necessary controls and instrumentations, and water cooled or air cooled oil cooler as specified by the purchaser. **(Mod.)**

6.12.9 External pressure lubrication systems shall comply with the requirements of ISO 10438-3 as amended /supplemented by IPS-M-PM-320. **(Mod.)**

6.12.10 If specified, the pressure lubrication system shall conform to the requirements of ISO 10438-2 (Special purpose oil systems) as amended /supplemented by IPS-M-PM-320. For such a lubrication system, datasheets should be supplied. **(Mod.)**

6.12.12 In the case of a unit having oil lubricated bearings in separate housings, constant-level oilers shall be furnished. The oilers' volume shall be 120 cm^3. **(Add.)**

6.14 Nameplates and Rotation Arrows

6.14.3 Total weight shall also appear on the machine's nameplate. **(Mod.)**

6.14.4 In additional to being stamped on the nameplate, the pump serial number shall be plainly and permanently marked on the pump casing. **(Add.)**

7. ACCESSORIES

7.1 Drivers

7.1.2 Motors

7.1.2.1 All induction motors supplied by the pump vendor shall be in accordance with IPS standards IPS-M-EL-131 or IPS-M-EL-132. **(Mod.)**

7.1.3 Steam turbines

7.1.3.1 All steam turbines supplied by the pump vendor shall be in accordance with IPS standards IPS-M-PM-240 or IPS-G-PM-250. **(Mod.)**

7.2 Couplings and Guards

7.2.15-c Removable metallic guards shall be supplied by the vendor. Guards shall be non-spark type. **(Mod.)**

7.4 Base plates

7.4.23 Base plates shall be provided with two welded on earthing studs positioned diagonally at opposite end complete with two nuts and two washers per earthing. **(Add.)**

7.5 Pressure-Limiting Valves (PLVS)

7.5.2.1 Delete “if specified” from this clause. **(Mod.)**

7.7 Auxiliary Piping

7.7.1 Auxiliary piping system shall be in accordance with IPS-E-PM-385 and IPS-M-PM-320. **(Mod.)**

7.7.2 Copper tubing and brass fittings are not acceptable. **(Mod.)**

8. INSPECTION TESTING, AND PREPARATION FOR SHIPMENT

8.2 Inspection

8.2.1.5 Shop inspection shall be carried out as follows prior to tests and performance testing.

For all pumps, shop inspection shall include a dimensional check against approved outline drawings combined with a visual check for good workmanship. Other types of inspection may be specified in purchase order or data sheet. **(Add.)**

8.3.2 Hydrostatic testing

8.3.2.1 The minimum test pressure for casing shall be 780 kPa. g. [7.8 bar (g)].The water used for the test shall contain a suitable agent. After completion of shop tests, pumps are to be thoroughly cleaned and dried. **(Mod.)**

8.3.2.5 Pressure casing shall be hydraulically tested for at least four hours. **(Mod.)**

8.3.7 Optional tests

8.3.7.1 If the NPSH required by the pump differs from the specified available NPSH by 0.3m or less, an NPSH suppression test is required. **(Mod.)**

8.3.9 Test data

8.3.9.1 Certified performance data and curves shall be supplied. **(Add.)**

8.4 Preparation for Shipment

8.4.3.2 Unless otherwise specified the rust preventive applied to unpainted exterior machined surfaces shall be of a type:

a) To provide protection during outdoor storage for a period of twelve months exposed to a normal industrial environment.

b) To be removable with mineral spirits or any standard solvent. **(Mod.)**

8.4.3.8 Each pump shall be identified as required by the purchase order. No material shall be shipped separately. Miscellaneous parts shall be properly tagged by securely affixed metal tags and marked with the item number for which they are intended. All such parts shall be suitably boxed, firmly attached to the base plate and shipped with the unit. **(Sub.)**

9. VENDOR'S DATA

9.2 Proposals

9.2.3 Technical data Add to item F of this clause:

f) Vendor's offer shall include recommended spare parts for two years of continuous operation with price list. **(Mod.)**

10. GUARANTEE AND WARRANTY

10.1 Mechanical

Unless exception is recorded by the Vendor in his proposal, it shall be understood that the Vendor agrees to the following guarantees and warranties

a) All equipment and component parts shall be warranted by the vendor against defected materials, design and workmanship for 1 year after start-up or 18 months after shipment, whichever is longer.

b) If any mal-performance or defects occur during the guarantee and warranty period, the vendor shall make all necessary alterations, repairs and replacements free of charge, with no field labor charges, on the purchaser's job site. **(Add.)**

10.2 Performance

The pump shall be guaranteed for satisfactory performance at all operating conditions specified on the data sheet. **(Add.)**