MATERIAL AND EQUIPMENT STANDARD

FOR

SPECIAL PURPOSE COUPLINGS

FIRST EDITION

DECEMBER 2003

This standard specification is reviewed and updated by the relevant technical committee on Jun. 2014. 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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0. INTRODUCTION

This Standard specification gives the amendments and supplements to API Standard 671 fourth edition, August 2007, Re-affirmed: September 2010, "Special Purpose Couplings for Petroleum, Chemical, and Gas Industry Services". It shall be used in conjunction with data/requisition sheets for Special Purpose Couplings.

Note 1:

This is a revised version of the standard specification for Special Purpose Couplings for process services, which is issued as edition (1). Edition (0) of the said standard specification is withdrawn.

Note 2:

This standard specification is reviewed and updated by the relevant technical committee on Jun. 2014. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 419 on Jun. 2014. These modifications are included in the present issue of IPS.

Guidance for Use of this Standard

The amendments/supplement to API Standard 671 given in this Standard are directly related to the equivalent sections or clauses in API Standard 671. For clarity, the section and paragraph numbering of API Standard 671 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 the type of changes made to the equivalent clause or paragraph of API.

Sub. (Substitution): The clause in API is deleted and replaced by the new clause in this Standard.

Del. (Deletion) : The clause in API is deleted without any replacement.

Add. (Addition) : The new clause with the new number is added to the relevant section of API.

Mod. (Modification): Part of the clause or paragraph in API is modified and/or the new description and/or statement is added to that clause or paragraph as given in this Standard

1. SCOPE

Compliance by the coupling manufacturer with the provisions of this standard specification does not relieve him of the responsibility of furnishing coupling of proper design, mechanically suited to meet guarantees at the specified service conditions.

Unless specific exception accompanied by a description of the proposed substitute is recorded under the heading "Exception" in manufacturer's proposal, it shall be mutually understood that the proposal is based on equipment which complies strictly with the requirements of this Standard. **(Mod.)**

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.

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

Boiler and Pressure Vessel Code, Section VIII

"Rules for Construction of Pressure Vessels"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

A 388 "Practice for Ultrasonic Examination of Heavy Steel Forgings"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-M-PM-320 "Material and Equipment Standard for Lubrication, Shaft Sealing, and Control Oil systems for Special Purpose Application"

IPS-E-GN-100 "Engineering Standard for Units" **(Mod.)**

4.1 Units

4.1.1 This Standard is based on International System of Units (SI), as per IPS-E-GN-100 except where otherwise specified. **(Add.)**

4.2 Conflicting Requirements

In the case of conflict between documents relating to the inquiry or order, the following priority of documents (whichever more stringent realized by Company) shall apply:

- First priority: Purchase order and variations thereto.
- Second priority: Data sheets and drawings.
- Third priority: This Standard Specification.

All conflicting requirements shall be referred to the purchaser in writing. The purchaser will issue conforming documentation if needed for clarification. **(Add.)**

6. COUPLING DESIGN

6.16 The company shall be informed if flexible element couplings are to be designed to operate at a condition other than a neutral state with the train in hot or normal running condition i.e. if the coupling will be required to undergo compression or stretch while running. **(Add.)**

8. COUPLING REQUIREMENTS

8.1 Metallic Flexible Element Coupling

8.1.9 Diaphragm coupling rating and design shall be based on the maximum axial and radial misalignment anticipated during transient and steady state conditions. The shaft end clearances for assembly shall be specified by the Vendor. The diaphragms shall be coated with manufacturer's standard coating, suitable for the specified environment. **(Add.)**

8.3 Unless otherwise approved by the Purchaser, couplings shall have a spacer with a minimum length of 46cm (18 in). For very large compressor trains, consideration should be given to increasing the spacer length to provide more maintenance access between equipment. Spacers as long as 76 cm. (30 in) are often provided for this class of equipment. **(Add.)**

8.4 Hub Type

The hubs shall be removable unless otherwise specified. **(Sub.)**

8.5.1 If the coupling is to fit to integrally flanged shaft end(s), the coupling vendor and the manufacturer with unit responsibility shall agree on the flange geometry and define the connections details. **(Mod.)**

8.6.2.4 A matched set of plug and ring gauges (see 11.5) shall be supplied. **(Mod.)**

8.6.2.5 A matching set of plug and ring lapping tools (see 11.6) shall be supplied. **(Mod.)**

8.8.1 The flexible element shall be positively secured to adjacent parts of coupling by spines, bolts or welds. Rivets, brazed or sweated connections are not acceptable for transmission of load. **(Mod.)**

8.11 For double-end motor drivers, the coupling on one end shall be electrically insulated. **(Mod.)**

9. BALANCE

9.1 General

All coupling components shall be match marked. For coupling requiring assembly balance or assembly check balance, match marking shall be performed after the balance or balance check and prior to subsequent disassembly of the coupling. **(Mod.)**

TABLE 1 - SUMMARY OF BALANCING METHODS (Mod.)

Operation	Reference clause	Method 1[a]	Method 2[a]	Method 3[a]
Component balance	9.3.5	R	R	R
Assembly check balance	9.3.6	N/A	R	N/A
Assembly balance	9.3.7	N/A	N/A	R
Residual Unbalance Verification	9.3.8	N/A	IS	IS
Repeatability check	9.3.9	N/A	R	R
Component interchangeability check	9.3.10	N/A	R	N/A

[a] Meaning of abbreviations:

R = required;

N/A = not applicable;

IS = if specified.

10. MATERIALS

10.8 When the environmental or other contaminant contains hydrogen sulfide, materials with hardness in excess of Rockwell C-22 shall not be used. **(Add.)**

10.9 For direct motor driven units, the coupling shall be all steel and have a high torsional stiffness factor. **(Add.)**

11. ACCESSORIES

11.3 A two-piece stop-ring shall be provided to locate the advance (draw) of the hydraulically fitted coupling hub during installation. This stop-ring shall be designed to be clamped onto the shaft and shall be removable after the coupling is properly in place, whether installed in the shop or the field. **(Mod.)**

11.5 The vendor shall supply a matched set of plug-and-ring gauges for each shaft-end taper.

These gauges shall meet the following requirements.

a) The hardness of the material of the gauge shall be greater than that of the shaft or coupling and not less than 45 HRC.

b) This plug-and-ring gauge set shall be verified with the machinery vendor's master plug and master ring gauges.

c) The plug-and-ring gauges shall meet the roundness, surface finish and contact requirements of this International Standard for coupling tapers.

d) The length of the ring-and-plug gauge shall at least be equal to the length of the coupling hub plus the advancement distance. The tools shall overlap the taper at each end.

e) Equipment drawings shall be reviewed for possible interference.

f) The gauges shall be marked “Gauge” in a non-critical location.

g) The storage preservation of these gauges shall satisfy the requirements of 12.5.4.

Note:

This gauge set is intended to become the master gauge set for the owner for use in inspection of both shaft and coupling taper. (Mod.)

12. MANUFACTURING QUALITY, INSPECTION, TESTING AND PREPARATION FOR SHIPMENT

12.1 Manufacturing Quality

12.1.6 Wrought materials shall be free from cracks, seams, laps, shrinkage and other injurious defects.

The Vendor shall ultrasonically inspect according to ASTM A 388 and shall assure the integrity of wrought materials for all torque transmitting parts as early as is practical in the manufacturing cycle. **(Add.)**

12.2 Inspection and Testing

12.3.5 Inspection procedure and acceptance shall be in accordance with the ASME boiler and pressure vessel code, Section VIII, as following:

Radiography, paragraph UW-51; magnetic particle, Appendix VI; and dye penetrant, Appendix VIII. When ultrasonic inspection is used, the procedures and acceptance criteria shall be in accordance with section VIII, Appendix XII unless otherwise agreed upon. **(Mod.)**

12.5 Preparation for Shipment

12.5.2 The expected storage location shall be outdoors in specified environmental conditions. **(Mod.)**

12.5.3 The packing shall be prepared for export shipping. **(Mod.)**

13. VENDOR'S DATA

13.1 General

13.1.2 The following information shall also be included:

g) Manufacturer's Name

h) Year of manufacturing **(Mod.)**

13.2 Proposals and Contract Data

13.2.1 General

h) A schedule according to which the vendor agrees to furnish the data requested by the purchaser

i) A list of spare parts recommended for start-up and normal maintenance purpose. (The

purchaser will specify any special requirements for long term storage). **(Mod.)**

13.2.4 Curves **(Add.)**

13.2.4.1 The following data shall be provided for gear couplings:

a) Axial force versus torque (from zero to maximum allowable torque) for relative tooth motion. (This curve shall be determined with the coupling at the maximum allowable angular misalignment and shall be on the vendor's stated coefficient of tooth friction).

b) Bending moment versus angular misalignment (This curve shall be determined based on the maximum allowable torque.) **(Add.)**

13.2.4.2 The following curves shall be provided for flexible-element couplings:

a) Axial force versus axial deflection (from zero to maximum allowable axial deflection in both directions)

b) Bending moment at maximum angular misalignment versus axial deflection. (From zero to maximum allowable axial deflection in both direction).

c) Windage loss versus coupling speed. (Enclosure data and ambient temperature data at the coupling location will be supplied by the purchaser). **(Add.)**

14. GUARANTEE AND WARRANTY

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

During a period of 12 months after the date of commissioning, the Vendor shall, with all possible speed and without cost to the purchaser, replace or repair the goods or any part thereof found to be defective due to faulty material, workmanship or to any act or omission of the Vendor. In particular the Vendor shall reimburse any transportation and other charges incurred by the purchaser in effecting such replacement or repair at the point of use. **(Add.)**

APPENDICES

APPENDIX A

(Normative)

TORSIONAL DAMPING COUPLINGS AND RESILIENT COUPLINGS

A.2.6 The minimum range of torsional damping and the allowable range of torsional stiffness shall be defined after train torsional analysis. **(Mod.)**

A.2.7 No elastomers shall be used in shear. **(Mod.)**

A.2.10 Couplings shall be of the double-engagement type. **(Mod.)**

A.2.11 The coupling shall be a spacer type. The Purchaser, taking into account the maintenance requirements of the coupled equipment, shall specify the length of spacer.

APPENDIX H

(Normative)

COUPLING GUARDS

H. 1 Unless otherwise agreed, the driven machine Vendor shall supply coupling guards. **(Mod.)**

H.2.2 Unless otherwise specified, guards for special purpose couplings shall be of the fully enclosed cylindrical type . **(Mod.)**

H.2.9 Guards shall be made from spark-resisting materials or as specified on the data/requisition sheets. Copper or copper-based alloys shall not be used in any environment where H2S may be present. **(Add.)**

H.4.1 Cylindrical guards shall be connected to the driving and driven machines through oil-tight joints. The design of these connections shall accommodate relative thermal movement in operation and permit the machines to be moved for alignment purposes. **(Add.)**