



## IRANIAN PETROLEUM STANDARD

# IPS

CONSTRUCTION STANDARD  
FOR  
PROCESS MACHINERIES ASSEMBLING  
AND  
INSTALLATION

FIRST EDITION  
MARCH 2005



## FOREWORD

This Standard is intended to be used within and for Iranian Ministry of Petroleum (N.I.O.C, N.I.G.C, N.P.C., N.I.O.R.D.C. and other affiliate organizations and companies) and has been prepared on the basis of the recognized standards, scientific publications, technical documents, accumulated knowledge and experiences in petroleum industries at national and international levels.

Iranian Petroleum Standards are prepared by Iranian Petroleum Standards Organization reviewed and amended by the relevant technical standard committees to incorporate acceptable comments made by oil, gas and petrochemical experts.

Standards are finally approved by the “Standards High Council” of Iranian Ministry of Petroleum.

Iranian Petroleum Standards (IPS) are subject to amendment withdrawal, if required, thus the latest edition of IPS shall be applicable.

Any comment or recommendation submitted to the “Iranian Petroleum Standards Organization” will be evaluated in the relevant technical committee and will be considered in the next revision, upon approval.

### 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 etc.

“**PURCHASER**” : Means the “Company “ Where this standard is 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.

“**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.

“**SHOULD**” : Is used where a provision is advisory only.

“**SHALL**” : Is used where a provision is mandatory.

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March 2005

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**0. INTRODUCTION**

This IPS Standard specifies the minimum requirements for the installation of rotating equipment in Iranian oil, gas and petrochemical industries process machineries. It is intended to supplement, and in those cases where it is more stringent, to replace Manufacturer's recommendations, unless otherwise agreed by the Company.

These requirements shall form the basis for the checklists to be prepared and used by the Contractor and the Company to ensure proper installation of process machineries.

Although primarily intended for new construction projects, this Standard may also be useful to maintenance departments responsible for installation of process machineries.

For civil, instrumentation and electrical requirements on installation of process machineries the appropriate documents shall be consulted.

## 1. SCOPE

This Standard contains the minimum requirements for the mechanical installation of process machineries.

It is intended to be used in oil refineries, chemical plants, gas plants, and where applicable, in exploration and production and new ventures.

The contractor shall inform the Company on any deviations from the requirements of this Standard necessary to comply with the above.

Any deviation requires the written approval of the Company.

For further guide line, API Recommended Practice 686 may be referred, which provide comprehensive details on machinery Installation and Installation Design.

**Note:** This is a revised version of the Standard specification for Process Machineries Assembling and Installation, which is issued as revision (1). Revision (0) of the said Standard specification is withdrawn.

## 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.

All publication referred to in this standard are listed below:

### API (AMERICAN PETROLIUM INSTITUTE)

686 :1996 "Recommended Practice for Machinery Installation and Installation Design"

### IPS (IRANIAN PETROLEUM STANDARDS)

[E-GN-100](#) "Engineering Standard for Units"

[G-PM-120](#) "General Standard for Accessibility and Safety of Machineries"

[E-PM-385](#) "Engineering Standard for Machinery Piping"

[M-PM-310](#) "Material and Equipment Standard for Special Purpose Couplings"

D-CE-201 "Anchor Bolts (Type L,S,LS,JS,T,S,U.B)"

## 3. UNITS

The International System of Units (SI), dimension and rating in accordance with IPS-E-GN-100 shall be used, unless otherwise specified.

## 4. GENERAL REQUIREMENTS

### 4.1 General

Whether or not hoisting facilities with associated roofs are to be provided shall be decided in accordance with the requirements of [IPS-G-PM-120](#).

The overall lay-out of a rotating equipment installation shall be such as to allow safe access to all

operating positions and to overhead lifting equipment. There shall be no unguarded floor opening around machines (specially for compressors and turbines).

Sufficient space shall be provided at the machine floor level for dismantling the machine its driver and auxiliary equipment.

When two or more rotating equipment are located on the same floor, provision shall be made for a clear floor area which is adequate for the simultaneous overhaul of all equipments, their drivers and associated auxiliary equipment.

The lay-out of auxiliary equipment shall be such as to permit easy and safe access to all components for operation and maintenance by the provision of permanent steps and platforms, and adequate clear floor space.

#### **4.2 Quality Control**

At an early stage of the project, the Contractor and the Company shall agree on a proposal for quality control of rotating equipment covering all aspects of installation, inspection and pre-commissioning.

Quality control should be maintained by an independent function within the Contractor's organization or inspection department which reports to the Contractor's management.

Each individual item of equipment shall have its own check list covering all aspects of installation, inspection and pre-commissioning (see Appendix B).

Such a check list shall ultimately be signed by the rotating equipment inspection department of the Company or its representative and shall act as a document in the handover procedure.

A copy of this check list shall be added to the Equipment Record Card (including installation records, level and alignment data, run-in record, vibration data etc. see Appendix C)

#### **4.3 Construction Tools/Special Tools**

It is the Contractor's responsibility to ensure that the proper tools are available and are used for the proper installation of rotating machinery (i.e. correct-size spanners and keys, certified slings and chain hoists, torque wrenches, alignment dial gages and calibrated engineering spirit levels, V-belt tensioners, portable vibration meters, analyzers etc.). Adjustable spanners shall not be used on rotating equipment.

Any defect of parts of equipment through the use of improper tools during assembly is not acceptable. At handover, equipment shall be in "as-new" condition.

At an early stage during the construction a check should be made on the availability of special tools that shall be supplied by the equipment Manufacturer.

Such special tools as provided shall be used by the Contractor as and when required. The Contractor remains responsible for the handover of these tools to the Company in as-new condition. Throughout the project, preservation of special tools should therefore be maintained.

#### **4.4 Installation and Operating Manuals**

Manufacturer's installation and operating manuals shall be available at site at least one month prior to installation of the equipment. The instructions contained therein shall be adhered to, unless superseded by more stringent requirements of this IPS.

Shop test inspection records and as built drawings shall be collected and made available at site when the installation commences.

The Contractor shall be responsible for supplying as-built data sheets and completed Equipment Record Cards of all equipment supplied (see Appendix B).

At the time installation starts, completed Equipment Record Cards shall be available at site.

During installation and commissioning, the Contractor shall add any relevant information to the Equipment Record Cards until the equipment has been handed over.

Information to be indicated in data record cards shall be specified by Company and Contractor mutually according to manufacturer's recommendations.

#### **4.5 Spare Parts**

The Contractor or Company should ensure that commissioning spare parts are available during the construction and commissioning period. Operating spare parts for two years shall be ordered to arrive at site prior to handover of equipment to the Company.

Spare rotors (if applicable) shall be furnished with proper supports, well preserved (long-term) and supplied with clear storage instructions.

For spare rotors of major equipment e.g. compressors, turbines etc., separate equipment record cards shall be prepared.

#### **4.6 Storage of Equipment Prior to and After Installation**

At a (very) early stage of the project it should be certified that there will be an adequate quantity of rust preventatives at site by the time equipment is received.

If the equipment is received at site before it can be installed it shall be immediately stored in a dry location.

On receipt the equipment shall be checked against the shipping manifest and inspected for any damage.

Shop preservation shall be checked. Where necessary, damage to preservative media shall be rectified without delay.

Shop-applied protection is usually sufficient for the shipment period or 6 months only. The Contractor shall take all necessary actions to restore the preservation, when the protection period expires.

Shafts shall be turned 180° at least once per month prior to and once per week after installation, and a check list shall be used to ensure that this is done to all rotating equipment at site. Locking devices, required for equipment transport, shall be removed and kept for any future transport.

At all times the Manufacturer's recommendations on extended storage (indoor and outdoor) shall be adhered to.

Installation procedure should be so scheduled to minimize the time elapsed before commissioning.

### **5. FOUNDATIONS**

#### **5.1 General**

Allowance shall be made between the rough surface of the concrete and the underside of the base plate for grouting.

Whereas most pump units and small compressors are mounted on base plates, some equipment may be mounted directly on the foundations. In these cases, sole plates shall be provided which are



grouted on the foundation to facilitate easy removal and reinstallation of the equipment during maintenance.

Vertical close-coupled pumps shall be mounted on sole plates.

If fixed points and sliding supports have been provided for in the bed plate, they shall be sufficiently rigid and properly cast in and/or grouted to the foundation.

Misalignment and distortion of the baseplate shall be prevented during installation.

## 5.2 Foundation Bolts

To allow for slight differences in dimensions between the holes in the frame or bed plate and the bolts in the foundation, foundation bolts shall be installed according to IPS standard drawing. IPS-.D-CE-201

## 5.3 Leveling

When equipment is placed on its foundation, it shall be leveled within a tolerance of  $\pm 0.05$  mm/m (or less if required by the Manufacturer). The level shall be checked with a calibrated engineer's spirit level (1 div = 0.02 mm/m).

Special leveling instructions of the Manufacturer shall be followed. For equipment which is delivered already installed on its base plate where machined pads are not sufficiently accessible for proper use of a spirit level, the equipment shall be removed to facilitate leveling.

Leveling spindles, if provided by the equipment Manufacturer, shall be used for leveling base plates instead of vertical jack screws. Leveling spindles should be removed or loosened after grouting. Removal of leveling spindles after grouting is mandatory with reciprocating machinery or any other installation where impact, pounding action or appreciable vibrations are to be expected during normal operation.

For reciprocating equipment, sole plates and shims should be installed.

Jacking screws should be used whenever leveling spindles have not been provided by the equipment Manufacturer.

Jacking screws shall be of a type and size according to Appendix A, and removal after grouting is not necessary. For each machine sufficient jacking screws shall be used (as a minimum one jacking screw per anchor bolt shall be installed).

All mounting pads shall be fully machined flat and level to receive the equipment. Only stainless steel shims which straddle the holding-down bolts shall be used. The total number of shims shall be minimized by using shims of adequate thickness. No more than three shims in any shim pack shall be used.

## 5.4 Grouting

Grout material (non-shrink mortar, resin base mortar, epoxy resin, high-temperature application etc.) shall comply with the equipment Manufacturer's requirements.

It shall be ensured that the foundation under the base plate is free of dirt, dust, oil or grease. Approximately 15-20 mm of the top of the concrete foundation, shall be properly roughened/ chipped to remove the weak upper layer of concrete, damaged concrete and any oil-soaked areas. At least 25 mm between base plate and top of the foundation should be allowed for grouting.

When using leveling spindles or jack screws (as per 5.3 on leveling), the clearance shall be at least 50 mm.

For proper bonding, the bed plate shall be clean, free of rust, oil and/or grease. When using epoxy resin, the bed plate bottom side may have to be specially treated. Instructions of the resin supplier shall be followed.

Foundation bolt sleeves or pockets shall be filled prior to grouting the base plate.

Metal parts that should not bond to the grout (like jack screws of reciprocating machinery and parts of the foundation bolts) are to be sealed with tape or grease prior to grouting.

On reciprocating machinery it is recommended to seal foundation bolts over a length of 10 times the diameter, to prevent bonding with the grout when filling sleeves or pockets, in order to retain elasticity.

When using cement-based grout, the foundation top shall be saturated with fresh water for at least 24 hours prior to grouting. Free water on the foundation top when grouting is not allowed. Necessary steps shall be taken to prevent grouting from drying too quickly as per Supplier's instructions.

After curing of the grout, foundation bolts shall be tightened and the level of the equipment rechecked. Any change in level can be a cause of rejection of the grouting, at the discretion of the Company.

The space between bed plate beams and drip pan/top plate shall be completely filled with concrete. Voids under the top plate are not allowed.

After grouting, the base plates shall be checked for the presence of any voids. Epoxy pressure grouting techniques shall be used to fill any voids.

Grout openings and vent holes shall be sealed and/or covered where necessary, to prevent contamination of the grout by oil or other products. In chemical plants it may be necessary to protect the grout and foundation from chemicals (tiles).

## **6. PIPING ASSOCIATED WITH PROCESS MACHINERY**

The Contractor shall ensure that the piping associated with the process machineries is in accordance with Manufacturer's requirements and with [IPS-E-PM-385](#), "Machinery Piping" requirements.

After leveling and grouting, the equipment is normally available for the installation of piping (including piping related with instrument and electrical connections).

During this period the equipment shall remain preserved and protected.

To prevent ingress of dirt and foreign matter it shall be ensured that all routes and openings are properly blinded off and sealed and that temporary suction strainers are correctly installed as per [IPS-E-PM-385](#), "Machinery Piping". Dust blinds shall remain installed until final alignment.

During construction, piping should never be firmly connected to the equipment, unless pipe supports are installed.

Piping work shall never start from equipment nozzles. Piping, upstream and downstream of the machinery shall be erected from the nearest anchor away. No uncontrolled strain shall be imposed on the equipment.

Welding on pipelines connected to the equipment foundation, bed plates or the equipment, without proper direct earthing-back to the welding transformer, is not allowed.

Welding earth cables shall never be connected to any part (base plate, pedestal, drive etc.) of process machineries, in order to prevent damage to bearings by stray currents.

All work on piping systems shall be completed before the equipment can be offered for final alignment inspection. This includes pressure tests, cleaning or air blowing, insulation installed, and installation of permanent supports (fixed, sliding and spring supports). The lock pins of any spring supports immediately adjacent to rotating equipment shall be kept in place until systems are filled with product and pressurized.

Following limitation on flange connections between process machineries and associated piping shall be applied:

**a) Parallelism**

Before bolting up, flange faces shall be aligned parallel within 0.05 degrees in all directions, i.e:

Flange diameter ( mm )	Maximum deviation from parallel across flange diameter ( mm )
<300	0.2
300 to 600	0.3
>600	0.5

Flange bolt holes shall be aligned within 3 mm maximum offset.

**b) Clearance**

The gasket type, material and size shall be checked. The gaps between the flanges shall be just sufficient to slide in the gasket without damaging the gasket or the flange faces.

**c) Concentricity**

The flange bolt dimensions and material shall be checked. Galvanized bolts shall not be used in stainless steel flanges. Stud bolts shall extend beyond the nut, but not by more than the height of one nut. To check flange concentricity the flange bolts shall slide freely through the bolt holes of mating flanges without interference.

**7. SHAFT ALIGNMENT**

**7.1 General**

Prior to alignment checks of rotating equipment, over and above the checks highlighted in (7.2), the following points shall be considered:

- a)** Alignment shall allow for potential movements such as thermal growth, hydraulic loading, gears with rising pinions etc. Manufacturer's instructions shall be followed.
- b)** Check that coupling hubs are correctly installed before starting alignment checks.
- c)** Check and record the distance between shaft ends and/or distance between hubs (axial float, pre-stress etc.).
- d)** Confirm that the equipment has been shimmed correctly, e.g.:
  - 1)** No soft feet \* (max. dial movement 0.03 mm);
  - 2)** shims are of stainless material;
  - 3)** shims straddle foundation bolts are fully bearing loaded;
  - 4)** axial and transverse keys are properly located and secured;
  - 5)** level and alignment adjustment screws are loose.

**7.2 Requirements**

Final misalignment shall not exceed the Manufacturer's recommendations or the tolerances given in Table 1, whichever are the more stringent.

**TABLE 1 - ALIGNMENT TOLERANCES**

EQUIPMENT CONDITION	RADIAL (PARALLEL) MISALIGNMENT	AXIAL (ANGULAR) MISALIGNMENT
All speeds and coupling spacer lengths < 250 mm	0.05 mm T.I.R.**	0.05 mm (Based on a diameter of 150 mm)
All speeds and coupling spacer lengths > 250 mm	0.02 mm T.I.R.** per 100 mm of spacer length	0.05 mm (Based on a diameter of 150 mm)
Speed lower than 1500 rpm, low power (< 10 kW) with elastomeric flexible couplings	0.10 mm T.I.R.**	0.05 mm (Based on a diameter of 150 mm)

\* "Soft feet" are those which do not have solid flat contact with the mating support pads when the equipment is in place.

\*\* T.I.R. = Total Indicator Reading

Method of alignment shall be either the reverse periphery method which should be used whenever possible, whereby a graphical plot of the shaft position should be made, or alternatively as follows:

2 axial dial gages }  
 1 radial dial gages } both shafts turned simultaneously

Readings shall be demonstrated to be repeatable. Dial bracket sag shall be taken into account and shall not be more than 0.05 mm which should be checked e.g. on a lathe.

Alignment checks include:

- a) A preliminary check to ensure that alignment is possible with regard to shim limitations, bolt and bolt hole positions, etc.
- b) An alignment check without piping connected to the equipment.
- c) An alignment check with bearing bracket support loose.
- d) Final alignment check.

For this check the dial indicators should be on the equipment before and during the tightening of the piping and brackets, in order to highlight the cause of any distortion. The final reading shall be taken with all process piping and auxiliary piping connected with proper gaskets in place.

With the piping connected, the relative movement of shaft centre lines shall not exceed 0.025 mm. (= 0.05 mm T.I.R.).

Hot alignment checks shall be agreed with the Company on a case-to-case basis, taking into account Manufacturer's recommendations.

Final alignment data shall be recorded, filed and handed over together with the Equipment Record Card of the equipment.



### 7.3 Doweling

Doweling of equipment and its drive shall be executed when required by the Manufacturer.

Diagonal doweling is not allowed. Gearboxes shall be doweled under the high-speed pinion.

### 8. COUPLING (see IPS-M-PM-310)

The following is a list of requirements to ensure that couplings are properly installed.

The following shall be checked:

- a) Special instructions from the Manufacturer;
- b) for couplings installed in the field, their record and file data of installations, e.g., hydraulic pressure applied, axial travel, final position, etc.;
- c) the record distance between shaft ends and/or distance between hubs (axial float, pre-stress, etc.);
- d) the correct tightening torque of the coupling bolts as applied and recorded;
- e) the axial float of spacer (measured and recorded);
- f) the lub. oil spray nozzles. They shall be effective in both extreme positions of the coupling spacer and shall not rub the spacer or hub;
- g) the oil pressure and flow;
- h) the correct installation of the coupling guard.

For dry-type couplings check further that the diaphragms are not distorted.

**Note: Grease-filled couplings shall be filled with the proper grade and quantity of grease as soon as possible after installation at site.**

### 9. CLEANING OF EQUIPMENT AND ASSOCIATED SYSTEM

For cleaning of systems, equipment parts, bearing housing, etc., a suitable non-flammable cleaning agent shall be used. Paint thinner, gasoline and similar liquids shall not be used because of their adverse effects on internal painting, "O" rings, liquid gasket material, etc.

After cleaning, parts shall be preserved.

#### 9.1 Flashing Of Lub. Oil and Seal Oil Systems

Lub. Oil and seal oil systems shall be cleaned and flushed in accordance with the manufacturer's instructions.

Forced feed lubricating and seal oil systems shall be demonstrated to be clean by installing 120 mesh SWG 42 screens upstream of each bearing and seal, and circulating oil for at least 12 hours at the highest possible temperature and flow, but in any case not lower than 45° C. During this period pumps shall be repeatedly stopped and started.

Each filter shall be inspected after this procedure to verify system cleanliness. After completion of this flushing/cleaning operation, the oil system shall be drained, the fine mesh screens removed, the tanks/vessels cleaned and inspected and fresh charge oil supplied.

Cleaning of piping associated to or serving gas seals shall be carried out according to the

requirements of seal manufacturer. Piping already installed and cleaned prior to shipment to site should be sealed off.

Piping between filters and seals should not be disturbed without the consent of the equipment manufacturer, in order not to violate the warranty.

## 9.2 Chemical Cleaning

Oil and process piping associated with equipment may require chemical cleaning.

This requirement should be reviewed and defined for each installation in consultation with the Company. If more stringent, the manufacturer's recommendations shall be followed. A leak test shall be carried out before pre-commissioning of the equipment.

## 9.3 Filters

For the pre-commissioning and start-up period, fine mesh screens shall be temporarily installed in the equipment suction strainers as indicated below:

### a) Pumps

During the pre-commissioning period, a 40 mesh, SWG32 wire cloth with an open area of approximately 32% shall be fixed on the upstream side of the perforated plate. This applies for both Y-type and conical strainers.

### b) Reciprocating compressors

On top of the perforated plate a primary screen of stainless steel wire cloth (22 mesh SWG 33) with an open area of approximately 61% shall be attached. On top of the wire cloth a secondary screen of stainless steel woven cloth (200 mesh SWG 47) with an open area of approximately 34% shall be attached.

After 1 hour of successful operation, the 200 mesh screen shall be replaced by a stainless steel wire cloth (100 mesh SWG 39) with an open area of approximately 23%. Operation shall continue for a further 5 hours, after which the cloth shall be checked and cleaned.

Eventually this secondary screen shall be removed if increase in pressure differential is observed and no foreign matter such as welding rod, nuts and scale is found to be present.

### c) Centrifugal compressors

On top of the perforated plate a stainless steel woven wire cloth (22 mesh SWQ 3S with an open area of approximately 61% shall be attached. This screen shall be removed when no increase in pressure differential is observed over a continuous operating period of 224 hours and no foreign matter is found present. This pressure differential shall be measured using differential pressure gauge.

Temporary strainers for line sizes greater than DN-600 shall follow the same requirements but may be of alternative design in view of the required strength.

Location of these filters shall be chosen with the agreement of the Company; in such a way, the filter handling does not disturb the equipment alignment.

**10. FINAL INSPECTION AND CHECKS BEFORE START-UP**

For process machineries, the Contractor and operating Company shall mutually agree a handover procedure.

Both the Contractor and the Company shall ensure that these inspection items and checks are carried out, the Contractor being the responsible action party.

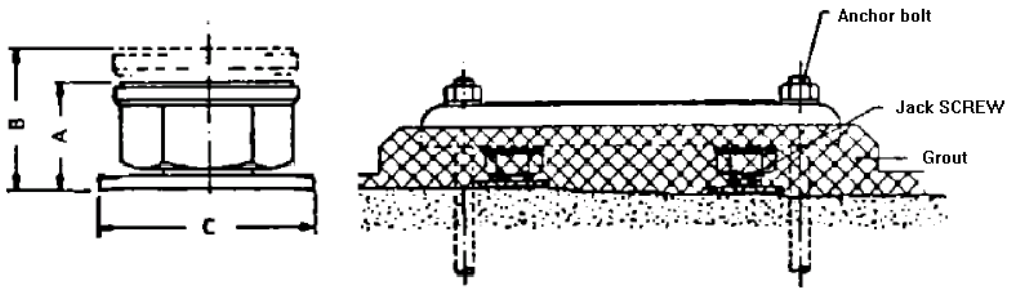
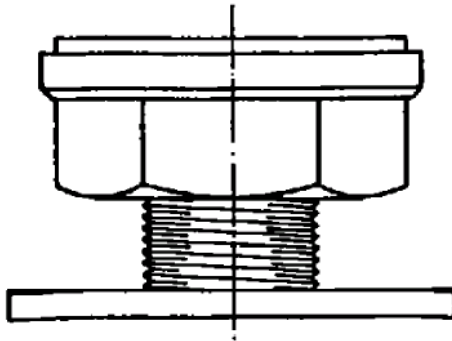
**11. FIRST START, RUN-IN, INITIAL OPERATION**

Within contractual stages, the Company shall specify, the responsible party for equipment installation, commissioning, and performance testing (including hot alignment, over speed tests and operational records) up to the agreed hand-over of the equipment.

**APPENDICES**

**APPENDIX A**

**DIMENSIONS AND TYPICAL ARRANGEMENT OF JACKING BOLTS**



**Dimensions:**

A = 45 mm

B = 67 mm

C = 80 × 80 mm

Approx. weight: 1.05 kg



**APPENDIX B****CHECK LISTS**

The following are some examples of check lists which are selected from API 686 : 1996 and included in this appendix as a guide.

**B1 - MACHINERY RECEIVING AND INSPECTION CHECKLIST**

**B2 - MACHINERY RECEIVING AND PROTECTION CHECKLIST**

**B3 - ALIGNMENT CHECKLIST**

**B4 - MACHINERY PIPING INSTALLATION CHECKLIST**

**B5 - LUBE OIL SYSTEMS INSTALLATION DESIGN CHECKLIST**

**B6 – LUBE OIL SYSTEMS INSTALLATION CHECKLIST**

**B7 -MACHINERY COMMISIONING CHECKLIST**





**B2-MACHINERY RECEIVING AND PROTECTION CHECKLIST**

<b>Project No:</b>	<b>Equip. Tag No.:</b>	<b>Report No.:</b>
<b>Prepared By:</b>	<b>Storage Location:</b>	<b>Date:</b>
<b>Equipment Description:</b>		

**Jobsite Receiving and Inspection**

Visual inspection for physical damage or contamination

Comments (before unloading): \_\_\_\_\_

\_\_\_\_\_

Comments (after unloading): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Initials Date**

- Shipping protection intact? \_\_\_\_\_
- Have offsite (shop) inspections been made? \_\_\_\_\_
- Loose components/packages match packing lists? \_\_\_\_\_
- Are special handling instructions required (and carried out)? \_\_\_\_\_
- Components properly identified? \_\_\_\_\_
- Do components comply with project requirements? \_\_\_\_\_
- Flange faces undamaged and properly coated? \_\_\_\_\_
- Plugs/caps in place , desiccants unsaturated, and equipment lubricated? \_\_\_\_\_
- For inert gas purged equipment, is the required pressure still applied? \_\_\_\_\_
- Grout surfaces clean and coated? \_\_\_\_\_
- Tapped openings in stuffing boxes and gland plates sealed? \_\_\_\_\_
- Impact measuring devices inspected? \_\_\_\_\_
- Damage reports completed and issued to shipper/vendor? \_\_\_\_\_

**General Instructions— Jobsite Protection**

Are manufacturer's recommendations for storage and protection available?

Note: If so, the manufacturer's recommendations take precedence, but continue to follow this checklist for items not covered by the manufacturer.

Equipment/material free of ground contact? Laydown area graveled as a minimum ! \_\_\_\_\_

For outdoor storage, is equipment on timber? \_\_\_\_\_

Protective coverings allow free air circulation and prevent collection of water? \_\_\_\_\_

Note: Reuse delivery packaging, if possible. \_\_\_\_\_

**B2-MACHINERY RECEIVING AND PROTECTION CHECKLIST(CONTINUED)**  
**EQUIPMENT NO.:**

	<b>Initials</b>	<b>Date</b>
Carbon and low alloy steel protected from corrosive or wet atmospheres?	_____	_____
Special parts and tools tagged and handed over to User?	_____	_____
Equipment protected from construction operations such as chipping, sanding, painting, rigging, welding, and so forth.	_____	_____
For periodic rotation of equipment, are shipping blocks, desiccant bags, and protective plastic clear of moving parts? Is equipment properly lubricated for rotation?	_____	_____
Have proper preservatives been selected?	_____	_____
Nitrogen purge in place for special purpose equipment or where specified? Use inert gas purge maintenance log in B1 for logging of purge inspections.	_____	_____
All cavities, cooling passages, and so forth, drained of water to prevent freezing?	_____	_____
Dirt, ice, and salt removed?	_____	_____
Unless stated differently in subsequent sections on specific equipment, the following applies:	_____	_____
Oil lubed bearing housings, seal housings, stuffing boxes, hydraulic equipment, and Gear cases fogged and ¼ filled with approved oil?	_____	_____
When specified, measure and record TAN number.	_____	_____
Exposed carbon steel coated with type A, B, or D preservative? Machined surfaces coated with type A, B, or D and wrapped with waxed cloth?	_____	_____
Grease lubed bearings greased by the manufacturer?	_____	_____
Oil mist system required?		
 <b>Lubricants and Preservatives</b>		
Are selected preservatives compatible with elastomeric parts, seals, gaskets, and so forth?	_____	_____
MSDSs on file and hazards reviewed?	_____	_____
 <b>Bolts</b>		
Loose bolts, nuts, and fasteners identified and stored in sheltered area?	_____	_____
Preservative applied to nongalvanized or plated items?	_____	_____
 <b>Spare parts</b>		
Spare parts inventoried and issued to User upon receipt?	_____	_____
 <b>Auxiliary Piping For Rotating Equipment</b>		
Pipe components coated internally and externally for long- term storage?	_____	_____
Flanges inspected and coated?	_____	_____
Valves inspected and coated? Ball valves in open position? Gate and globe valves in closed position and stored horizontal?	_____	_____



**B2-MACHINERY RECEIVING AND PROTECTION CHECKLIST(CONTINUED)**  
**EQUIPMENT NO.:**

	Initials	Date
<b>compressors—General</b>		
Watertight covers on all openings?	_____	_____
Are intermediate rotor shaft supports required?		
Is vertical storage of rotating elements required by the manufacturer?	_____	_____
Preservatives and procedures for refrigeration, oxygen, and chlorine service approved by manufacturer?	_____	_____
<b>Reciprocating Compressors</b>		
Exposed rods, eccentrics, plungers, and machined surfaces coated?	_____	_____
Nonlubed compressors nitrogen purged, not contaminated with preservatives?	_____	_____
Covers on openings in cylinders and crankcase undamaged? If damaged, check for water or dirt inside.	_____	_____
For field assembled compressors, have loose components been properly cleaned and preserved? Have carbon rings and rod packing been left out until just prior to initial operation?	_____	_____
Lubrication through force feed lubricators or drip feed lubricators, and /or through manually priming main oil pump once per week?		
<b>Centrifugal Compressors</b>		
Is bearing housing properly lubricated and preserved?	_____	_____
Have the lubricant fill points, site glass, and piping been checked for leaks?	_____	_____
Has a nitrogen purge, or vapor phase inhibitors and desiccant been applied per paragraph 1.12.6 of API RP 686.1996?	_____	_____
<b>Fans and Blowers</b>		
Have all exposed low alloy surfaces and shafts been coated with preservative?	_____	_____
Bearing housing oil level correct?	_____	_____
Weatherproof covers installed?	_____	_____
<b>Gearboxes</b>		
Is gear box full of manufacturer's recommended oil?	_____	_____
Have machined surfaces and shafts been coated?	_____	_____
Has a nitrogen purge been applied, when specified?	_____	_____
<b>Pumps — General</b>		
Coupling parts, except elastomers, coated?	_____	_____
Have flange surfaces been inspected and coated?	_____	_____
Have loose components been tagged?		

**B2-MACHINERY RECEIVING AND PROTECTION CHECKLIST (CONTINUED)**  
**EQUIPMENT NO.:** \_\_\_\_\_

	Initials	Date
<b>Centrifugal Pumps</b>		
Have all openings covered?	_____	_____
Have bearing brackets been filled with oil?	_____	_____
Have low alloy pump casings been coated?	_____	_____
Barrier fluid piping filled?	_____	_____
<b>Vertical Suspended Pumps</b>		
Has preservative been applied to shaft journals at sleeve bearing and thrust disc?	_____	_____
Bearing brackets completely filled?	_____	_____
Bowl assembly, barrel flange, discharge head flanges, stuffing box, and machined surfaces coated?	_____	_____
Weatherproof covers installed on all openings?	_____	_____
<b>Reciprocating Pumps</b>		
When recommended by manufacturer, have pistons and rods been removed, coated, tagged, and stored in covered area?	_____	_____
Has rod packing been removed and tagged, when required?	_____	_____
Have suction and discharge valves been removed, coated, and tagged?	_____	_____
Has crankcase been filled with preservative?	_____	_____
Have cylinder and distance piece walls been coated?	_____	_____
Exposed shafts coated?	_____	_____
<b>Steam Turbines</b>		
Have stuffing box, shaft in packing area, and flange gasket surfaces been coated?	_____	_____
Are weatherproof covers on all openings?	_____	_____
Have internals been inspected for cleanliness?	_____	_____
Have loosely shipped components been tagged?	_____	_____
<b>General purpose Turbines</b>		
Have carbon rings been removed, tagged, and stored indoors?	_____	_____
Have shaft journals been lubricated?	_____	_____
Have bearing housings been filled?	_____	_____
Have exposed shafts been coated?	_____	_____
Has governor been filled with manufacturer's approved fluid?	_____	_____
<b>Special Purpose Turbines</b>		
Have valve racks, cam, and cam followers been inspected and coated?	_____	_____
Have bearing housings, shaft journals, and thrust bearing discs been coated?	_____	_____

**B2-MACHINERY RECEIVING AND PROTECTION CHECKLIST (CONTINUED)**  
**EQUIPMENT NO.:** \_\_\_\_\_

**Initials. Date**

Have exposed shafts been coated? \_\_\_\_\_  
Has the nitrogen purge been applied? \_\_\_\_\_

**Motors**

Have motors been inspected and tagged? \_\_\_\_\_  
Has an insulation test been made and logged? Have oil levels been checked? \_\_\_\_\_  
Has shaft been coated? \_\_\_\_\_  
Have seal areas been covered with waxed cloth? \_\_\_\_\_  
Have motor baseplate or feet been coated? \_\_\_\_\_  
Have nonweatherproof motors been stored indoors? \_\_\_\_\_  
Have space heaters been energized? Have warning signs been posted? \_\_\_\_\_

**Instrumentation**

Do instruments comply with specifications, and are they properly tagged? \_\_\_\_\_  
Are loose instruments stored in a dry enclosed area, in original factory packaging? \_\_\_\_\_  
Can premounted instruments be stored outdoors? \_\_\_\_\_  
Are electronic instruments stored in a dry heated room? \_\_\_\_\_  
Are pneumatic instruments stored in a dry area? \_\_\_\_\_  
Are instrument cases and local control panels stored in a dry heated room? \_\_\_\_\_  
Are thermometers, pressure gauges, and gauge glasses protected from physical damage? \_\_\_\_\_

**B3- ALIGNMENT CHECKLIST**

	Initials	Date
<b>Prealignment</b>		
Prealignment meeting held.	_____	_____
Foundation cured and mounting plate installed.	_____	_____
Equipment installed and fixed machine centered on holes.	_____	_____
Coupling hubs rum-out rim and face readings are $\leq 0.05$ millimeter ( $\leq 0.002$ inches) or the manufacturer's requirement, whichever is less.	_____	_____
Initial alignment made and approved by user's representative.	_____	_____
Grout installed.	_____	_____
Fixtures and tools on hand.	_____	_____
Torque requirements for the hold-down bolts	_____	_____
Equipment available to lift the movable machine and move it in the horizontal and axial directions.	_____	_____
The washers are thick enough at the hold-down bolts, and if not, obtain sufficiently thick washers.	_____	_____
All piping is disconnected.	_____	_____
Fixed and movable machine shafts free to turn.	_____	_____
Pump seal locking devices disengaged.	_____	_____
Packing of blocking material removed.	_____	_____
Lubrication provided for bearings.	_____	_____
Drawings and data sheets available.	_____	_____
<b>Final Alignment</b>		
<b>Alignment Tolerances</b>		
All piping is disconnected.	_____	_____
Fixed and movable machine shafts free to turn.	_____	_____
Movable and fixed machine rotors DBSE or coupling spacer gap length=		
when set to running position.	_____	_____
Coupling spacer free length =	_____	_____
DBSE or coupling spacer gap length corrected for thermal growth required=_____ and is within $\pm 0.25$ millimeters ( $\pm 0.010$ inches) of required DBSE or actual coupling spacer free length for and flex couplings. For gear and elastomeric coupling the requirement is $\pm 0.75$ millimeters ( $\pm 0.030$ inches).	_____	_____
Maximum five shims under any support.	_____	_____
Shims 300 series stainless steel or better material, not laminated and flat to 1/1000.		
At least 3 millimeters (0.125 inch) but not more than 12 millimeters (0.5 inch) under movable machine foot. No more than one $\geq 3$ millimeters ( $\geq 0.125$ inch) thick shim under any foot.	_____	_____
Shims are full bearing.	_____	_____
Bolts are not undercut.	_____	_____
Washers are not lock washers and do not yield when hold-down bolts are tightened.	_____	_____
Hold-down bolts are not bolt bound and reasonably centered in bolt holes.	_____	_____
Hold-down bolts tight to manufacturer's/user's instructions.	_____	_____
Soft-foot is not more than 0.05 millimeters (0.002 inches).	_____	_____
Sag of alignment fixture recorded=___ and $\leq 0.8$ millimeters per meter ( $\leq 0.8$ mils per inch).	_____	_____
Alignment within tolerance ( paragraph 1.4.6 of chapter 1of API 686:1996)before pipes and conduit attached.	_____	_____
Pipe strain checks made in accordance with procedure in Chapter 6 API 686:1996—piping;		
Section 4 Paragraph 1.8.1 through 1.8.5.	_____	_____
Alignment within tolerance(paragraph 1.4.6 of API 686 :1996)	_____	_____



**B4-MACHINERY PIPING INSTALLATION CHECKLIST**

	<b>Initials</b>	<b>Date</b>
<b>General Requirements</b>		
Grouting, preliminary shaft alignment, and field welding completed?	_____	_____
Piping hangers and supports installed per design to avoid applying strain on the machinery?	_____	_____
Layout and installation of piping and conduit jointly coordinated?	_____	_____
Electrical power and instrumentation connections to machinery made with conduit sufficiently flexible?		
Suction and discharge piping for vertical in-line pumps have adjustable supports located within 1 meter (3 feet )of the pump's suction and discharge flanges?	_____	_____
Pump in solid contact with the foundation mounting plate?	_____	_____
Adjustable supports locked in position?	_____	_____
Temporary blinds installed at the machinery flanges to prevent dirt and debris from entering the machinery?	_____	_____
All threaded openings plugged with a threaded pipe plug to prevent contamination?	_____	_____
No plastic pipe plugs used to plug openings?	_____	_____
Any solid preservatives such as desiccant bags removed prior to connection of piping?	_____	_____
<b>Field Installation of Auxiliaries</b>		
All auxiliary equipment, piping, conduit, instruments, coolers, seal pots, consoles, and so forth, mounted separately from the machine and driver?	_____	_____
These items do not interfere with removal of the machine or driver nor with access to the machinery for normal operation and maintenance?	_____	_____
Auxiliary support piping, conduit, instrumentation, and so forth, located for a single drop area on the machinery baseplate or soleplate?	_____	_____
Openings for branch connections of NPS 1 or smaller made by drilling the run pipe?	_____	_____
All threaded connections have 2 to 5 exposed pipe threads after making up the joint?	_____	_____
<b>Hydrotest Restrictions</b>		
Machinery isolated for hydrotesting of piping?	_____	_____
Preliminary piping alignment and fit-up completed?	_____	_____
<b>Stray Electrical Currents</b>		
A double ground cable located on each side of the weld within a distance of less than 30 centimeter (12 inches)installed?	_____	_____
The welding clamps clamped onto the pipe and welding machine grounded?	_____	_____
Ground leads not attached to any part of the machinery, auxiliary systems, or supports?	_____	_____

**B4-MACHINERY PIPING INSTALLATION CHECKLIST(CONTINUED)**

	Initials	Date
Machinery isolated from the pipe flange by using a full-circle 3 –millimeter(1/8-inch) thick composition gasket with insulated bolts or studs?	_____	_____
Continuity check performed to prove the electrical isolation of the machine from the piping?	_____	_____
Magnetic flux density measured and recorded before and after welding?	_____	_____
<b>Design Verification</b>		
Pipe hydrotesting and drying out of the system finished and all hydrotest blinds removed?	_____	_____
All permanent supports and hangers installed and adjusted?	_____	_____
All temporary supports and hangers removed?	_____	_____
All the system piping components and machinery at the same ambient temperature withn a range of 10°C(18°F)before starting final piping alignment checks?	_____	_____
The piping engineering design inspector verifies that the machine inlet and outlet piping is properly constructed in accordance with the piping and instrumentation drawings?	_____	_____
The piping engineering design inspector verifies that spring hangers are installed with the preset spring hanger stops in position such that the springs are locked at the cold load setting before proceeding with piping alignment checks?	_____	_____
The piping engineering design inspector verifies that there are no visible gaps between the piping and fixed piping supports?	_____	_____
The machine inspected to verify that it is still removable?	_____	_____
<b>Piping Alignment Requirements</b>		
Flanges of connecting piping not sprung into position?	_____	_____
Pipe flange bolt holes lined up with machinery nozzle bolt holes within 1.5 millimeters (1/16 inch)maximum offset from bolt hole center?	_____	_____
The machine and piping flange faces parallel to less than 10 micrometers per centimeters (0.001 inch per inch) of pipe flange outer diameter up to a maximum of 750 micrometers ( 0.030 inches)?	_____	_____
If piping flange outer diameters are smaller than 25 centimeters (10 inches), are the flanges parallel to 250 micrometers (0.010 inch ) or less?	_____	_____
Piping Alignment Data Sheet completed?	_____	_____
Flange face separation within the gasket spacing plus or minus 1.5 millimeters (1/16 inch)?	_____	_____
<b>Piping Alignment</b>		
All temporary supports for piping alignment (such as chain falls and wedges) removed during final alignment readings and piping bolt-up?	_____	_____
Piping supported by permanent fixed and spring supports and hangers?	_____	_____
Piping not binding on pipe guides or restraints?	_____	_____
No spring hangers of supports “topped-out” or“ bottomed-out ” when stops removed?	_____	_____
Stops reinstalled as preparation for final pipe strain check?	_____	_____

**B4-MACHINERY PIPING INSTALLATION CHECKLIST(CONTINUED)**

**Initials Date**

Heating procedure approved in advanced by welding engineer of materials specialist? \_\_\_\_\_  
 Piping disconnected from machinery prior to heating as method of correcting pipe strain? \_\_\_\_\_

**Pipe Strain Measurement**

Indicators mounted on the coupling hub to measure vertical and horizontal movement on the opposite machine as the pipe flange bolts are being tightened using a torque wrench? \_\_\_\_\_  
 Initial tightening of the flange bolts snug (10 percent of total torque)? \_\_\_\_\_  
 Flange bolts then tightened to 30 percent total torque? \_\_\_\_\_  
 Flange bolts then tightened to 100 percent of total final torque? \_\_\_\_\_  
 Total Torque:\_\_\_\_\_ \_\_\_\_\_  
 Lubricated Threads:— Nonlubricated Threads:— \_\_\_\_\_  
 The maximum shaft movement in either the vertical or horizontal directions after the flange is tightened 50 micrometers( 0.002 inch) or less? \_\_\_\_\_  
 Machine shaft total horizontal movement: \_\_\_\_\_  
 Machine shaft total vertical movement: \_\_\_\_\_  
 Final piping alignment measurements recorded on the Piping Alignment Data Sheet? \_\_\_\_\_

**Spring Hanger and Spring Support Function Check**

Spring hanger and spring support function verified as acceptable?(No spring hangers or spring supports topped or bottomed out and machinery shaft alignment within the specified tolerances.) \_\_\_\_\_  
 All spring hanger turnbuckle locknuts verified as tight? \_\_\_\_\_  
 All spring hanger and support load indicators at cold load settings? \_\_\_\_\_

**Oil Mist Piping Installation**

All oil mist piping joints exposed to view? \_\_\_\_\_  
 Reducing swage nipples and reducing couplings used in place of reducing bushings? \_\_\_\_\_  
 No welded joints in the oil mist piping system? \_\_\_\_\_  
 Cut pipe or tubing deburred or reamed so that there is so reduction of the inside diameter or any burrs at the pipe cut? \_\_\_\_\_  
 All piping joints threaded? \_\_\_\_\_  
 Threaded connections only made with a light lubricating oil? \_\_\_\_\_  
 PTFE (Teflon®)tape not used? \_\_\_\_\_  
 Each piece of pipe and all fittings swabbed with clean, lint – free, unused cloth or wiper prior to joining and threading connections? \_\_\_\_\_  
 Oil mist branch header to main header connections as well as drop point lateral to header connections made at the top of the header pipe? \_\_\_\_\_  
 The oil mist application fittings ( reclassifiers) connected to the machinery bearing housings with the tubing arranged to allow normal operation and maintenance access without moving the application fitting (reclassifier) or the tubing? \_\_\_\_\_

**B4-MACHINERY PIPING INSTALLATION CHECKLIST(CONTINUED)**

	<b>Initials</b>	<b>Date</b>
Oil mist tubing installed such that no oil will be trapped?	_____	_____
Tubing benders used for bending such that the tubing will have no kinks, wrinkles, or flattened spots?	_____	_____
Machinery that has previously been grease-lubricated has the grease fitting and vent passages cleaned before connection to the oil mist system is made?	_____	_____
Machinery bearing housings lubricated using purge mist has permanent vent connection?	_____	_____
Constant level oiler modified so that a rising oil level can overflow from the oiler for machinery lubricated using purge mist and a constant level oiler?	_____	_____
Oil sight glass installed in the bearing housing drain connection for machinery lubricated using pure mist?	_____	_____
 <b>Miscellaneous Requirements</b>		
Final shaft alignment verified after final piping bolt-up?	_____	_____
Machinery hand rotated to ensure that neither binding nor case distortion has occurred?	_____	_____
Spring hanger turnbuckle locknuts tight?	_____	_____
This piping installation checklist forwarded as specified?	_____	_____

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**B5 –LUBE OIL SYSTEMS INSTALLATION DESIGN CHECKLIST**

	<b>Initials</b>	<b>Date</b>
<b>Installation Design Requirements</b>		
Easy access to fills and drains.	_____	_____
Design provides easy access for maintenance and operation.	_____	_____
Adequate size and placement of vents/drains for cleaning.	_____	_____
Size and orientation of fills/drains minimize spilling.	_____	_____
High point vents present where needed.	_____	_____
Drains with pipe plugs or block valves with blinds.	_____	_____
Lube oil flushing diagram adequate.	_____	_____
Cleaning specifications and flush diagram approved by user.	_____	_____
Lube oil specifications agreed between user/vendor.	_____	_____
Equipment and oil systems flushed and clean before shipment by manufacturer.	_____	_____
Oil mist protection reviewed by manufacturer and user ( if applicable.)	_____	_____



**B6-LUBE OIL SYSTEMS INSTALLATION CHECKLIST**

	<b>Initials</b>	<b>Date</b>
<b>Receiving and Protection</b>		
Inspection, preservation, rotation procedure established	_____	_____
Long – term preservation program agreed upon by user and vendor.	_____	_____
Vendor/user agreed on instructions for installation, oil mist preservation system (if applicable), cleaning and flushing were followed.	_____	_____
<b>Temporary oil Mist Systems</b>		
Oil mist lubrication connections (if applicable) were used for preservation mist.	_____	_____
Oil mist supply and drain connections (if applicable) sufficient and placed at all required locations.	_____	_____
Oil mist system adequate for preservation service.	_____	_____
Oil mist system provided with necessary instrumentation header and branches, and so forth.	_____	_____
Equipment protected against damage and internal/external corrosion as prescribed and agreed upon by vendor and user.	_____	_____
Preservatives/sealants compatibility reviewed with process and materials of construction.	_____	_____
Type and origin of oil recorded.	_____	_____
Equipment preservation maintenance performed as required.	_____	_____
<b>Cleaning</b>		
Agreement on physical location of bypasses and screens.	_____	_____
All interconnect piping internally without rust, debris, scale, deposits, weld splatter, and dry.	_____	_____
Orifices, valves, and similar obstructions removed for cleaning –flushing.	_____	_____
<b>Chemical cleaning</b>		
Verified that piping system is carbon steel.	_____	_____
Warning tags installed on isolated equipment .	_____	_____
Verified adequacy of system cleanliness after chemical cleaning.	_____	_____
Nitrogen purge applied.	_____	_____
<b>Flushing of Oil Systems</b>		
Verified that system is completely drained and dry before final oil fill.	_____	_____
Clean filters installed for oil flushing	_____	_____
Bypasses installed as agreed between vendor and user.	_____	_____
100-mesh screens installed before bearing areas.	_____	_____
Oil circulation checked for optimum cleaning effect.	_____	_____
Oil samples free of water and particles.	_____	_____



**SECTION 7—MACHINERY COMMISSIONING CHECKLIST (CONTINUED)**

	Initials	Date
Was machinery flushed through? _____(yes/no)	_____	_____
Record purge medium and temperature. _____ ° C ( ° F)	_____	_____
<b>Driver Prerotation Checks</b>		
Oil mist system start date/time _____		
Adapter plate for solo run required? _____(yes/ no)	_____	_____
Solo run will not contact adjacent areas.	_____	_____
Adapter plate bolt torque values _____kg-cm (lb-in.)	_____	_____
Coupling area roped off and safe.	_____	_____
Shaft visible.	_____	_____
Required direction of rotation looking at driver shaft coupling face from driven equipment.	_____	_____
Circle one: CW CCW.		
All lockout and tag out procedures have been followed.		
<b>Motor Solo Run</b>		
Follow section 1.18 of API 686: 1996 if driver is motor.	_____	_____
Motor power bump rotation is correct then run. If not, switch leads and run motor.	_____	_____
Motor bearing temperature: IB _____	_____	_____
Motor bearing temperature: OB _____		
Temperatures taken _____ minutes after start- up.		
Temperatures after 30 minute run: IB _____OB _____		
Vibration signature taken _____ minutes after start- up.		
Motor amps _____	_____	_____
Motor winding temperatures A _____ ° C(° F) B _____ ° C(° F) C _____ ° C(° F)	_____	_____
	_____	_____
<b>Turbine Solo Run</b>		
Follow section 1.19 of API 686:1996 for turbine drivers.	_____	_____
Lockout- tag out procedures complete.	_____	_____
Verify piping system complete and cleaned.	_____	_____
Vendor instructions understood.	_____	_____
Inlet strainers installed.	_____	_____
Exhaust line open.	_____	_____
Carbon rings installed, and leak- off piping open.	_____	_____
Cooling water on.	_____	_____
Gauges installed.	_____	_____
Speed indicator working properly.	_____	_____

**APPENDIX C**  
**EQUIPMENT RECORD CARDS**

[AXIAL PUMP](#)

[CENTRIFUGAL COMPRESSOR-BLOWER](#)

[CENTIFUGAL PUMP](#)

[FAN](#)

[GAS TURBINE](#)

[STEAM TURBINE](#)

[GEAR BOX](#)

[INTERNAL COMBUSTION ENGINE](#)

[RECIPRCATING COMPRESSOR](#)

[RECIPROCATING PUMP](#)

[RECIPROCATING VACUUM PUMP](#)

[ROTARY DISPLACEMENT PUMP](#)

[ROTARY VACUUM PUMP](#)

[STEAM ENGINE](#)

## 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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