

# Packaged, Integrally Geared Centrifugal Air Compressors

## Specification

This Standard replaces and cancels its previous revision.

The CONTEC - Authoring Subcommittee provides guidance on the interpretation of this Standard when questions arise regarding its contents. The Department of PETROBRAS that uses this Standard is responsible for adopting and applying the sections, subsections and enumerates thereof.

**Technical Requirement:** A provision established as the most adequate and which shall be used strictly in accordance with this Standard. If a decision is taken not to follow the requirement ("non-conformity" to this Standard) it shall be based on well-founded economic and management reasons, and be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by imperative nature.

**Recommended Practice:** A provision that may be adopted under the conditions of this Standard, but which admits (and draws attention to) the possibility of there being a more adequate alternative (not written in this Standard) to the particular application. The alternative adopted shall be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by verbs of a nonmandatory nature. It is indicated by the expression: **[Recommended Practice]**.

Copies of the registered "non-conformities" to this Standard that may contribute to the improvement thereof shall be submitted to the CONTEC - Authoring Subcommittee.

Proposed revisions to this Standard shall be submitted to the CONTEC - Authoring Subcommittee, indicating the alphanumeric identification and revision of the Standard, the section, subsection and enumerate to be revised, the proposed text, and technical/economic justification for revision. The proposals are evaluated during the work for alteration of this Standard.

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## Introduction

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## Foreword

This Standard is the English version (issued in 05/2013) of PETROBRAS N-2649 REV. B 05/2013. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used. This Standard is based on API [STD 672](#), 4<sup>th</sup> edition, march 2004.

## 1 Scope

1.1 This Standard establishes the minimum conditions required for Packaged, Integrally Geared Centrifugal Air Compressors, and their auxiliary equipment or systems, to be supplied in accordance with API [STD 672:2004](#).

1.2 Except for new clauses, item numbers referred in parentheses in this Standard are the same API [STD 672:2004](#) paragraph ones.

1.3 Packaged, Integrally Geared Centrifugal Air Compressors and Auxiliary Equipment shall be in accordance with API [STD 672:2004](#), plus the following changes, as noted in parenthesis for each clause, according to the definitions stated below. The information of each clause shall be read as follows, whenever starting with:

- **Addition:** continuation of that particular API [STD 672:2004](#) paragraph;
- **Modification:** replacement of part of that affected API [STD 672:2004](#) paragraph;
- **Substitution:** replacement of that API [STD 672:2004](#) paragraph in its entirety;
- **New:** insertion of a requirement not found in API [STD 672:2004](#);
- **Deletion:** removal of that particular API [STD 672:2004](#) paragraph;
- **Comment:** clarification or interpretation on that API [STD 672:2004](#) paragraph.

1.4 This Standard applies to design starting from its issue date.

1.5 This Standard only contains Technical Requirements.

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies.

ISO [10438-3:2007](#) - Petroleum, Petrochemical and Natural Gas Industries - Lubrication, Shaft-sealing and Control-oil Systems and Auxiliaries - Part 3: General-purpose e Oil Systems;

IEC [60079](#) - Explosive Atmospheres;

API [RP 686](#) - Recommended Practice for Machinery Installation and Installation Design;

API [STD 614:2008](#) - Lubrication, Shaft-sealing and Oil-control Systems and Auxiliaries;

API [STD 670](#) - Machinery Protection Systems;

API [STD 672:2004](#) - Packaged, Integrally Geared Centrifugal Air Compressors for Petroleum, Chemical, and Gas Industry Services;

ASTM [A193/A193M](#) - Standard Specification for Alloy-steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications;

ASTM [A194/A194M](#) - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both;

MSS [SP-55](#) - Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components Visual Method for Evaluation of Surface Irregularities;

NOTE For documents referred in this Standard and for which only the Portuguese version is available, the PETROBRAS department that uses this Standard should be consulted for any information required for the specific application.

### **3 Scope (Section 1 of API [STD 672:2004](#))**

#### **3.1 Addition (1.2 of API [STD 672:2004](#))**

All equipment supplied to PETROBRAS shall be Special Duty packages.

#### **3.2 Substitution (1.4 of API [STD 672:2004](#))**

In case of conflict between the inquiry documents, the following priority shall govern:

- a) data sheets;
- b) supplementary job or technical specifications (if any);
- c) this Standard and all other PETROBRAS standards specifically referenced in the inquiry;
- d) API [STD 672:2004](#).

Concerning any conflict after placement of order, the following priority shall govern:

- a) formal correspondence regarding any changes in the scope of supply or technical specifications, mutually agreed upon by PETROBRAS and vendor;
- b) approved documentation;
- c) revised data sheets and other material requisition documents (applicable to purchase);
- d) this PETROBRAS Standard and all other PETROBRAS standards specifically referenced in the inquiry or order;
- e) API [STD 672:2004](#);
- f) vendor's proposal.

### **4 Requirements (Section 5 of API [STD 672:2004](#))**

#### **4.1 Deletion (5.4 of API [STD 672:2004](#))**

Removed from API [STD 672:2004](#).

#### **4.2 New (5.5)**

New models or prototypes are not acceptable. A minimum of 25 000 hours continuous operation under similar operating conditions shall be demonstrated for 20 machines of the same model and 10 machines of the same size as the one offered.

The following parameters shall be considered to indicate similar operating conditions and shall be plotted in an experience plot.

**Table 1 - Parameters of Comparison**

Type of equipment/component	Most common set of parameters
Shaft seals	Peripheral speed
Bearings	Specific load and peripheral speed
Impellers	Tip speed
Couplings	RPM and power
Gears	RPM and power
Compressors	Power, RPM, head & pressures, capacity and critical speed ratio

**4.3 New (5.6)**

All supplied equipment shall be new. Refurbished equipment or parts are not acceptable.

**5 Basic Design (Section 6 of API STD 672:2004)****5.1 Substitution (6.1.2 of API STD 672:2004)**

The compressor vendor shall assume unit responsibility and shall assure that all sub-vendors comply with the specification.

**5.2 Substitution (6.1.3 of API STD 672:2004)**

Unless otherwise specified, the whole train furnished by the vendor (compressor, driver, gear and auxiliary equipment) shall conform to the maximum allowable sound pressure level of 85 dBA, slow-response, measured at 1 m (3.28 ft) from the equipment surfaces. Unless otherwise specifically stated on the data sheets, noise level tests need not to be performed. On the other hand, bidder/vendor shall guarantee that equipment actual sound pressure level will remain within allowable limits, informing in his proposal the expected or guaranteed maximum sound pressure level of quoted equipment and including copies of noise level test certificates performed on similar equipment.

**5.3 Addition (6.1.7.2 of API STD 672:2004)**

Compressor components that are very similar among each other (such as impellers, shafts, seals and seal glands, sleeves, diffusers and casings) shall be indelibly identified with the order of assembly and to which sub-set they belong to (e.g.: stage number, suction side, coupling end, etc.). Lifting lugs or eyebolts shall be provided for any equipment or component that weighs more than 30 kg (66 lb). Precision assembly components (such as bearing housings, bearings, seals, diffusers, diaphragms, couplings, etc.), regardless of weight, shall always be fitted with suitable provisions to facilitate assembly / disassembly activities or any other maintenance task.

**5.4 Substitution (6.1.8 of API STD 672:2004)**

Motors, electrical components and electrical installations shall be suitable for the area classification (zone, group and temperature class) specified by PETROBRAS on the data sheets and shall meet the requirements of the applicable parts of IEC 60079 (International Electrotechnical Commission) as well as local codes specified by PETROBRAS.

**5.5 Addition (6.1.10 of API STD 672:2004)**

Whenever non-standard flanges are approved by PETROBRAS, their respective companions, studs and nuts shall be furnished as well.

**5.6 Modification (6.1.13 of API STD 672:2004)**

Replace the first sentence by: Mounting surfaces are required and shall meet the following criteria.

**5.7 New (6.1.14)**

Equipment shall be designed to run to the trip speed and maximum allowable working pressure without damage.

**5.8 New (6.1.15)**

Many factors (such as piping loads, alignment at operating conditions, supporting structure, handling during shipment, and handling and assembly at the site) may adversely affect site performance. To minimize the influence of these factors, the vendor shall review and comment on the purchaser's piping and foundation drawings. The vendor's representative shall do the following:

- a) observe a check of the piping performed by parting the flanges;
- b) be present during the initial alignment check;
- c) check alignment at the operating temperature.

**5.9 Addition (6.5.1.2 of API STD 672:2004)**

The combined total electrical and mechanical runout shall not exceed 25 % of the maximum allowed peak-to-peak vibration amplitude or 6  $\mu\text{m}$  (0,25 mil), whichever is greater.

**5.10 New (6.5.1.5)**

Combined electrical and mechanical runout shall be determined and recorded by rolling the rotor in V-blocks at the journal centerline while measuring runout with a noncontacting vibration probe and a dial indicator at the centerline of the probe location and one probe-tip diameter to either side.

**5.11 Addition (6.7.1.3 of API STD 672:2004)**

These undesirable operating speeds shall comply with the separation margin stated in Annex C, C.2.10 of API STD 672:2004.

**5.12 Deletion (6.7.1.4 of API STD 672:2004)**

Removed from API STD 672:2004.

**5.13 Substitution (6.7.3.1 of API STD 672:2004)**

The vendor's torsional critical speed values that have been analytically derived and proven by successful operation of identical previously manufactured compressor drive trains are acceptable. A report is not required.

**5.14 New (6.8.3.7)**

Means shall be provided to adjust axial clearances between impellers and casings.

**5.15 Substitution (6.9.2 of API STD 672:2004)**

A pressurized oil system shall be supplied in accordance with ISO 10438-3:2007 or API STD 614:2008, Chapter 3 except as noted in 6.9.3 - 6.9.5. Oil system shall be as described in figure E-1 of API STD 672:2004 with the following additions/modifications:

- a) reservoir: include level transmitter, a minimum of one electric immersion heater, armored gauge glass, a 2" valved and flanged drain, temperature transmitter;
- b) pumps: include one 100 % auxiliary pump (driven by same type of main equipment driver), block valves, 2 separate pressure transmitters for auxiliary pump start-up and for compressor shut down, automatic main pump priming after auxiliary pump start-up;
- c) filters and coolers: one oil cooler (including thermal relief valves and restriction orifice of 3 mm size at vent lines), two 100 % full stainless steel casing filters (including equalization/fill line), a temperature transmitter at cooler outlet, a 3 way constant temperature control valve without by pass, differential pressure transmitter for filters;
- d) pressure control: include safety relief valves at pump discharge with sight glasses at the return lines, direct acting back pressure control valve.

**5.16 New (6.9.5)**

Unless otherwise specified, lube oil system shall be in full stainless steel.

NOTE Oil pump casings and valve bodies need not to be in stainless steel.

**5.17 New (6.10.1.7)**

The minimum quality flange bolting material shall be ASTM A193 Grade B7. Nuts shall conform to ASTM A194 Grade 2H.

**5.18 Substitution (6.10.4.3 of API STD 672:2004)**

Documentation of major defects shall be submitted to the purchaser prior to any repairs being conducted at the manufacturer's shop and shall include the following:

- a) extent of the repair;
- b) location;
- c) size;
- d) welding procedure specification;
- e) detailed photographs of the defect prior to any preparatory work and after preparation but prior to the actual repair. If the location of the defect cannot be clearly defined by photographic means, the location shall be indicated on a sketch or drawing of the affected component.

**5.19 Substitution (6.12.4 of API STD 672:2004)**

When the vendor is not able to demonstrate that identical equipment has operated satisfactorily under the conditions stated in 6.7.2 of API STD 672:2004, a damped unbalanced response analysis shall be conducted as per Annex C, C.2.10 of API STD 672:2004 and confirmed by test stand data in accordance with Annex C.

#### **5.20 Modification (6.12.5 of API STD 672:2004)**

Replace the first paragraph by: When the vendor is not able to demonstrate that identical equipment has operated satisfactorily under the conditions stated in 6.7.3.1 of API STD 672:2004, a torsional vibration analysis of the complete coupled train shall be performed, complying with the requirements of Annex C, C.7 of API STD 672:2004. In this case, the vendor shall also be responsible for directing the modifications necessary to meet the requirements of 6.7.3.2 - 6.7.3.5.

#### **5.21 Addition (6.12.7 of API STD 672:2004)**

After completion of the final balancing, all major elements of the assembled rotor shall be match-marked.

#### **5.22 Substitution (6.12.10 of API STD 672:2004)**

Thrust bearings and radial bearings shall be fitted with bearing-metal temperature sensors.

### **6 Accessories (Section 7 of API STD 672:2004)**

#### **6.1 Modification (7.1.3.2 of API STD 672:2004)**

Replace the last sentence by: The governor shall be electronic.

#### **6.2 Modification (7.2.1.1 of API STD 672:2004)**

Replace the second sentence by: The flexible elements shall be in stainless steel.

#### **6.3 Substitution (7.2.2.3 of API STD 672:2004)**

Guards shall preferably be fabricated from solid sheet or plate with no openings. Guards fabricated from expanded metal or perforated sheets are acceptable, provided the size of the openings does not exceed 10 mm (0,375 in.) diameter. Guards shall be constructed of metallic, non-sparking materials.

#### **6.4 Substitution (7.3.1 of API STD 672:2004)**

The compressor and all other machine components shall be supported on a rigid steel frame. The frame shall have full-length structural members in contact with the foundation. The term baseplate shall refer to either design.

#### **6.5 Addition (7.4.1.3 of API STD 672:2004)**

**NOTE** The purchaser shall specify the acceptable microprocessor based control manufacturers for each particular job.

#### **6.6 New (7.4.1.7)**

When specified, analog instruments shall be provided with HART protocol. In this case, the microprocessor shall be provided with HART I/O cards and ethernet port card for asset management purposes.

### 6.7 Modification (7.4.3.2 of API STD 672:2004)

Replace the third sentence by: If required to meet the area classification, purging shall be provided in accordance with the applicable part of IEC 60079.

### 6.8 Addition (7.4.4.2.1 of API STD 672:2004)

Flanged-type thermowells shall be used.

### 6.9 Addition (7.4.4.4 of API STD 672:2004)

When pressure gauges are specified, they shall be liquid-filled type, in accordance with 6.3.8.3 of API STD 614:2008, Chapter 1.

### 6.10 Modification (7.4.4.5.1 of API STD 672:2004)

Replace sentence "a" by: a. two radially oriented (X-Y), noncontacting shaft vibration sensing probe.

### 6.11 Substitution (7.4.5.1 of API STD 672:2004)

Switches, sensors, control devices, and annunciation function shall be furnished and mounted by the vendor in accordance with Table 2 below. The alarm setting shall precede the shutdown setting. Program logic shall distinguish between a shutdown device and alarm device such that failure of a shutdown device will not allow operation of the compressor until the device problem is corrected; whereas, failure of an alarm device will cause an alarm condition but will allow continued operation of the compressor.

**Table 2 - Equipment Monitoring**

Condition	Alarm	Shutdown
High vibration of compressor	X	X
High last-stage air temperature (inlet)	X	X
Low lube-oil pressure	X	X
High oil-supply temperature	X	
High oil filter differential pressure	X	
Low sealing-system pressure (see Note 1)	X	
Operation of the standby oil pump	X	
Low-lube level in reservoir (see Note 2)	X	
High inlet-air filter differential pressure	X	
High vibration of driver	X	
Panel purge (see Note 3)	X	
Surge recognition	X	
Permissive start contact (see Note 4)	X	
High bearing temperature	X	
Axial position	X	X
NOTE 1 If applicable. NOTE 2 With oil heater cutout. NOTE 3 If required. NOTE 4 Separate pilot-light indication.		

### 6.12 Deletion (7.4.5.3.4 of API STD 672:2004)

Removed from API STD 672:2004.



**6.13 Substitution (7.4.5.3.5 of API STD 672:2004)**

Unless otherwise specified, alarm and shutdown instruments shall be arranged to permit testing of the control circuit, including when possible the actuating element, without interfering with normal operation of the equipment. The vendor shall provide a clearly visible light on the panel to indicate when shutdown circuits are in a test bypass mode.

**6.14 Substitution (7.5.1.2 of API STD 672:2004)**

A manifolded cooling water piping system shall terminate with flanged single-supply and single-return connections at the edge of the package.

**6.15 Addition (7.5.1.7 of API STD 672:2004)**

Wafer butterfly valves shall not be used.

**6.16 Deletion (7.5.2.1 of API STD 672:2004)**

Removed from API STD 672:2004.

**6.17 Comment (7.7 of API STD 672:2004)**

Normally, vendor's standard filter will suffice. When plant locations are subject to unusual conditions (such as a high content of pollutants or corrosive components in the atmosphere), PETROBRAS will issue specific air intake filter sets data-sheets with additional requirements.

**6.18 Modification (7.7 of API STD 672:2004)**

Replace the Note 2 by: The filter-silencer may be elevated some distance above the compressor for certain plant locations subject to unusual conditions such as sand storms. Inlet piping between filter-silencer and the compressor is typically supplied by the purchaser. The piping shall be of corrosion resistant material to avoid ingestion of rust into the compressor.

**6.19 Substitution (7.10.1 of API STD 672:2004)**

The driver nameplate rating (exclusive of the service factor) shall be at least 110 % of the maximum power required for all of the specified operating conditions. When specified, the product of driver nameplate rating and any applicable service factor shall be no less than the power required (including losses from shaft-driven oil pump, coupling, and gear) when the compressor is operated unthrottled (inlet throttle device wide open) at the specified low-ambient operating conditions. The purchaser will specify the inlet air temperature and the inlet cooling water temperature to be used by the vendor in calculating the maximum unthrottled power.

NOTE The specified inlet temperature is not necessarily the minimum ambient temperature.

**6.20 Substitution (7.10.2 of API STD 672:2004)**

Drain rim decking shall extend under the drive-train components so that any leakage from these components is contained. For those cases where vendor can demonstrate that drain rim decking is not practical to be installed, drip pans shall be used as an alternative method of oil leakage containment.

**6.21 Substitution (7.10.3 of API STD 672:2004)**

Unless otherwise specified, the vendor shall prepare and coat all grout contact surfaces of the baseplate in accordance with API RP 686.

**6.22 Substitution (7.10.4 of API STD 672:2004)**

The microprocessor shall be capable of communicating with the purchaser's supervisory and control system.

NOTE The purchaser shall specify the communication protocol to be used.

**6.23 Substitution (7.10.5 of API STD 672:2004)**

Unless otherwise specified, a surge avoidance system shall be provided.

NOTE Typically this requires additional instrumentation for measuring flow, pressure and temperature, a modulating type anti-surge (blow-off) valve and additional control logic.

**6.24 Substitution (7.10.6 of API STD 672:2004)**

The system shall have the capability of recording data at multiple intervals just prior to an alarm or trip as an aid for troubleshooting compressor operational problems.

**6.25 Substitution (7.10.7 of API STD 672:2004)**

Provisions for phase reference (phase angle probes) shall be made on all pinions in accordance with API STD 670.

**6.26 Substitution (7.10.8 of API STD 672:2004)**

Tapped and plugged holes shall be provided for mounting probes to sense axial position of the gear wheel and pinions.

**6.27 Substitution (7.10.9 of API STD 672:2004)**

Gear casing shall have a machined surface for mounting the purchaser's accelerometer in accordance with API STD 670.

NOTE This requirement is for purchaser's field diagnostics of gear condition.

**6.28 Substitution (7.10.10 of API STD 672:2004)**

Vibration and axial position transducers shall be supplied, installed, and calibrated in accordance with API STD 670.

**6.29 Substitution (7.10.11 of API STD 672:2004)**

Unless otherwise specified, vibration and axial position monitors shall be supplied, installed, and calibrated in accordance with API STD 670.

**6.30 Substitution (7.10.12 of API [STD 672:2004](#))**

Bearing-metal temperature sensors, transducers and monitors shall be supplied, installed and calibrated in accordance with API [STD 670](#).

**6.31 Substitution (7.10.13 of API [STD 672:2004](#))**

The control system shall maintain a chronological record of the shutdowns. The panel shall have the capability of storing all operational parameters related to the chronological shutdowns in a battery-backed nonvolatile memory.

**6.32 Substitution (7.10.21 of API [STD 672:2004](#))**

Intercooler and aftercooler channels and covers shall be of steel; tubesheet shall be of brass and tubes shall be of inhibited admiralty.

**7 Inspection, Testing and Preparation for Shipment (Section 8 of API [STD 672:2004](#))****7.1 Modification (8.2.1 of API [STD 672:2004](#))**

Replace the item 'a' by: Material certificates of compliance for shafts, pinions, gear wheels, impellers, casings and bearings.

**7.2 Substitution (8.2.2.1.1 of API [STD 672:2004](#))**

Castings shall also be inspected per MSS [SP-55](#).

**7.3 Addition (8.2.3.1 of API [STD 672:2004](#))**

Unless otherwise specified, the cleanliness shall be in accordance with API [RP 686](#).

**7.4 Substitution (8.3.3.1 of API [STD 672:2004](#))**

An overspeed test to 115 % of rated speed shall be performed for a minimum duration of 1 minute. Impellers shall be examined for dimensional changes and cracking in high stress areas. Impeller dimensions identified by the manufacturer as critical (such as bore and outside diameter) shall be measured before and after the overspeed test. Any permanent deformation of the bore or other critical dimensions outside drawing tolerances shall be resolved to the satisfaction of the vendor and the purchaser.

**7.5 Substitution (8.3.3.2 of API [STD 672:2004](#))**

After the overspeed test, each impeller shall be examined by magnetic particle or liquid penetrant methods. Impeller dimensions identified by the manufacturer as critical (such as bore and outside diameter) shall be measured before and after the overspeed test. Any permanent deformation of the bore or other critical dimensions outside drawing tolerances shall be resolved to the satisfaction of the vendor and the purchaser.

**7.6 Substitution (8.3.4.2 of API STD 672:2004)**

All oil pressures, viscosities, and temperatures shall be within the range of operating values recommended in the vendor's operating instructions for the specific unit being tested, provided that the highest bearing surface metal temperature shall not exceed 100 °C (212 °F) at maximum continuous speed. Performance data shall be obtained only after bearing and lube-oil temperatures have stabilized.

Lube-oil inlet pressures and temperatures shall be varied through the range permitted in the equipment operating manual, after the first hour during the 4-hour run. The following cases shall be verified during the 4-hour test (at least, half an hour in each case):

- HI Lube oil pressure & HI Lube oil temperature;
- HI Lube oil pressure & LO Lube oil temperature;
- LO Lube oil pressure & HI Lube oil temperature;
- LO Lube oil pressure & LO Lube oil temperature.

Vibration readings shall be taken at least at the end of each case period.

**7.7 Substitution (8.3.4.5.3 of API STD 672:2004)**

During the combined mechanical and performance tests, a functional test of the job lube system shall be performed, including verification of calibration and operation of all valves and instrumentation.

**7.8 Substitution (8.3.4.6.4 of API STD 672:2004)**

Compressor and contract driver vibration levels shall be recorded at every performance data point and shall meet the criteria of 6.7.4.3 of API STD 672:2004, and 7.18 of this Standard.

All Real-Time data (vibration, speed, phase signals, etc.) shall be recorded during the whole MRT and URT, and submitted for purchaser review.

**7.9 Substitution (8.3.5 of API STD 672:2004)**

The purchaser's representative will perform a final inspection prior to shipment, including dimensional inspection, review of scope of supply, and documentation review.

**7.10 Substitution (8.3.6 of API STD 672:2004)**

Immediately upon completion of each mechanical and performance test, copies of the data logged, as well as the as-tested and corrected performance data shall be submitted to the purchaser.

**7.11 Modification (8.4.1 of API STD 672:2004)**

Replace the third sentence by: The preparation shall make the equipment suitable for 12 months of outdoor storage from the time of shipment, with no disassembly required before operation except for inspection of bearings and seals.

**7.12 Addition (8.4.2 of API STD 672:2004)**

The vendor shall specify the products to be used in preparation of compressor train components, the methods of removal and reapplication, and inform the date of application. Such data shall be summarized in two tags to be securely affixed to the main equipment and on the outside of each crate.

**7.13 New (8.4.8)**

After testing and final inspections, spare rotors shall be wrapped, packed in steel containers, sealed and pressurized / purged with Nitrogen gas. Should any rust preventive be required at packing and shipment stage, volatile products shall be applied. Containers shall be provided with N2 pressure indication, vent, drain and refill connections and shall be equipped with a pressure safety valve and a Nitrogen cylinder and pressure control valve, to ensure adequate Nitrogen pressure inside the storage container. Container design shall be suitable for both horizontal and vertical storage. Neither TFE nor PTFE shall be used between the rotor and the cradle at the support areas.

**7.14 Substitution (8.5.1 of API STD 672:2004)**

The vendor shall keep final assembly maintenance and running clearances for at least 20 years.

**7.15 Substitution (8.5.6 of API STD 672:2004)**

The combined test shall be for a continuous 4-hour period.

**7.16 Substitution (8.5.7 of API STD 672:2004)**

A minimum of 5 test points shall be recorded, including surge, rated, and maximum capacity.

**7.17 Substitution (8.5.8 of API STD 672:2004)**

An unthrottled test curve shall be produced.

**7.18 Substitution (8.5.9 of API STD 672:2004)**

While the equipment is operating at rated speed, sweeps shall be made for vibration amplitudes at frequencies other than synchronous. As a minimum, these sweeps shall cover a frequency from 0,25 times to 8 times the rated speed of the shaft being observed. If the amplitude of any discrete, non-synchronous vibration exceeds 20 % of the allowable vibration as defined in 6.7.4.3 of API STD 672:2004, the purchaser and the vendor shall mutually agree on requirements for any additional testing and on the equipment's suitability for shipment.

**7.19 Substitution (8.5.11 of API STD 672:2004)**

The requirements of 8.5.11.1, 8.5.11.3 of API STD 672:2004 and 7.20 of this Standard shall be met after the combined mechanical and performance test is completed.

**7.20 Substitution (8.5.11.2 of API STD 672:2004)**

When, due to the design of the integrally geared compressor, inspection of the bearings and seals requires disassembly of any pinion rotor. In this case, purchaser will decide to carry out inspection of bearings and seals depending on analysis of test data.

**7.21 Substitution (8.5.12 of API STD 672:2004)**

The shop tests specified in 7.22 of this Standard or 8.5.12.2 of API STD 672:2004 shall be performed (see also 5.19 of this Standard).

**7.22 Substitution (8.5.12.1 of API STD 672:2004)**

The package shall be tested at the number of guide vane settings specified by the purchaser. Each setting shall include five test points including surge, rated, and maximum capacity.

**8 Vendor Data (Section 9 of API STD 672:2004)****8.1 Substitution (9.1.3 of API STD 672:2004)**

A coordination meeting shall be held with PETROBRAS' staff, preferably at the PETROBRAS' (or its representative's) office, within 4-6 weeks after the order commitment. Unless otherwise specified, the vendor shall prepare and distribute an agenda prior to this meeting which as a minimum shall include review of the following items:

- a) the purchase order, scope of supply, unit responsibility, sub-vendor items and lines of communication;
- b) the data sheets;
- c) applicable specifications and previously agreed exceptions;
- d) schedules for transmittal of data, production, and testing;
- e) the quality assurance program and procedures;
- f) inspection, expediting, and testing;
- g) schematics and bills of material for auxiliary systems;
- h) the physical orientation of the equipment, piping, and auxiliary systems including access for operation and maintenance;
- i) coupling selection and rating;
- j) equipment performance, alternate operating conditions, startup, shutdown, and any operating limitations;
- k) instrumentation and controls.

**8.2 Substitution (9.3.3 of API STD 672:2004)**

Unless otherwise specified, the vendor shall submit progress reports to the purchaser, at least, monthly.


**8.3 Substitution (9.4.3 of API STD 672:2004)**


The Installation, Operating and Maintenance Instructions (IOMI) manual(s) shall be prepared for the equipment covered by the purchase order and "typical" manuals are not acceptable. Those manuals must be issued by the vendor in both Portuguese and English languages. In case of conflicts between IOMI instructions, the Portuguese version shall prevail.

**9 Annexes**

This Standard contains the following annexes:

- a) Annexes A and B - Data Sheet (**Annex A of API STD 672:2004**);
- b) Annex C - Vendor Drawing and Data Requirements (**Annex D of API STD 672:2004**).

 <b>PETROBRAS</b>	<b>DATA SHEET</b>		No.						
	CLIENT:			SHEET of					
	JOB:								
	AREA:								
	TITLE:			<b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>					
<b>INDEX OF REVISIONS</b>									
<b>REV.</b>	<b>DESCRIPTION AND/OR REVISED SHEETS</b>								
	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE									
DESIGN									
EXECUTION									
CHECK									
APPROVAL									
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX A - SHEET 01/12.									

DATA SHEET		No.	REV.
		SHEET 2 of 12	
TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>			
<b>SI UNITS (kPa)</b>			
1 APPLICABLE TO: <input type="radio"/> PROPOSAL <input type="radio"/> PURCHASE <input type="radio"/> AS BUILT 2 FOR: _____ UNIT: _____ 3 SITE: _____ No. REQUIRED: _____ 4 SERVICE _____ DRIVER ITEM No.: _____ 5 <input type="radio"/> CONTINUOUS <input type="radio"/> INTERMITTENT <input type="radio"/> STANDBY (2.1.7) SPARED BY: _____ 6 NOTE: INFORMATION TO BE COMPLETED. <input type="radio"/> BY PURCHASER <input type="checkbox"/> BY MANUFACTURER <input checked="" type="checkbox"/> BY PURCHASER OR MFR			
<b>GENERAL</b>			
8 COMPRESSOR MFR _____ MODEL (SIZE AND TYPE) _____ SERIAL No. _____ 9 DRIVER MFR _____ DRIVER TYPE _____ RATED (BkW) _____ RPM _____ 10 DRIVE SYSTEM: <input type="radio"/> DIRECT COUPLED <input type="radio"/> OTHER _____ DUTY (1.2) <input type="radio"/> BASIC <input type="radio"/> SPECIAL			
<b>OPERATING CONDITIONS (5.1.9)</b>		<b>CONTROL SYSTEM (7.4.2)</b>	
14 ALL DATA ON PER UNIT BASIS	RATED (3.2.4)	LOW AMB (7.10.1)	MIN AMB
15 <input type="radio"/> DELIVERED FLOW, m <sup>3</sup> /h (101.3 kPa & 0 °C DRY)			
16 <input type="radio"/> WEIGHT FLOW, kg/h (WET) (DRY)			
17 <input type="radio"/> INLET COOLING WATER TEMP. (°C)			
18 <b>INLET CONDITIONS:</b>			
19 <input type="radio"/> PRESSURE (kPa)			
20 <input type="radio"/> TEMPERATURE (°C)			
21 <input type="radio"/> RELATIVE HUMIDITY %			
22 <input type="radio"/> MOLECULAR WEIGHT (M)			
23 <input type="checkbox"/> INLET VOLUME, (m <sup>3</sup> /h) (WET / DRY)			
24 <b>DISCHARGE CONDITIONS:</b>			
25 <input type="radio"/> PRESSURE (kPa)			
26 <input type="checkbox"/> TEMPERATURE (°C)			
27 <b>PERFORMANCE:</b>			
28 <input type="checkbox"/> MAX (BkW) REQUIRED (ALL LOSSES INCL)			
29 <input type="checkbox"/> (BkW / 100 m <sup>3</sup> /h) AIR DELIVERED			
30 <input type="checkbox"/> INPUT SPEED (rpm)			
31 <input type="checkbox"/> ESTIMATED SURGE, (m <sup>3</sup> /h) (@ ABOVE SPEED)			
32 <input type="radio"/> MAX ΔP ACROSS INLET FILTER, (kPa)			
33 ΔP INCLUDED IN CALCULATION <input type="checkbox"/> YES <input type="checkbox"/> NO			
34 <input checked="" type="checkbox"/> AFTERCOOLER OUTLET TEMP. (°C)			
35 <input type="checkbox"/> PERFORMANCE CURVE NO.			
36 <input type="checkbox"/> % RISE TO SURGE (5.1.12.2)			
37 <input type="checkbox"/> % TURNDOWN			
38 <input type="checkbox"/> GUARANTEE			
39 <input type="checkbox"/> _____			
40 <input type="checkbox"/> _____			
41 <input type="checkbox"/> _____			
42 <input type="checkbox"/> _____			
43 <input type="checkbox"/> _____			
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56 <input type="checkbox"/> _____			
57 <input type="checkbox"/> _____			
58 <input type="checkbox"/> _____			
* UNTHROTTLED PERFORMANCE FOR DRIVER SIZING		<b>CONTROL METHOD: (7.4.2.1)</b> <input type="radio"/> CAPACITY MODULATION (CONST DISCH PRESS) (7.4.2.1 a.) <input type="radio"/> INLET THROTTLE DEVICE <input type="radio"/> DAMPER <input type="radio"/> GLOBE VALVE <input type="radio"/> BUTTERFLY VALVE <input type="radio"/> VARIABLE INLET GUIDE VANES <input type="radio"/> AUTOMATIC DUAL CONTROL (7.4.2.1 b.) <input type="radio"/> (kPaG) TO (kPaG) DISCH PRESS <input type="radio"/> AUTO START AND STOP (7.4.2.1 c.) <input type="radio"/> START (kPaG) STOP (kPaG) <input type="radio"/> OTHER (DESCRIBE): _____ <b>CONTROL SYSTEM REQUIREMENTS:</b> <input type="radio"/> UNIT OPERATES IN PARALLEL (7.4.2.2) <input type="radio"/> W/CENTRIFUGAL <input type="radio"/> W/ROTARY <input type="radio"/> W/RECIPROCATING <input type="radio"/> MICROPROCESSOR CAPABLE OF COMMUNICATION WITH PURCHASER'S DCS (7.4.1.4) <input type="radio"/> COMM PROTOCOL _____ <b>CONTROL SYSTEM ALTERNATES: (7.4.1.3)</b> <input type="radio"/> OTHER THAN MICROPROCESSOR BASED: _____ <input type="radio"/> SUITABLE FOR INDOOR ONLY <input type="radio"/> FURNISHED BY PURCHASER	
<b>INTER- AND AFTER-COOLERS (7.6)</b>		<b>AFTERCOOLER:</b> <input type="radio"/> FURNISHED BY PURCHASER (7.6.1) <input type="radio"/> NOT NEEDED (7.6.1) <input type="radio"/> WATER-COOLED TYPE BY VENDOR <input type="radio"/> WATER-COOLED INTERCOOLERS REQD (7.6.3) <input type="radio"/> FURNISHED BY PURCHASER <input checked="" type="checkbox"/> AIR-COOLED EXCHANGER AUTOMATIC TEMPERATURE CONTROL MEANS: (7.6.6) <input type="radio"/> LOUVERS <input type="radio"/> VARIABLE SPEED FANS <input type="radio"/> VARIABLE PITCH FANS <input type="radio"/> BYPASS VALVE <input checked="" type="checkbox"/> AIR-COOLER CONTROL MANUAL ONLY (7.6.6) BY: <input type="radio"/> LOUVERS <input type="radio"/> BYPASS VALVE <input type="radio"/> VARIABLE PITCH FANS	
46 BASED ON THE ANNEX A API STD 672 INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE. FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX A - SHEET 02/12.			





PETROBRAS

N-2649

REV. B

ENGLISH


06 / 2013

DATA SHEET		No.	REV.																																																																																													
		SHEET 3 of 12																																																																																														
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<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><input type="radio"/> LOCATION, SITE DATA (6.1.5)</p> <p>LOCATION:</p> <p><input type="checkbox"/> INDOOR      <input type="radio"/> HEATED      <input type="radio"/> UNDER ROOF</p> <p><input type="checkbox"/> OUTDOOR      <input type="radio"/> UNHEATED      <input type="radio"/> PARTIAL SIDES</p> <p><input type="checkbox"/> GRADE      <input type="radio"/> MEZZANINE      <input type="checkbox"/></p> <p><input type="checkbox"/> WINTERIZATION REQD      <input type="radio"/> TROPICALIZATION REQD</p> <p>SITE DATA:</p> <p><input type="checkbox"/> ELEVATION _____ (m)      <input type="checkbox"/> BAROMETER _____ (kPa)</p> <p><input type="checkbox"/> RANGE OF AMBIENT TEMPERATURE, _____ (°C)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>DRY BULB</th> <th>WET BULB</th> </tr> </thead> <tbody> <tr> <td>NORMAL</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MAXIMUM</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>MINIMUM</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <p>UNUSUAL CONDITIONS:</p> <p><input type="checkbox"/> DUST    <input type="checkbox"/> FUMES    <input type="checkbox"/> CORROSIVE CONDITIONS</p> <p><input type="checkbox"/> CORROSIVES PRESENT: _____</p> <p><input type="checkbox"/> CONDITIONS CAUSE STRESS CORROSION CRACKING</p> <p><input type="checkbox"/> OTHER _____</p> </div> <div style="width: 48%;"> <p><input type="radio"/> SPECIFICATIONS</p> <p>NOISE SPECIFICATIONS: (6.1.3)</p> <p><input type="checkbox"/> MAX ALLOWABLE SPL _____ (@ 1 m)</p> <p><input type="checkbox"/> APPLICABLE SPEC _____</p> <p>ACOUSTIC HOUSING: <input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>APPLICABLE SPECIFICATIONS:</p> <p>API STD 672 AND <input type="checkbox"/> _____</p> <p><input type="checkbox"/> NON-ASME WELDING IF NOT AWS D1.1: (6.10.3.5) _____</p> <p><input type="checkbox"/> UNITS OF MEASURE (5.1) <input type="checkbox"/> US CUSTOMARY    <input type="checkbox"/> SI    <input type="checkbox"/> OTHER _____</p> <p>PAINTING:</p> <p><input type="checkbox"/> MANUFACTURER'S STD</p> <p><input type="checkbox"/> OTHER _____</p> <p>BASEPLATE GROUT: (7.10.3) <input type="checkbox"/> EPOXY    <input type="checkbox"/> CEMENT    <input type="checkbox"/> NONE</p> <p>PREPARATION FOR GROUT SURFACES: (7.10.3)</p> <p><input type="checkbox"/> MFR STD    <input type="checkbox"/> API RP 686 BLAST    <input type="checkbox"/> BARE FOR FIELD BLAST</p> <p><input type="checkbox"/> INORGANIC ZINC SILICATE COATING</p> <p><input type="checkbox"/> OTHER _____</p> </div> </div>			DRY BULB	WET BULB	NORMAL	_____	_____	MAXIMUM	_____	_____	MINIMUM	_____	_____																																																																																			
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<p>23 AREA ELECTRICAL CLASSIFICATION: (6.1.8) T-CODE _____</p> <p>24 <input type="checkbox"/> CLASS _____ GROUP _____ DIVISION _____</p> <p>25 <input type="checkbox"/> LOCAL ELECTRICAL CODES: _____</p> <p>26 _____</p> <p>27 <input type="checkbox"/> UTILITY CONDITIONS:</p>		<p>SHIPMENT: (8.4.1)</p> <p><input type="checkbox"/> DOMESTIC    <input type="checkbox"/> EXPORT    <input type="checkbox"/> EXPORT BOXING REQD</p> <p><input type="checkbox"/> OUTDOOR STORAGE OVER: <input type="checkbox"/> 6 MONTHS    <input type="checkbox"/> 12 MONTHS</p>																																																																																														
<p>28 <input type="checkbox"/> STEAM HEATING:</p> <p>29 INLET MIN _____ (kPaG) _____ (°C)</p> <p>30 NORM _____ (kPaG) _____ (°C)</p> <p>31 MAX _____ (kPaG) _____ (°C)</p> <p>32 OUTLET MIN _____ (kPaG) _____ (°C)</p> <p>33 NORM _____ (kPaG) _____ (°C)</p> <p>34 MAX _____ (kPaG) _____ (°C)</p> <p>35 _____</p> <p>36 <input type="checkbox"/> ELECTRICITY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>HEATING</th> <th>CONTROL</th> <th>DRIVERS</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>INSTRUMENTS CONTROL PANEL</td> <td></td> </tr> <tr> <td>VOLTAGE</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>HERTZ</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>PHASE</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>			HEATING	CONTROL	DRIVERS			INSTRUMENTS CONTROL PANEL		VOLTAGE	_____	_____	_____	HERTZ	_____	_____	_____	PHASE	_____	_____	_____	<p><input type="checkbox"/> UTILITY CONSUMPTION (9.2.3.1.)</p> <p>STEAM:</p> <p>OIL HEATER: _____ (kg/h) OTHER _____ (kg/h)</p> <p>ELECTRIC:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>(kW)</th> <th>LOCKED ROTOR AMPS</th> <th>FULL LOAD AMPS</th> </tr> </thead> <tbody> <tr> <td>MAIN LO PUMP</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>AUX LO PUMP</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>OIL HEATER</td> <td>_____ (kW)</td> <td>_____</td> <td>_____ (kW)</td> </tr> <tr> <td>SPACE HEATER</td> <td>_____</td> <td>_____</td> <td>_____ (kW)</td> </tr> <tr> <td>CONTROL SYSTEM LOAD:</td> <td>_____ (kW)</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <p>COOLING WATER:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>L.O. COOLER</th> <th>INTER-COOLER</th> <th>AFTER-COOLER</th> <th>OTHER</th> </tr> </thead> <tbody> <tr> <td>QUANTITY, (L/min)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>OUTLET TEMP, (°C)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>PRESS DROP, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>TOTAL CW, (L/min)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <p>AIR/NITROGEN:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>INLET PRESS (kPaG)</th> <th>QUANTITY (m³/h)</th> </tr> </thead> <tbody> <tr> <td>SEAL SYSTEM:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>CONTROL PANEL:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>LO RESERVOIR:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>INSTR HOUSINGS:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>CONTROL SYSTEM:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>OTHER:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>TOTAL PURGE, (m³/h)</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>			(kW)	LOCKED ROTOR AMPS	FULL LOAD AMPS	MAIN LO PUMP	_____	_____	_____	AUX LO PUMP	_____	_____	_____	OIL HEATER	_____ (kW)	_____	_____ (kW)	SPACE HEATER	_____	_____	_____ (kW)	CONTROL SYSTEM LOAD:	_____ (kW)	_____	_____		L.O. COOLER	INTER-COOLER	AFTER-COOLER	OTHER	QUANTITY, (L/min)	_____	_____	_____	_____	OUTLET TEMP, (°C)	_____	_____	_____	_____	PRESS DROP, (kPa)	_____	_____	_____	_____	TOTAL CW, (L/min)	_____	_____	_____	_____		INLET PRESS (kPaG)	QUANTITY (m³/h)	SEAL SYSTEM:	_____	_____	CONTROL PANEL:	_____	_____	LO RESERVOIR:	_____	_____	INSTR HOUSINGS:	_____	_____	CONTROL SYSTEM:	_____	_____	OTHER:	_____	_____	TOTAL PURGE, (m³/h)	_____	_____
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<p>43 <input type="checkbox"/> COOLING WATER: (6.1.6)</p> <p>44 TEMP INLET _____ (°C) MAX RETURN _____ (°C)</p> <p>45 PRESS NORM _____ (kPaG) DESIGN _____ (kPaG)</p> <p>46 MIN RETURN _____ (kPaG) MAX ALLOW ΔP _____ (kPa)</p> <p>47 WATER SOURCE _____</p> <p>48 _____</p> <p>49 <input type="checkbox"/> AIR:</p> <p>50 MAX PRESS _____ (kPaG) MIN PRESS _____ (kPaG)</p> <p>51 GAS COMPOSITION _____</p> <p>52 <input type="checkbox"/> NITROGEN:</p> <p>53 MAX PRESS _____ (kPaG) MIN PRESS _____ (kPaG)</p> <p>54 GAS COMPOSITION _____</p> <p>55 _____</p> <p>56 NOTES: _____</p> <p>57 _____</p> <p>58 _____</p> <p>59 _____</p>																																																																																																

BASED ON THE ANNEX A API STD 672

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<input type="checkbox"/> <b>COMPRESSOR SPEEDS:</b> 3 RATED INPUT: _____ (rpm) TRIP _____ (rpm) 4 BULLGEAR CRITICALS: 1st _____ (rpm) 2nd _____ (rpm) 5 PINION CRITICALS: 6 1st STG PINION 1st _____ (rpm) 2nd _____ (rpm) 7 2nd STG PINION 1st _____ (rpm) 2nd _____ (rpm) 8 3rd STG PINION 1st _____ (rpm) 2nd _____ (rpm) 9 4th STG PINION 1st _____ (rpm) 2nd _____ (rpm) 10 11 OTHER UNDESIRABLE SPEEDS: (6.7.1.3) _____ 12 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>STAGE</th> <th>IMPELLER</th> <th>TIP</th> </tr> <tr> <th>SPEED</th> <th>DIAMETER</th> <th>SPEED</th> </tr> </thead> <tbody> <tr> <td>1st STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>2nd STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>3rd STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>4th STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> </tbody> </table>				STAGE	IMPELLER	TIP	SPEED	DIAMETER	SPEED	1st STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	2nd STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	3rd STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	4th STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)																																																																																																																																																																										
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<input type="checkbox"/> <b>INTEGRAL GEAR HOUSING:</b> MATERIAL _____ SPLIT _____ <input type="checkbox"/> <b>BULL GEAR:</b> (6.5.3 6.12.2) RATED POWER BASED ON TOOTH SURFACE DURABILITY: _____ (kW) RATED POWER BASED ON TOOTH BENDING: _____ (kW) <input type="checkbox"/> MIN AGMA SF: _____ <input type="checkbox"/> ACTUAL S.F. _____ GEAR RIM MATERIAL: _____ HARDNESS: _____ GEAR FACE WIDTH: _____ (mm) GEAR CENTER MATL: _____ MECHANICAL EFFICIENCY: _____ % ISO 1328 GRADE: _____ PITCH DIA _____ (mm) PITCH LINE VELOCITY _____ <input type="checkbox"/> <b>PINIONS:</b> (6.5.3 6.12.2) 1st 2nd 3rd 4th SERVICE FACTOR: _____ MATERIAL: _____ HARDNESS: (BHN) (R <sub>c</sub> ) _____ <input type="checkbox"/> <b>BULL GEAR SHAFT:</b> <input type="checkbox"/> REPLACEABLE <input type="checkbox"/> INTEGRAL W/GEAR MATL: _____ HARDNESS: _____ (BHN) (R <sub>c</sub> ) BRG SPAN _____ (mm) WEIGHT (W/GEAR) _____ (kg) DIA @ GEAR _____ (mm) DIA @ COUPLING _____ (mm) SHAFT SLEEVES AT SEALS: MATL _____ SHAFT LABYS: TYPE _____ MATL _____ BULL GEAR RADIAL BRG TYPE: _____ LENGTH _____ ALLOW LOAD _____ (kPa) ACTUAL LOAD _____ (kPa) <input type="checkbox"/> <b>BULL GEAR THRUST BEARINGS:</b> (6.8.3) LOCATION _____ TYPE _____ MFR _____ AREA _____ (mm <sup>2</sup> ) THRUST COLLAR (6.8.3.6) <input type="checkbox"/> INTEGRAL <input type="checkbox"/> REPLACEABLE ALLOW LOAD _____ (kPa) ACTUAL LOAD _____ (kPa) GAS LOAD _____ (kg) COUPLING LOAD _____ (kg) BEARINGS FITTED W/TEMP SENSORS (6.12.10 6.12.11) <input type="checkbox"/> PINION RADIAL BRG <input type="checkbox"/> BULL GEAR RADIAL BRG <input type="checkbox"/> THRUST BRG																																																																																																																																																																																															
<input type="checkbox"/> <b>IMPELLERS:</b> (6.5.2) 20 NO. OF IMPELLERS: _____ MATERIAL _____ 21 TYPE (OPEN, RADIAL, BACKWARD LEANING, ETC.) _____ 22 TYPE CONSTRUCTION: (6.5.2.2) _____ 23 METHOD OF ATTACH: (6.5.2.2) _____ 24 ROTATION, VIEWED FROM INPUT SHAFT END: <input type="checkbox"/> CW <input type="checkbox"/> CCW 25 <input type="checkbox"/> <b>COMPRESSOR CASING:</b> 27 MODEL _____ CASING SPLIT _____ 28 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>STG 1</th> <th>STG 2</th> <th>STG 3</th> <th>STG 4</th> </tr> </thead> <tbody> <tr> <td>29 MATERIAL</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>30 MAWP, (kPaG)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>31 HYDRO TEST, (kPaG)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>32 MAX OPT TEMP, (°C)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>33 MIN OPT TEMP, (°C)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>34 <input type="checkbox"/> MIN DESIGN METAL TEMP (6.10.5) _____ (°C)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>35 <input type="checkbox"/> CASING HEAT TREATMENT REQUIRED (6.10.3.1.1)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>36 <input type="checkbox"/> ULTIMATE STRESS FOR MATL (6.2.1) _____ (Mpa)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>37 <input type="checkbox"/> CASTING FACTOR (6.2.1) _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="5">38 WELDED CONNECTIONS—NDT PROVIDED</td> </tr> <tr> <td colspan="5">39 <input type="checkbox"/> 100 % RADIOGRAPH <input type="checkbox"/> MAG PARTICLE <input type="checkbox"/> LIQ PENETRANT</td> </tr> <tr> <td colspan="5">40 _____</td> </tr> <tr> <td colspan="5">41</td> </tr> <tr> <td colspan="4"> <input type="checkbox"/> <b>COMPRESSOR BEARINGS &amp; BEARING HOUSINGS:</b>            43 BEARING HSG MATERIAL:            44 PINION RADIAL BEARINGS: (6.8.2)  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>STG 1</th> <th>STG 2</th> <th>STG 3</th> <th>STG 4</th> </tr> </thead> <tbody> <tr> <td>45 BRG TYPE</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>47 ALLOW LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>48 ACTUAL LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>49 BRG SPAN, (mm)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>50 PINION THRUST BEARINGS: (6.8.3)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>51 STG 1 STG 2 STG 3 STG 4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>52 BRG TYPE</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>53 ALLOW LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>54 ACTUAL LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>55 THRUST COLLAR</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> </td> <td> <input checked="" type="checkbox"/> <b>MAIN CONNECTIONS:</b> (6.3)  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>SIZE</th> <th>ASME RATING</th> <th>FACING</th> <th>POSITION</th> </tr> </thead> <tbody> <tr> <td>COMPR INLET</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COMPR DISCH</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PKG OUTLET</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ATM BLOWOFF</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FILTER OUTLET</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>   <input type="checkbox"/> <b>OTHER CONNECTIONS:</b>  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>NO.</th> <th>SIZE</th> <th>TYPE</th> </tr> </thead> <tbody> <tr> <td>LUBE OIL INLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LUBE OIL OUTLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>COOLING WATER INLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PRESSURE GAUGE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>TEMPERATURE GAUGE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CONDENSATE DRAINS</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> </tr> </tbody> </table> <p>BASED ON THE ANNEX A API STD 672</p> <p>INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.</p> <p>FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX A - SHEET 04/12.</p>					STG 1	STG 2	STG 3	STG 4	29 MATERIAL	_____	_____	_____	_____	30 MAWP, (kPaG)	_____	_____	_____	_____	31 HYDRO TEST, (kPaG)	_____	_____	_____	_____	32 MAX OPT TEMP, (°C)	_____	_____	_____	_____	33 MIN OPT TEMP, (°C)	_____	_____	_____	_____	34 <input type="checkbox"/> MIN DESIGN METAL TEMP (6.10.5) _____ (°C)					35 <input type="checkbox"/> CASING HEAT TREATMENT REQUIRED (6.10.3.1.1)					36 <input type="checkbox"/> ULTIMATE STRESS FOR MATL (6.2.1) _____ (Mpa)					37 <input type="checkbox"/> CASTING FACTOR (6.2.1) _____					38 WELDED CONNECTIONS—NDT PROVIDED					39 <input type="checkbox"/> 100 % RADIOGRAPH <input type="checkbox"/> MAG PARTICLE <input type="checkbox"/> LIQ PENETRANT					40 _____					41					<input type="checkbox"/> <b>COMPRESSOR BEARINGS &amp; BEARING HOUSINGS:</b> 43 BEARING HSG MATERIAL: 44 PINION RADIAL BEARINGS: (6.8.2) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>STG 1</th> <th>STG 2</th> <th>STG 3</th> <th>STG 4</th> </tr> </thead> <tbody> <tr> <td>45 BRG TYPE</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>47 ALLOW LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>48 ACTUAL LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>49 BRG SPAN, (mm)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>50 PINION THRUST BEARINGS: (6.8.3)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>51 STG 1 STG 2 STG 3 STG 4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>52 BRG TYPE</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>53 ALLOW LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>54 ACTUAL LOAD, (kPa)</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>55 THRUST COLLAR</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>					STG 1	STG 2	STG 3	STG 4	45 BRG TYPE	_____	_____	_____	_____	47 ALLOW LOAD, (kPa)	_____	_____	_____	_____	48 ACTUAL LOAD, (kPa)	_____	_____	_____	_____	49 BRG SPAN, (mm)	_____	_____	_____	_____	50 PINION THRUST BEARINGS: (6.8.3)					51 STG 1 STG 2 STG 3 STG 4					52 BRG TYPE	_____	_____	_____	_____	53 ALLOW LOAD, (kPa)	_____	_____	_____	_____	54 ACTUAL LOAD, (kPa)	_____	_____	_____	_____	55 THRUST COLLAR	_____	_____	_____	_____	<input checked="" type="checkbox"/> <b>MAIN CONNECTIONS:</b> (6.3) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>SIZE</th> <th>ASME RATING</th> <th>FACING</th> <th>POSITION</th> </tr> </thead> <tbody> <tr> <td>COMPR INLET</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COMPR DISCH</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PKG OUTLET</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ATM BLOWOFF</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FILTER OUTLET</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <input type="checkbox"/> <b>OTHER CONNECTIONS:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>NO.</th> <th>SIZE</th> <th>TYPE</th> </tr> </thead> <tbody> <tr> <td>LUBE OIL INLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LUBE OIL OUTLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>COOLING WATER INLET</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PRESSURE GAUGE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>TEMPERATURE GAUGE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CONDENSATE DRAINS</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		SIZE	ASME RATING	FACING	POSITION	COMPR INLET					COMPR DISCH					PKG OUTLET					ATM BLOWOFF					FILTER OUTLET						NO.	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<b>1 VIBRATION DETECTORS: (7.4.4.5 7.10.10)</b> <b>2</b> <input checked="" type="checkbox"/> TYPE _____ <input checked="" type="checkbox"/> MODEL _____ <b>3</b> <input type="checkbox"/> MFR _____ <b>4</b> <input type="checkbox"/> NO. AT EACH PINION BEARING _____ TOTAL NO. _____ <b>5</b> <input type="checkbox"/> NO. AT EACH DRIVER BEARING _____ TOTAL NO. _____ <b>6</b> <input type="checkbox"/> X&Y RADIAL PROBES CAN BE MOUNTED ADJACENT TO IMPELLERS FOR: <b>7</b> <input type="checkbox"/> 1st STG <input type="checkbox"/> 2nd STG <input type="checkbox"/> 3rd STG <input type="checkbox"/> 4th STG <b>8</b> <b>OSCILLATOR-DEMODULATORS:</b> <b>9</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>10</b> <input type="checkbox"/> MONITOR SUPPLIED BY _____ <b>11</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>12</b> <input type="checkbox"/> LOCATION _____ ENCLOSURE _____ <b>13</b> <input type="checkbox"/> READOUT SCALE RANGE _____ <input type="checkbox"/> ALARM <input type="checkbox"/> SET @ _____ <b>14</b> <input type="checkbox"/> SHUTDOWN: <input type="checkbox"/> SET @ _____ (mm/sec <sup>2</sup> ) <input type="checkbox"/> TIME DELAY _____ SEC <b>15</b> <input type="checkbox"/> PER API STD 670 (7.10.10 7.10.11) <b>16</b> <b>BEARING-TEMPERATURE MONITOR: (7.10.12)</b> <b>17</b> <input type="checkbox"/> REQD <input type="checkbox"/> SUPPLIED BY: _____ <input type="checkbox"/> PER API 670 <b>18</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>19</b> <b>AXIAL POS. MOVEMENT DETECTOR: (7.10.10 7.10.11)</b> <b>20</b> <input checked="" type="checkbox"/> TYPE _____ <input checked="" type="checkbox"/> MODEL _____ <b>21</b> <input type="checkbox"/> MFR _____ <b>22</b> <input type="checkbox"/> READOUT SCALE RANGE _____ <input type="checkbox"/> ALARM <input type="checkbox"/> SET @ _____ <b>23</b> <input type="checkbox"/> SHUTDOWN: <input type="checkbox"/> SET @ _____ (mm/sec <sup>2</sup> ) <input type="checkbox"/> TIME DELAY _____ SEC <b>24</b> _____ <b>25</b> <b>DYNAMICS: (6.7 6.12)</b> <b>26</b> <input type="checkbox"/> CRITICAL LATERAL SPEEDS ARE PROVEN BY PRIOR UNITS (6.7.2) <b>27</b> <input type="checkbox"/> DAMPED UNBALANCED RESPONSE ANALYSIS REQD (6.12.3) <b>28</b> <input type="checkbox"/> TORSIONAL VIBRATION ANALYSIS OF TRAIN REQD (6.12.5) <b>29</b> <input type="checkbox"/> RESIDUAL UNBALANCE WORKSHEET REQD (6.12.8) <b>30</b> <input checked="" type="checkbox"/> REMARKS _____ <b>31</b> _____ <b>32</b> <b>COUPLINGS: (7.2.1)</b> <b>33</b> TYPE: <input checked="" type="checkbox"/> DISK PAK <input checked="" type="checkbox"/> DIAPHRAGM <input type="checkbox"/> OTHER _____ <b>34</b> DISK MATL: <input checked="" type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> COATED W/ _____ <b>35</b> <input checked="" type="checkbox"/> MAKE _____ <input checked="" type="checkbox"/> MODEL _____ <b>36</b> <input type="checkbox"/> NON-LUBE <input type="checkbox"/> LUB'D <input checked="" type="checkbox"/> LUBRICATION _____ <b>37</b> <input type="checkbox"/> SPACER LENGTH _____ (mm) <input checked="" type="checkbox"/> LIMITED END-FLOAT REQD <b>38</b> <input type="checkbox"/> CPLG RATING _____ kW/100 @ 1.0 S.F. ACTUAL S.F. _____ <b>39</b> <input type="checkbox"/> SHAFT JCT RATING: @ DRIVER _____ (kW) @ INPUT SHAFT _____ (kW) <b>40</b> <input checked="" type="checkbox"/> MOUNTING ARRANGEMENT @ INPUT SHAFT: _____ DRIVER _____ <b>41</b> <input type="checkbox"/> MFR MAX BORE _____ (mm) PROPOSED BORE _____ (mm) (7.2.1.6) <b>42</b> DRIVER HALF-CPLG MTD BY: <input checked="" type="checkbox"/> DRIVER MFR <input checked="" type="checkbox"/> COMPR VENDOR <b>43</b> <input checked="" type="checkbox"/> IDLING ADAPTER FOR DRIVER HALF-COUPLING REQD <b>44</b> _____ <b>45</b> <b>PIPING REQUIREMENTS:</b> <b>46</b> <input type="checkbox"/> RECOMMENDED STRAIGHT RUN OF PIPE DIA BEFORE SUCTION: _____ <b>47</b> <input type="checkbox"/> VENDOR TO OBSERVE FLANGE PARTING <b>48</b> <input type="checkbox"/> THROUGH STUDS REQUIRED FOR PIPING FLANGES <b>49</b> <b>MISCELLANEOUS:</b> <b>50</b> <input type="checkbox"/> VENDOR PRESENT DURING INITIAL ALIGN CHECK <b>51</b> <input type="checkbox"/> VENDOR CHECK ALIGN AT OPERATING TEMP <b>52</b> <input type="checkbox"/> BASE DESIGNED FOR COLUMN MOUNTING <b>53</b> <input type="checkbox"/> THERMAL RELIEF VALVES PROVIDED BY VENDOR <b>54</b> <input type="checkbox"/> FOR WATER-COOLED EXCHANGERS <b>55</b> <input type="checkbox"/> FOR _____ <b>56</b> <input type="checkbox"/> PURCHASER WILL PREPARE COORDINATION MEETING AGENDA (9.1.3) <b>57</b> _____ <b>58</b> _____ <b>59</b> _____		<b>60</b> <b>SHOP INSPECTIONS &amp; TESTS: (8.1.1)</b> <input type="checkbox"/> ADVANCE NOTIFICATION REQD _____ DAYS <table border="1"> <thead> <tr> <th></th> <th>OBSERVED</th> <th>WITNESSED</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/> SHOP INSPECTION</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> HYDROSTATIC (8.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> COMBINED TEST (8.3.4 8.5.6)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> ASME PTC 10 TEST (8.3.4.1)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> INCLUDES <input type="checkbox"/> AIR FILTER</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> AFTERCOOLER</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> _____</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> GUIDE VANE (8.5.12.1)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> AT _____ NON-100 % POSITIONS</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> SOUND-LEVEL TEST</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> SPARE ROTOR TEST (8.5.12.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> SPARE ROTOR MECH ONLY</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> IMPELLER OVERSPEED TEST (8.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> POST OVERSPEED TEST NDE OF IMPELLERS (8.3.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> RESIDUAL UNBALANCE CHECK (6.12.8)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> OIL SYSTEM CLEANLINESS</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CONTROL SYSTEM CHECK (8.3.4.5.5)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> BRG, SEAL, GEAR CHECK (8.5.11.1 6.5.11.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> GEAR CONTACT CHECK (8.2.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CLEANLINESS CHECK-VESSELS (8.2.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CLEANLINESS CHECK-PIPING (8.2.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> HARDNESS CHECK OF PINIONS (8.2.3.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> OF BULL-GEAR</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> OF WELD REPAIRS</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> NDE OF MAJOR REPAIRS (8.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> GEAR TOOTH MAG-PART (8.5.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> FINAL INSPECTION PRIOR TO PAINT</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> INSPECTION OF PREP FOR SHIPMENT (8.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> _____</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> _____</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> PRIOR DOCUMENTATION ON MAJOR REPAIRS NOT REQD (6.10.4.3)</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> RETAIN FINAL ASSEMBLY CLEARANCES (8.5.1)</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> SUBMITTAL OF INSPECTOR'S CHECKLIST (8.1.2)</td><td></td><td></td></tr> <tr><td>SIGNED BY REP FOR: <input type="checkbox"/> PURCHASER <input type="checkbox"/> VENDOR</td><td></td><td></td></tr> <tr><td>IF DESIGN REQUIRES DISASSEMBLY OF PINION FOR BRG INSPECTION,</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> FORGO BEARING INSPECTION BASED ON TEST DATA; 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BASED ON THE ANNEX A API STD 672


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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX A - SHEET 05/12.

DATA SHEET		No.	REV.																																										
		SHEET 6 of 12																																											
TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>																																													
LUBE OIL SYSTEMS (6.9)																																													
BASIC SYSTEM REQUIREMENTS - NORMAL OIL FLOW		LUBRICANT: <input checked="" type="checkbox"/> SYNTHETIC <input checked="" type="checkbox"/> HYDROCARBON																																											
LUBE OIL TO: (L/min) (kPaG) (SSU @37.7 °C) <input type="checkbox"/> COMPRI/GEAR _____ <input type="checkbox"/> DRIVER _____ <input type="checkbox"/> EXT GEAR _____ <input type="checkbox"/> OIL SYSTEM PRESSURES: SUPPLY (kPaG) PUMP RV SETTING (kPaG) SYS DESIGN (kPaG) HYDROTEST (kPaG)		DESCRIPTION <input type="checkbox"/> MIN ALLOW OIL TEMP _____ (°C) _____ (SSU) SYSTEM COMPONENT SUPPLIERS: <table border="1"> <thead> <tr> <th></th> <th>MFR</th> <th>MODEL</th> </tr> </thead> <tbody> <tr><td>MAIN PUMP</td><td></td><td></td></tr> <tr><td>STANDBY PUMP</td><td></td><td></td></tr> <tr><td>ELECTRIC MOTOR(S)</td><td></td><td></td></tr> <tr><td>STEAM TURBINE(S)</td><td></td><td></td></tr> <tr><td>OIL COOLER(S)</td><td></td><td></td></tr> <tr><td>OIL FILTERS</td><td></td><td></td></tr> <tr><td>ACCUMULATOR(S)</td><td></td><td></td></tr> <tr><td>SUCTION STRAINERS</td><td></td><td></td></tr> <tr><td>CHECK VALVES</td><td></td><td></td></tr> <tr><td>TRANSFER VALVE(S)</td><td></td><td></td></tr> <tr><td>PUMP COUPLING</td><td></td><td></td></tr> <tr><td>PUMP RELIEF VALVES</td><td></td><td></td></tr> <tr><td>ELECTRIC HEATER</td><td></td><td></td></tr> </tbody> </table>			MFR	MODEL	MAIN PUMP			STANDBY PUMP			ELECTRIC MOTOR(S)			STEAM TURBINE(S)			OIL COOLER(S)			OIL FILTERS			ACCUMULATOR(S)			SUCTION STRAINERS			CHECK VALVES			TRANSFER VALVE(S)			PUMP COUPLING			PUMP RELIEF VALVES			ELECTRIC HEATER		
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ELECTRIC HEATER																																													
OIL COOLER: (TWIN - WITH TRANSFER VALVE)		PUMPS:																																											
<input type="checkbox"/> OPERATING PRESS. (kPaG) SHELL SIDE TUBE SIDE <input type="checkbox"/> MAX ALLOW WORK PRESS. (kPaG) <input type="checkbox"/> MAX ALLOW TEMP. (°C) <input checked="" type="checkbox"/> FOULING FACTOR _____ <input type="checkbox"/> SURFACE AREA (m²) DUTY (kJ/hr) <input checked="" type="checkbox"/> REMOVABLE BUNDLE TO BE FURNISHED <input type="checkbox"/> ASME CODE STAMPED <input type="radio"/> DESIGNED TO TEMA <input checked="" type="checkbox"/> TUBES: No. _____ O.D. (mm) LENGTH (mm) WALL THICKNESS (mm) <input type="checkbox"/> AVG <input type="checkbox"/> MIN <input checked="" type="checkbox"/> MATERIALS CHANNELS/HEADS SHELL TUBES TUBE SHELL CHANNEL COVERS TUBE SUPPORTS		<input checked="" type="checkbox"/> HORIZONTAL <input checked="" type="checkbox"/> VERTICAL <input checked="" type="checkbox"/> SUBMERGED <input checked="" type="checkbox"/> MOTOR DRIVEN <input checked="" type="checkbox"/> TURBINE DRIVEN <input checked="" type="checkbox"/> SHAFT DRIVEN <input checked="" type="checkbox"/> CENTRIFUGAL <input checked="" type="checkbox"/> ROTARY (SCREW) <input checked="" type="checkbox"/> FLANGE CONNECTED <input type="checkbox"/> RATED CAPACITY (m³/h) <input type="checkbox"/> DISCHARGE PRESS (kPaG) <input type="checkbox"/> @ MAX SSU <input type="checkbox"/> DRIVER RATING (kW) <input checked="" type="checkbox"/> CASING MATERIAL <input type="checkbox"/> SPEED <input checked="" type="checkbox"/> COUPLING <input checked="" type="checkbox"/> OSHA GUARD <input checked="" type="checkbox"/> MECHANICAL SEAL																																											
OIL FILTERS: (TWIN - WITH TRANSFER VALVE)		STANDBY PUMP CONTROL RESET:																																											
<input checked="" type="checkbox"/> MICRON RATING <input type="radio"/> NOMINAL <input type="radio"/> ABSOLUTE <input checked="" type="checkbox"/> ΔP: (kPa) CLEAN _____ DIRTY _____ COLLAPSE _____ <input checked="" type="checkbox"/> ELEMENT: MAKE _____ MODEL _____ <input type="checkbox"/> NO. ELEMENTS <input checked="" type="checkbox"/> MEDIA <input checked="" type="checkbox"/> CORE MATL <input checked="" type="checkbox"/> HSG MATL <input type="checkbox"/> HSG MAWP (kPaG) <input type="checkbox"/> MAX ALLOW TEMP (°C) MATERIAL: STAINLESS STEEL OIL HEATER: <input checked="" type="checkbox"/> STEAM HEATER REQD <input type="checkbox"/> ELECTRIC HEATER REQD <input type="checkbox"/> RATING (kJ/hr) <input type="checkbox"/> WATT DENSITY (W/m²)		<input type="radio"/> MANUAL <input type="radio"/> AUTOMATIC <input type="radio"/> HOA SELECTOR SWITCH																																											
OIL RESERVOIR:		SILENCERS																																											
<input checked="" type="checkbox"/> RETENTION TIME _____ MIN <input type="checkbox"/> CAPACITY _____ (l) <input type="checkbox"/> FREE SURFACE AREA (cm²) <input type="checkbox"/> INTERNAL BAFFLES MATERIAL:		INLET AIR FILTER/SILENCER: (7.7) <input type="checkbox"/> MFR _____ MODEL _____ <input type="checkbox"/> DESCRIPTION _____ <input type="checkbox"/> PIPING CONNECTION _____ <input type="checkbox"/> CLEAN ΔP, AS QUOTED (kPa) <input checked="" type="checkbox"/> CORROSION PROTECTION _____ <input type="checkbox"/> FILTER WILL BE REMOTE MOUNTED BY PURCHASER AT A DISTANCE (m) FROM COMPRESSOR <input type="checkbox"/> FILTER WILL BE ELEVATED (m) ABOVE GRADE																																											
		DISCHARGE BLOWOFF SILENCER: (7.8) <input type="checkbox"/> MFR _____ MODEL _____ <input type="checkbox"/> DESCRIPTION _____ <input type="checkbox"/> FLANGE CONNECTION _____ MOUNTING <input checked="" type="checkbox"/> HORIZONTAL <input checked="" type="checkbox"/> VERTICAL SUPPORTED BY <input checked="" type="checkbox"/> PIPING <input type="checkbox"/> OTHER _____ <input checked="" type="checkbox"/> SPL (dBA) (@ 1 m) FROM DISCHARGE OF SILENCER _____ NOTES _____ _____ _____																																											
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 <b>PETROBRAS</b>	TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>		SHEET 7 of 12
CONTROLS AND INSTRUMENTATION (7.4)			
1 LOCAL CONTROL PANEL: (7.4.3)			
2 <input type="radio"/> ELECTRICAL AREA CLASSIFICATION:			
3 CL _____ GR _____ DIV _____			
4 PURGE REQUIREMENT: (7.4.3.2)			
5 <input checked="" type="checkbox"/> NONE <input type="checkbox"/> INSTRUMENT AIR <input type="checkbox"/> NITROGEN			
6 <input checked="" type="checkbox"/> TYPE X - REDUCES THE CLASSIFICATION FROM DIV 1 TO NONHAZARDOUS			
7 <input checked="" type="checkbox"/> NEMA TYPE 4X ENCLOSURE MATERIAL: _____			
8 <input checked="" type="checkbox"/> NEMA TYPE 7 (INDOOR EXPLOSION-PROOF FOR HAZARDOUS GAS AREAS) REQUIRED			
9 <input checked="" type="checkbox"/> TYPE Y - REDUCES THE CLASSIFICATION FROM DIV 1 TO DIV 2			
10 PANEL FEATURES: (7.4.3.2)			
11 <input type="checkbox"/> VIBRATION ISOLATORS <input type="checkbox"/> STRIP HEATER <input type="checkbox"/> INTERNAL COOLING <input type="checkbox"/> TYPE Z - REDUCES THE CLASSIFICATION FROM DIV 2 TO NONHAZARDOUS			
12 <input type="checkbox"/> WEATHERHOOD <input checked="" type="checkbox"/> PURGE CONNECTIONS <input type="checkbox"/> OTHER			
13 <input type="checkbox"/> TROPICALIZATION REQUIRED			
14 <input checked="" type="checkbox"/> INSTRUMENT SUPPLIERS:			
15	PRESSURE GAUGES:	MFR _____	SIZE & TYPE _____
16	TEMPERATURE GAUGES:	MFR _____	SIZE & TYPE _____
17	LEVEL GAUGES:	MFR _____	SIZE & TYPE _____
18	DIFF PRESSURE GAUGES:	MFR _____	SIZE & TYPE _____
19	PRESSURE SWITCHES:	MFR _____	SIZE & TYPE _____
20	TEMPERATURE SWITCHES:	MFR _____	SIZE & TYPE _____
21	LEVEL SWITCHES:	MFR _____	SIZE & TYPE _____
22	PRESSURE TRANSMITTERS:	MFR _____	SIZE & TYPE _____
23	TEMPERATURE TRANSMITTERS:	MFR _____	SIZE & TYPE _____
24	LEVEL TRANSMITTERS:	MFR _____	SIZE & TYPE _____
25	CONTROL VALVES:	MFR _____	SIZE & TYPE _____
26	PRESSURE RELIEF VALVES:	MFR _____	SIZE & TYPE _____
27	THERMAL RELIEF VALVES:	MFR _____	SIZE & TYPE _____
28	TEMPERATURE CONTROL VALVES:	MFR _____	SIZE & TYPE _____
29	SIGHT FLOW INDICATORS:	MFR _____	SIZE & TYPE _____
30	PURGE FLOW INDICATORS:	MFR _____	SIZE & TYPE _____
31	SOLENOID VALVES:	MFR _____	SIZE & TYPE _____
32	ANNUNCIATOR:	MFR _____	SIZE & TYPE _____
33	TUBE FITTINGS	MFR _____	SIZE & TYPE _____
34		MFR _____	SIZE & TYPE _____
35		MFR _____	SIZE & TYPE _____
36		MFR _____	SIZE & TYPE _____
37		MFR _____	SIZE & TYPE _____
38 SWITCH CLOSURES: (7.4.5.3.2)			
39	ALARM CONTACTS SHALL:	<input type="radio"/> OPEN <input type="radio"/> CLOSE TO SOUND ALARM AND BE NORMALLY	<input type="radio"/> ENERGIZED <input type="radio"/> DE-ENERGIZED
40	SHUTDOWN CONTACTS SHALL:	<input type="radio"/> OPEN <input type="radio"/> CLOSE TO TRIP AND BE NORMALLY	<input type="radio"/> ENERGIZED <input type="radio"/> DE-ENERGIZED
41 (NOTE: NORMAL CONDITION IS WHEN COMPRESSOR IS IN OPERATION)			
42 <input type="radio"/> SHUTDOWN SYSTEMS ARE NOT TO BE PROVIDED WITH A MEANS TO PERMIT TESTING WITHOUT SHUTTING DOWN THE UNIT (7.4.5.3.4)			
43 <input type="radio"/> NON-SHUTDOWN DEVICES ARE NOT REQUIRED TO HAVE VALVING TO PERMIT REPLACEMENT DURING OPERATION			
44 <input type="radio"/> ISOLATION VALVES ARE REQUIRED FOR SHUTDOWN SENSING DEVICES			
45 MISCELLANEOUS INSTRUMENTATION:			
46 <input type="radio"/> THROUGH FLOWING INSTRUMENT SENSING LINE REQUIRED			
47 <input type="radio"/> LIQUID-FILLED GAUGES ARE REQUIRED FOR AREAS SUBJECT TO VIBRATION			
48 <input type="radio"/> RELIEF VALVES MAY HAVE BODIES IN MATERIALS OTHER THAN STEEL <input checked="" type="checkbox"/> RV BODY MATERIAL: _____			
49 <input type="radio"/> THERMAL RELIEF VALVES REQUIRED FOR COMPONENTS THAT CAN BE ISOLATED			
50 <input type="radio"/> FLOW INDICATOR TYPE/MATERIAL IF OTHER THAN BULLS EYE TYPE WITH STEEL BODY			
51 <input type="radio"/> PURGE REQUIRED FOR ANNUNCIATOR (7.4.3.2) <input type="radio"/> X <input type="radio"/> Y <input type="radio"/> Z <input type="radio"/> CONNECTION ONLY			
52 <input type="radio"/> COMBINATION BLOCK AND BLEED VALVES MAY BE SUBSTITUTED			
53 <input type="radio"/>			
54 <input type="radio"/>			
55 NOTES: _____			
56 _____			
57 _____			
58 _____			
59 _____			
BASED ON THE ANNEX A API STD 672			
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						SHEET
						8 of 12
TITLE:		<b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>				
INSTRUMENTATION SCOPE OF SUPPLY						
		ELEMENT			INDICATOR	
		PROV BY	TYPE	LOCATION	INSTALL BY	PROV BY LOCATION
		VENDOR PURCHASER	DIRECT READOUT SWITCH TRANSMITTER <sup>1)</sup>	VENDOR PKG LOCAL PANEL PURCH PIPING	VENDOR PURCHASER	VENDOR PKG PURCH PIPING LOCAL PANEL ALARM SHUTDOWN REPEAT SIGNAL <sup>2)</sup>
PRESSURE:						
COMPRESSOR SUCTION STAGE						
COMPRESSOR DISCHARGE STAGE						
LUBE OIL DISCHARGE (LOW)						
LUBE OIL FILTER ΔP (HIGH)						
LUBE OIL SUPPLY						
AIR FILTER/SILENCER ΔP (HIGH)						
WATER MANIFOLD IN AND OUT						
TEMPERATURE:						
COMPRESSOR SUCTION STAGE						
COMPRESSOR DISCHARGE STAGE						
OIL COOLER OUTLET						
COMPRESSOR PINION JOURNAL BRG						
BULL GEAR JOURNAL BRG						
BULL GEAR OR PINION THRUST BRG						
DRIVER JOURNAL BRG						
DRIVER THRUST BRG						
RESERVOIR						
LEVEL:						
LUBE OIL RESERVOIR						
SEPARATOR						
VIBRATION:						
RADIAL VIBRATION EACH STAGE						
RADIAL VIBRATION BULL GEAR SHAFT						
AXIAL POSITION BULL GEAR SHAFT						
AXIAL POSITION						
RADIAL VIBRATION ON DRIVER						
AXIAL POSITION ON DRIVER SHAFT						
ACCELEROMETER ON GEAR BOX						
FLOW:						
OIL RETURN						
MISCELLANEOUS:						
STANDBY L.O. PUMP RUNNING						
PANEL PUGE FAILURE						
ANNUNCIATOR PURGE FAILURE						
SURGE RECOGNITION						
OIL HEATER ON						
COMMON REMOTE ALARM INDICATION						
COMMON REMOTE SHUTDOWN INDICATION						
NOTE 1 TRANSMITTERS SUPPLIED BY VENDOR SHALL INCLUDE SENSING ELEMENT.						
NOTE 2 SUPPLY "REPEAT SIGNAL" FOR CONTROL ROOM ALSO.						
BASED ON THE ANNEX A API STD 672						
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PETROBRAS


N-2649

REV. B


ENGLISH

06 / 2013

DATA SHEET		No.	REV.
		SHEET 9 of 12	
TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>			
1 (INTER-) (AFTER-) COOLER(S)			
2 SERVICE OF UNIT: _____ TEM No _____			
3 SIZE: _____ TYPE: _____ <input type="checkbox"/> HORIZ <input type="checkbox"/> VERT CONNECTED IN <input type="checkbox"/> PARALLEL <input type="checkbox"/> SERIES			
4 SURF/UNIT: (GROSS/EFF) _____ (m <sup>2</sup> ) SHELLS/UNIT: _____ SURF/SHELL: (GROSS/EFF) _____ (m <sup>2</sup> )			
5			
6 PERFORMANCE OF ONE UNIT			
7 <input type="radio"/> FLUID NAME 8 <input type="checkbox"/> FLUID QUANTITY, TOTAL (kg/h) 9 VAPOR-IN/OUT 10 LIQUID-IN/OUT 11 <input type="checkbox"/> TEMPERATURE-IN/OUT (°C) 12 <input type="checkbox"/> SPECIFIC GRAVITY 13 <input type="checkbox"/> VISCOSITY, LIQUID (mPa-s) 14 <input type="checkbox"/> SPECIFIC HEAT, (kJ/kg °C) 15 <input type="checkbox"/> THERMAL CONDUCTIVITY, (kJ/m h °C) 16 <input type="checkbox"/> LATENT HEAT, (kJ/kg °C) 17 <input type="checkbox"/> INLET PRESSURE, (kPaG) 18 <input checked="" type="checkbox"/> VELOCITY, (m/s) 19 <input checked="" type="checkbox"/> PRESSURE DROP-ALLOW/CALC, (kPa) 20 <input checked="" type="checkbox"/> FOULING RESISTANCE-MINIMUM (hr m <sup>2</sup> °C/kJ) 21		SHELL SIDE AIR TUBE SIDE WATER	
22			
23 <input type="checkbox"/> HEAT EXCHANGED _____ (kJ/hr) MTD CORRECTED _____ (°C)			
24 <input type="checkbox"/> TRANSFER RATE, (kJ/hr m <sup>2</sup> °C) SERVICE _____ CLEAN _____			
25			
26 <input type="checkbox"/> CONSTRUCTION OF ONE SHELL		SKETCH: BUNDLE NOZZLE ORIENTATIONS	
27 DESIGN/TEST PRESSURE, (kPaG) 28 DESIGN TEMPERATURE, (°C) 29 NO. PASSES PER SHELL 30 CORROSION ALLOWANCE, (mm) 31 NOZZLES: _____ INLET 32 SIZE _____ OUTLET 33 RATING _____ INSP. NOZZLE		SHELL SIDE TUBE SIDE	
34			
35 TUBE No. _____ O.D. _____ (mm) THK (MIN) (AVG) _____ (mm) LENGTH _____ (m) PITCH _____ (mm) 30 45 60 90 120			
36 TUBE TYPE _____ MATERIAL _____			
37 SHELL MATL _____ I.D. _____ (mm) O.D. _____ (mm) SHELL COVER MATL _____ (INTEG) (REMOV)			
38 CHANNEL OR BONNET MATL _____ CHANNEL COVER MATL _____			
39 TUBESHEET-STATIONARY MATL _____ TUBESHEET-FLOATING MATL _____			
40 FLOATING HEAD COVER MATL _____ IMPINGEMENT PROTECTION _____			
41 BAFFLES-CROSS MATL _____ TYPE _____ % CUT (DIA) (AREA) _____ SPACING: C/C _____ INLET _____ (mm)			
42 BAFFLES-LONG MATL _____ SEAL TYPE _____			
43 SUPPORTS-TUBE _____ U-BEND _____ TYPE _____			
44 BYPASS SEAL ARRANGEMENT _____ TUBE-TUBESHEET JOINT _____			
45 GASKETS-SHELL SIDE _____ TUBE SIDE _____			
46 -FLOATING HEAD _____			
47 ASME SECTION VIII CODE REQUIREMENTS: <input type="checkbox"/> DESIGN & TEST <input type="checkbox"/> STAMP <input type="checkbox"/> NOT APPLICABLE TEMA CLASS _____			
48 WEIGHT/SHELL _____ (kg) FILLED WITH WATER _____ (kg) BUNDLE _____ (kg)			
49			
50 NOTES:			
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DATA SHEET		No.	REV.																				
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		TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>																					
NEMA FRAME INDUCTION MOTORS TO IEEE 841																							
1 MFR	MODEL	SERIAL No.	NEMA FRAME																				
2 DRIVEN EQUIPMENT TYPE	DRIVEN EQUIPMENT ITEM No.	MOTOR ITEM No.																					
○ OPERATION CONDITIONS																							
<b>SITE DATA:</b> ELECTRICAL SUPPLY: VOLTS _____ PHASE _____ HERTZ _____ ELECTRICAL AREA CLASSIFICATION: ○ NON-HAZARDOUS ○ CLASS _____ GROUP _____ DIVISION _____ ATMOSPHERIC MIXTURE: _____ IGNITION TEMPERATURE: _____ (°C) TEMP CODE: _____ ALTITUDE: ○ LESS THAN (1 000 m) ○ 595 (m) AMBIENT TEMPERATURE MINIMUM _____ (°C) _____ (°C) UNUSUAL CONDITIONS: _____		<b>DRIVE SYSTEM:</b> ○ DIRECT CONNECTED ○ EXTERNAL GEAR ○ OTHER _____ <b>STARTING: (7.1.2.2)</b> ○ FULL VOLTAGE ○ REDUCED VOLTAGE _____ % ○ LOADED ○ UNLOADED ○ VOLTAGE DIP _____ %																					
□ PERFORMANCE																							
NO LOAD CURRENT, AMPS _____ FULL LOAD TORQUE, (N-m) _____ STARTS PER HOUR: _____ HOT _____ COLD ACCELERATION TIME: _____ SEC		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>LOAD</th> <th>CURRENT AMP</th> <th>EFFICIENCY</th> <th>POWER FACTOR</th> </tr> </thead> <tbody> <tr> <td>FULL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>75%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>50%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LOCKED ROTOR</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		LOAD	CURRENT AMP	EFFICIENCY	POWER FACTOR	FULL				75%				50%				LOCKED ROTOR			
LOAD	CURRENT AMP	EFFICIENCY	POWER FACTOR																				
FULL																							
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50%																							
LOCKED ROTOR																							
☑ CONSTRUCTION FEATURES [6] [7] [8] [19]																							
□ NAMEPLATE (kW) _____ (rpm) S.F. _____ NEMA TORQUE DESIGN: ○ A ○ B ○ C ○ D □ NEMA LOCKED ROTOR KVA CODE LETTER: _____ EFFICIENCY: ○ STANDARD ○ HIGH ○ PREMIUM NOISE DESIGN: ○ STANDARD ○ LOW NOISE ○ MAX SOUND PRESSURE LEVEL (dBA) (@ 1 m) _____ □ EXPECTED SPL (dBA) (@ 1 m) _____ ENCLOSURE: ☑ TEAAC □ TENV ☑ EXPLOSION PROOF MOUNTING: ☑ HORIZONTAL ☑ VERTICAL □ FOOT MOUNTED ☑ FLANGE MOUNTED □ SHAFT UP □ SHAFT DOWN MAIN TERMINAL BOX MOUNTING LOCATION: ☑ F-1 ☑ F-2 FAN: □ REVERSIBLE □ UNI-DIRECTIONAL ○ NON-SPARKING BEARING TYPE: □ BALL □ ROLLER □ SLEEVE BRG LUBRICATION: ☑ GREASE □ RING OIL ○ FORCED LUBRIFIC. GREASE FITTING: ☑ PLUGGED ○ ALEMITE ○ OTHER _____ BRG SHIELDING: □ SINGLE ☑ DOUBLE ○ SEALED FOR LIFE		MOTOR ROTATION: (FACING END OPPOSITE SHAFT EXTENSION) ☑ CW ☑ CCW ☑ BI-DIRECTIONAL INSULATION CLASS: ○ B ○ F ○ OTHER _____ ○ NON-HYGROSCOPIC ○ TROPICALIZED ☑ TEMPERATURE RISE: (DEFAULT IS 80 °C ABOVE 40 °C BY RES @ 1.0) _____ °C ABOVE _____ °C BY _____ @ _____ S.F. ☑ MOTOR TO BE "THERMALLY PROTECTED" ☑ MOTOR TO BE "OVER TEMP PROTECTED" □ TYPE #1--"WINDING--RUNNING AND LOCKED-ROTOR PROTECTED" □ TYPE #2--"WINDING--RUNNING PROTECTED" □ TYPE #3--"WINDING--PROTECTED, NON-SPECIFIC" ○ SPACE HEATER REQD □ RATED AT: _____ WATTS ☑ VOLTS _____ PHASE _____ HERTZ _____ ☑ MAX SHEATH TEMPERATURE: _____ °C ○ SEPARATE JUNCTION BOX FOR SPACE HEATER LEADS MOTOR THRUST LOAD: ○ _____ (kg) ○ NONE DIRECTION OF THRUST: ○ TOWARD COUPLING ○ AWAY FROM COUPLING □ MOTOR THRUST RATING: _____ (kg)																					
<b>TESTING</b> IEEE TESTING: ○ OBSVD ○ WIT ○ SUBMIT CERT'D RESULTS ○ SPECIAL TESTING: _____ _____ _____ _____ _____ _____ _____ _____ _____		<b>MISCELLANEOUS</b> PAINTING: ○ IEEE 841 STD ○ OTHER _____ ○ PETROBRAS N-1735 _____ _____ _____ _____ _____ _____ _____ _____																					
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 <b>PETROBRAS</b>	<b>DATA SHEET</b>	No.	REV.
	<b>TITLE:</b> <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>		SHEET
			11 of 12

1	ALLOWABLE PIPING FORCES AND MOMENTS					
2						
3	COMPRESSOR INLET		COMPRESSOR DISCHARGE		PACKAGE OUTLET	
4	FORCE, (kg)	MOMENT, (N-m)	FORCE, (kg)	MOMENT, (N-m)	FORCE, (kg)	MOMENT, (N-m)
5						
6	AXIAL					
7	VERT					
8	TRANS					
9						
10	ADDITIONAL DATA _____					
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 <b>PETROBRAS</b>	<b>DATA SHEET</b>	No.	REV.
	TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - SI UNITS (kPa)</b>		SHEET 12 of 12
	GENERAL NOTES		
1			
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[illegible]



PETROBRAS

N-2649

REV. B

ENGLISH

06 / 2013

DATA SHEET		No.	REV.
		SHEET 2 of 12	
TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>			
SI UNITS (kgf/cm <sup>2</sup> )			
1 APPLICABLE TO: <input type="radio"/> PROPOSAL <input type="radio"/> PURCHASE <input type="radio"/> AS BUILT 2 FOR: _____ UNIT: _____ 3 SITE: _____ No. REQUIRED: _____ 4 SERVICE _____ DRIVER ITEM No.: _____ 5 <input type="radio"/> CONTINUOUS <input type="radio"/> INTERMITTENT <input type="radio"/> STANDBY (2.1.7) SPARED BY: _____ 6 NOTE: INFORMATION TO BE COMPLETED. <input type="radio"/> BY PURCHASER <input type="checkbox"/> BY MANUFACTURER <input checked="" type="checkbox"/> BY PURCHASER OR MFR			
GENERAL			
8 COMPRESSOR MFR _____ MODEL (SIZE AND TYPE) _____ SERIAL No. _____ 9 DRIVER MFR _____ DRIVER TYPE _____ RATED (BHP) _____ RPM _____ 10 DRIVE SYSTEM: <input type="radio"/> DIRECT COUPLED <input type="radio"/> OTHER _____ DUTY (1.2) <input type="radio"/> BASIC <input type="radio"/> SPECIAL			
OPERATING CONDITIONS (6.1.9)		CONTROL SYSTEM (7.4.2)	
13 ALL DATA ON PER UNIT BASIS	RATED (3.2.4)	LOW AMB (7.10.1)	MIN AMB
14 <input type="radio"/> DELIVERED FLOW, m <sup>3</sup> /h (1,033 kgf/cm <sup>2</sup> & 0 °C DRY)			
15 <input type="radio"/> WEIGHT FLOW, kg/h (WET) (DRY)			
16 <input type="radio"/> INLET COOLING WATER TEMP. (°C)			
17 INLET CONDITIONS:			
18 <input type="radio"/> PRESSURE (kgf/cm <sup>2</sup> A)			
19 <input type="radio"/> TEMPERATURE (°C)			
20 <input type="radio"/> RELATIVE HUMIDITY %			
21 <input type="radio"/> MOLECULAR WEIGHT (M)			
22 <input type="checkbox"/> INLET VOLUME, (m <sup>3</sup> /h) (WET / DRY)			
23 DISCHARGE CONDITIONS:			
24 <input type="radio"/> PRESSURE (kgf/cm <sup>2</sup> A)			
25 <input type="checkbox"/> TEMPERATURE (°C)			
26 PERFORMANCE:			
27 <input type="checkbox"/> MAX (BHP) REQUIRED (ALL LOSSES INCL)			
28 <input type="checkbox"/> (BHP / 100 m <sup>3</sup> /h) AIR DELIVERED			
29 <input type="checkbox"/> INPUT SPEED (rpm)			
30 <input type="checkbox"/> ESTIMATED SURGE, (m <sup>3</sup> /h) (@ ABOVE SPEED)			
31 <input type="radio"/> MAX ΔP ACROSS INLET FILTER, (kgf/cm <sup>2</sup> )			
32 ΔP INCLUDED IN CALCULATION <input type="checkbox"/> YES <input type="checkbox"/> NO			
33 <input checked="" type="checkbox"/> AFTERCOOLER OUTLET TEMP, (°C)			
34 <input type="checkbox"/> PERFORMANCE CURVE NO.			
35 <input type="checkbox"/> % RISE TO SURGE (6.1.12.2)			
36 <input type="checkbox"/> % TURNDOWN			
37 <input type="checkbox"/> GUARANTEE			
38 <input type="checkbox"/> _____			
39 <input type="checkbox"/> _____			
40 <input type="checkbox"/> _____			
41 <input type="checkbox"/> _____			
42 <input type="checkbox"/> _____			
43 <input type="checkbox"/> _____			
44 <input type="checkbox"/> _____			
45 <input type="checkbox"/> _____			
46 * UNTHROTTLED PERFORMANCE FOR DRIVER SIZING			
NOTES		CONTROL METHOD: (7.4.2.1)	
		<input type="radio"/> CAPACITY MODULATION (CONST DISCH PRESS) (7.4.2.1 a.) <input type="radio"/> INLET THROTTLE DEVICE <input type="radio"/> DAMPER <input type="radio"/> GLOBE VALVE <input type="radio"/> BUTTERFLY VALVE <input type="radio"/> VARIABLE INLET GUIDE VANES <input type="radio"/> AUTOMATIC DUAL CONTROL (7.4.2.1 b.) <input type="radio"/> (kgf/cm <sup>2</sup> G) TO (kgf/cm <sup>2</sup> G) DISCH PRESS <input type="radio"/> AUTO START AND STOP (7.4.2.1 c.) <input type="radio"/> START (kgf/cm <sup>2</sup> G) STOP (kgf/cm <sup>2</sup> G) <input type="radio"/> OTHER (DESCRIBE): _____	
		CONTROL SYSTEM REQUIREMENTS:	
		<input type="radio"/> UNIT OPERATES IN PARALLEL (7.4.2.2) <input type="radio"/> W/CENTRIFUGAL <input type="radio"/> W/ROTARY <input type="radio"/> W/RECIPROCATING <input type="radio"/> MICROPROCESSOR CAPABLE OF COMMUNICATION WITH PURCHASER'S DCS (7.4.1.4) <input type="radio"/> COMM PROTOCOL _____	
		CONTROL SYSTEM ALTERNATES: (7.4.1.3)	
		<input type="radio"/> OTHER THAN MICROPROCESSOR BASED: <input type="radio"/> SUITABLE FOR INDOOR ONLY <input type="radio"/> FURNISHED BY PURCHASER	
		INTER- AND AFTER-COOLERS (7.6)	
		AFTERCOOLER:	
		<input type="radio"/> FURNISHED BY PURCHASER (7.6.1) <input type="radio"/> NOT NEEDED (7.6.1) <input type="radio"/> WATER-COOLED TYPE BY VENDOR <input type="radio"/> WATER-COOLED INTERCOOLERS REQD (7.6.3) <input type="radio"/> FURNISHED BY PURCHASER <input checked="" type="checkbox"/> AIR-COOLED EXCHANGER AUTOMATIC TEMPERATURE CONTROL MEANS: (7.6.6) <input type="radio"/> LOUVERS <input type="radio"/> VARIABLE SPEED FANS <input type="radio"/> VARIABLE PITCH FANS <input type="radio"/> BYPASS VALVE <input checked="" type="checkbox"/> AIR-COOLER CONTROL MANUAL ONLY (7.6.6) BY: <input type="radio"/> LOUVERS <input type="radio"/> BYPASS VALVE <input type="radio"/> VARIABLE PITCH FANS	
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BR PETROBRAS		DATA SHEET		No.	REV.
				SHEET 3 of 12	
		TITLE:		PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm <sup>2</sup> )	
1		LOCATION, SITE DATA (6.1.5)		SPECIFICATIONS	
2		LOCATION:		NOISE SPECIFICATIONS: (6.1.3)	
3		<input type="checkbox"/> INDOOR <input type="checkbox"/> HEATED <input type="checkbox"/> UNDER ROOF		<input type="checkbox"/> MAX ALLOWABLE SPL _____ (@ 1 m)	
4		<input type="checkbox"/> OUTDOOR <input type="checkbox"/> UNHEATED <input type="checkbox"/> PARTIAL SIDES		<input type="checkbox"/> APPLICABLE SPEC _____	
5		<input type="checkbox"/> GRADE <input type="checkbox"/> MEZZANINE <input type="checkbox"/>		ACOUSTIC HOUSING: <input type="checkbox"/> YES <input type="checkbox"/> NO	
6		<input type="checkbox"/> WINTERIZATION REQD <input type="checkbox"/> TROPICALIZATION REQD		APPLICABLE SPECIFICATIONS:	
7				API STD 672 AND <input type="checkbox"/>	
8		SITE DATA:		<input type="checkbox"/> NON-ASME WELDING IF NOT AWS D1.1: (6.10.3.5) _____	
9		<input type="checkbox"/> ELEVATION _____ (m) <input type="checkbox"/> BAROMETER _____ (kgf/cm <sup>2</sup> A)		<input type="checkbox"/> UNITS OF MEASURE (5.1) <input type="checkbox"/> US CUSTOMARY <input type="checkbox"/> SI <input type="checkbox"/> OTHER _____	
10		<input type="checkbox"/> RANGE OF AMBIENT TEMPERATURE, _____ (°C)			
11		DRY BULB WET BULB			
12		NORMAL _____			
13		MAXIMUM _____			
14		MINIMUM _____			
15					
16					
17		UNUSUAL CONDITIONS:		PAINTING:	
18		<input type="checkbox"/> DUST <input type="checkbox"/> FUMES <input type="checkbox"/> CORROSIVE CONDITIONS		<input type="checkbox"/> MANUFACTURER'S STD	
19		<input type="checkbox"/> CORROSIVES PRESENT: _____		<input type="checkbox"/> OTHER _____	
20		<input type="checkbox"/> CONDITIONS CAUSE STRESS CORROSION CRACKING		BASEPLATE GROUT: (7.10.3) <input type="checkbox"/> EPOXY <input type="checkbox"/> CEMENT <input type="checkbox"/> NONE	
21		<input type="checkbox"/> OTHER _____		PREPARATION FOR GROUT SURFACES: (7.10.3)	
22				<input type="checkbox"/> MFR STD <input type="checkbox"/> API RP 686 BLAST <input type="checkbox"/> BARE FOR FIELD BLAST	
23		AREA ELECTRICAL CLASSIFICATION: (6.1.8) T-CODE _____		<input type="checkbox"/> INORGANIC ZINC SILICATE COATING	
24		<input type="checkbox"/> CLASS _____ GROUP _____ DIVISION _____		<input type="checkbox"/> OTHER _____	
25		<input type="checkbox"/> LOCAL ELECTRICAL CODES: _____			
26					
27		UTILITY CONDITIONS:		SHIPMENT: (8.4.1)	
28		<input type="checkbox"/> STEAM HEATING:		<input type="checkbox"/> DOMESTIC <input type="checkbox"/> EXPORT <input type="checkbox"/> EXPORT BOXING REQD	
29		INLET MIN _____ (kgf/cm <sup>2</sup> G) _____ (°C)		<input type="checkbox"/> OUTDOOR STORAGE OVER: <input type="checkbox"/> 6 MONTHS <input type="checkbox"/> 12 MONTHS	
30		NORM _____ (kgf/cm <sup>2</sup> G) _____ (°C)			
31		MAX _____ (kgf/cm <sup>2</sup> G) _____ (°C)			
32		OUTLET MIN _____ (kgf/cm <sup>2</sup> G) _____ (°C)			
33		NORM _____ (kgf/cm <sup>2</sup> G) _____ (°C)			
34		MAX _____ (kgf/cm <sup>2</sup> G) _____ (°C)			
35					
36		<input type="checkbox"/> ELECTRICITY:		<input type="checkbox"/> UTILITY CONSUMPTION (9.2.3.1.)	
37		HEATING CONTROL DRIVERS		STEAM:	
38		INSTRUMENTS CONTROL PANEL		OIL HEATER: _____ (kg/h) OTHER _____ (kg/h)	
39		VOLTAGE _____		ELECTRIC:	
40		HERTZ _____		LOCKED ROTOR AMPS FULL LOAD AMPS	
41		PHASE _____		(kW)	
42				MAIN LO PUMP _____	
43				AUX LO PUMP _____	
44				OIL HEATER _____ (kW) SPACE HEATER _____ (kW)	
45				CONTROL SYSTEM LOAD: _____ (kW)	
46				COOLING WATER:	
47				L.O. COOLER INTER-COOLER AFTER-COOLER OTHER	
48				QUANTITY, (L/min) _____	
49				OUTLET TEMP, (°C) _____	
50				PRESS DROP, (kgf/cm <sup>2</sup> ) _____	
51				TOTAL CW, (L/min) _____	
52				AIR/NITROGEN:	
53				INLET PRESS (kgf/cm <sup>2</sup> G) QUANTITY (m <sup>3</sup> /h)	
54				SEAL SYSTEM: _____	
55				CONTROL PANEL: _____	
56				LO RESERVOIR: _____	
57				INSTR HOUSINGS: _____	
58				CONTROL SYSTEM: _____	
59				OTHER _____	
60				TOTAL PURGE, (m <sup>3</sup> /h) _____	
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<input type="checkbox"/> <b>COMPRESSOR SPEEDS:</b> RATED INPUT: _____ (rpm) TRIP _____ (rpm) BULLGEAR CRITICALS: 1st _____ (rpm) 2nd _____ (rpm) PINION CRITICALS: 1st STG PINION 1st _____ (rpm) 2nd _____ (rpm) 2nd STG PINION 1st _____ (rpm) 2nd _____ (rpm) 3rd STG PINION 1st _____ (rpm) 2nd _____ (rpm) 4th STG PINION 1st _____ (rpm) 2nd _____ (rpm) OTHER UNDESIRABLE SPEEDS: (6.7.1.3) _____ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>STAGE</th> <th>IMPELLER</th> <th>TIP</th> </tr> <tr> <th>SPEED</th> <th>DIAMETER</th> <th>SPEED</th> </tr> </thead> <tbody> <tr> <td>1st STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>2nd STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>3rd STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> <tr> <td>4th STAGE _____ (rpm)</td> <td>_____ (mm)</td> <td>_____ (m/hr)</td> </tr> </tbody> </table>				STAGE	IMPELLER	TIP	SPEED	DIAMETER	SPEED	1st STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	2nd STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	3rd STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)	4th STAGE _____ (rpm)	_____ (mm)	_____ (m/hr)																																																																																		
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<input type="checkbox"/> <b>INTEGRAL GEAR HOUSING:</b> MATERIAL _____ SPLIT _____ <input type="checkbox"/> <b>BULL GEAR:</b> (6.5.3 6.12.2) RATED POWER BASED ON TOOTH SURFACE DURABILITY: _____ (kW) RATED POWER BASED ON TOOTH BENDING: _____ (kW) <input type="checkbox"/> MIN AGMA SF: _____ <input type="checkbox"/> ACTUAL S.F. _____ GEAR RIM MATERIAL: _____ HARDNESS: _____ GEAR FACE WIDTH: _____ (mm) GEAR CENTER MATL: _____ MECHANICAL EFFICIENCY: _____ % ISO 1328 GRADE: _____ PITCH DIA _____ (mm) PITCH LINE VELOCITY _____ <input type="checkbox"/> <b>PINIONS:</b> (6.5.3 6.12.2) 1st 2nd 3rd 4th SERVICE FACTOR: _____ MATERIAL: _____ HARDNESS: (BHN) (R <sub>c</sub> ) _____ <input type="checkbox"/> <b>BULL GEAR SHAFT:</b> <input type="checkbox"/> REPLACEABLE <input type="checkbox"/> INTEGRAL W/GEAR MATL: _____ HARDNESS: _____ (BHN) (R <sub>c</sub> ) BRG SPAN _____ (mm) WEIGHT (W/GEAR) _____ (kg) DIA @ GEAR _____ (mm) DIA @ COUPLING _____ (mm) SHAFT SLEEVES AT SEALS: MATL _____ SHAFT LABYS: TYPE _____ MATL _____ BULL GEAR RADIAL BRG TYPE: _____ LENGTH _____ ALLOW LOAD _____ (kgf/cm <sup>2</sup> ) ACTUAL LOAD _____ (kgf/cm <sup>2</sup> ) <input type="checkbox"/> <b>BULL GEAR THRUST BEARINGS:</b> (6.8.3) LOCATION _____ TYPE _____ MFR _____ AREA _____ (mm <sup>2</sup> ) THRUST COLLAR (6.8.3.6) <input type="checkbox"/> INTEGRAL <input type="checkbox"/> REPLACEABLE ALLOW LOAD _____ (kgf/cm <sup>2</sup> ) ACTUAL LOAD _____ (kgf/cm <sup>2</sup> ) GAS LOAD _____ (kg) COUPLING LOAD _____ (kg) BEARINGS FITTED W/TEMP SENSORS (6.12.10 6.12.11) <input type="checkbox"/> PINION RADIAL BRG <input type="checkbox"/> BULL GEAR RADIAL BRG <input type="checkbox"/> THRUST BRG <input checked="" type="checkbox"/> <b>MAIN CONNECTIONS:</b> (6.3) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>SIZE</th> <th>ASME RATING</th> <th>FACING</th> <th>POSITION</th> </tr> </thead> <tbody> <tr><td>COMPR INLET</td><td></td><td></td><td></td><td></td></tr> <tr><td>COMPR DISCH</td><td></td><td></td><td></td><td></td></tr> <tr><td>PKG OUTLET</td><td></td><td></td><td></td><td></td></tr> <tr><td>ATM BLOWOFF</td><td></td><td></td><td></td><td></td></tr> <tr><td>FILTER OUTLET</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>					SIZE	ASME RATING	FACING	POSITION	COMPR INLET					COMPR DISCH					PKG OUTLET					ATM BLOWOFF					FILTER OUTLET																																																																										
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<b>1 VIBRATION DETECTORS: (7.4.4.5 7.10.10)</b> <b>2</b> <input checked="" type="checkbox"/> TYPE _____ <input checked="" type="checkbox"/> MODEL _____ <b>3</b> <input type="checkbox"/> MFR _____ <b>4</b> <input type="checkbox"/> No. AT EACH PINION BEARING _____ TOTAL No. _____ <b>5</b> <input type="checkbox"/> No. AT EACH DRIVER BEARING _____ TOTAL No. _____ <b>6</b> <input type="checkbox"/> X&Y RADIAL PROBES CAN BE MOUNTED ADJACENT TO IMPELLERS FOR: <b>7</b> <input type="checkbox"/> 1st STG <input type="checkbox"/> 2nd STG <input type="checkbox"/> 3rd STG <input type="checkbox"/> 4th STG <b>8</b> <b>OSCILLATOR-DEMODULATORS:</b> <b>9</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>10</b> <input type="checkbox"/> MONITOR SUPPLIED BY _____ <b>11</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>12</b> <input type="checkbox"/> LOCATION _____ ENCLOSURE _____ <b>13</b> <input type="checkbox"/> READOUT SCALE RANGE _____ <input type="checkbox"/> ALARM <input type="checkbox"/> SET @ _____ <b>14</b> <input type="checkbox"/> SHUTDOWN: <input type="checkbox"/> SET @ _____ (mm/sec <sup>2</sup> ) <input type="checkbox"/> TIME DELAY _____ SEC <b>15</b> <input type="checkbox"/> PER API 670 (7.10.10 7.10.11) <b>16</b> <b>BEARING-TEMPERATURE MONITOR: (7.10.12)</b> <b>17</b> <input type="checkbox"/> REQD <input type="checkbox"/> SUPPLIED BY: _____ <input type="checkbox"/> PER API 670 <b>18</b> <input type="checkbox"/> MFR _____ <input checked="" type="checkbox"/> MODEL _____ <b>19</b> <b>AXIAL POS. MOVEMENT DETECTOR: (7.10.10 7.10.11)</b> <b>20</b> <input checked="" type="checkbox"/> TYPE _____ <input checked="" type="checkbox"/> MODEL _____ <b>21</b> <input type="checkbox"/> MFR _____ <b>22</b> <input type="checkbox"/> READOUT SCALE RANGE _____ <input type="checkbox"/> ALARM <input type="checkbox"/> SET @ _____ <b>23</b> <input type="checkbox"/> SHUTDOWN: <input type="checkbox"/> SET @ _____ (mm/sec <sup>2</sup> ) <input type="checkbox"/> TIME DELAY _____ SEC <b>24</b>		<b>25</b> <b>DYNAMICS: (6.7 6.12)</b> <b>26</b> <input type="checkbox"/> CRITICAL LATERAL SPEEDS ARE PROVEN BY PRIOR UNITS (6.7.2) <b>27</b> <input type="checkbox"/> DAMPED UNBALANCED RESPONSE ANALYSIS REQD (6.12.3) <b>28</b> <input type="checkbox"/> TORSIONAL VIBRATION ANALYSIS OF TRAIN REQD (6.12.5) <b>29</b> <input type="checkbox"/> RESIDUAL UNBALANCE WORKSHEET REQD (6.12.8) <b>30</b> <input checked="" type="checkbox"/> REMARKS _____ <b>31</b>																																																																																																																										
<b>32</b> <b>COUPLINGS: (7.2.1)</b> <b>33</b> TYPE: <input checked="" type="checkbox"/> DISK PAK <input checked="" type="checkbox"/> DIAPHRAGM <input type="checkbox"/> OTHER _____ <b>34</b> DISK MATL: <input checked="" type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> COATED W/ _____ <b>35</b> <input checked="" type="checkbox"/> MAKE _____ <input checked="" type="checkbox"/> MODEL _____ <b>36</b> <input type="checkbox"/> NON-LUBE <input type="checkbox"/> LUB'D <input checked="" type="checkbox"/> LUBRICATION _____ <b>37</b> <input type="checkbox"/> SPACER LENGTH _____ (mm) <input checked="" type="checkbox"/> LIMITED END-FLOAT REQD <b>38</b> <input type="checkbox"/> CPLG RATING _____ kW/100 @ 1.0 S.F. ACTUAL S.F. _____ <b>39</b> <input type="checkbox"/> SHAFT JCT RATING: @ DRIVER _____ (kW) @ INPUT SHAFT _____ (kW) <b>40</b> <input checked="" type="checkbox"/> MOUNTING ARRANGEMENT @ INPUT SHAFT: _____ DRIVER <b>41</b> <input type="checkbox"/> MFR MAX BORE _____ (mm) PROPOSED BORE _____ (mm) (7.2.1.6) <b>42</b> DRIVER HALF-CPLG MTD BY: <input checked="" type="checkbox"/> DRIVER MFR <input checked="" type="checkbox"/> COMPR VENDOR <b>43</b> <input checked="" type="checkbox"/> IDLING ADAPTER FOR DRIVER HALF-COUPLING REQD <b>44</b>		<b>45</b> <b>SHOP INSPECTIONS &amp; TESTS: (8.1.1)</b> <input type="checkbox"/> ADVANCE NOTIFICATION REQD _____ DAYS <table border="1"> <thead> <tr> <th></th> <th>OBSERVED</th> <th>WITNESSED</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/> SHOP INSPECTION</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> HYDROSTATIC (8.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> COMBINED TEST (8.3.4 8.5.6)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> ASME PTC 10 TEST (8.3.4.1)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td colspan="3">INCLUDES <input type="checkbox"/> AIR FILTER</td></tr> <tr><td colspan="3"><input type="checkbox"/> AFTERCOOLER</td></tr> <tr><td colspan="3"><input type="checkbox"/> _____</td></tr> <tr><td><input type="checkbox"/> GUIDE VANE (8.5.12.1)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td colspan="3"><input type="checkbox"/> AT _____ NON-100 % POSITIONS</td></tr> <tr><td><input type="checkbox"/> SOUND-LEVEL TEST</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> SPARE ROTOR TEST (8.5.12.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td colspan="3"><input type="checkbox"/> SPARE ROTOR MECH ONLY</td></tr> <tr><td><input type="checkbox"/> IMPELLER OVERSPEED TEST (8.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> POST OVERSPEED TEST NDE OF IMPELLERS (8.3.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> RESIDUAL UNBALANCE CHECK (6.12.8)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> OIL SYSTEM CLEANLINESS</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CONTROL SYSTEM CHECK (8.3.4.5.5)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> BRG, SEAL, GEAR CHECK (8.5.11.1 6.5.11.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> GEAR CONTACT CHECK (8.2.3.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CLEANLINESS CHECK-VESSELS (8.2.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> CLEANLINESS CHECK-PIPING (8.2.3.3)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> HARDNESS CHECK OF PINIONS (8.2.3.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td colspan="3"><input type="checkbox"/> OF BULL-GEAR</td></tr> <tr><td colspan="3"><input type="checkbox"/> OF WELD REPAIRS</td></tr> <tr><td><input type="checkbox"/> NDE OF MAJOR REPAIRS (8.2)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> GEAR TOOTH MAG-PART (8.5.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> FINAL INSPECTION PRIOR TO PAINT</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> INSPECTION OF PREP FOR SHIPMENT (8.4)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> _____</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/> _____</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td colspan="3"><input type="checkbox"/> PRIOR DOCUMENTATION ON MAJOR REPAIRS NOT REQD (6.10.4.3)</td></tr> <tr><td colspan="3"><input type="checkbox"/> RETAIN FINAL ASSEMBLY CLEARANCES (8.5.1)</td></tr> <tr><td colspan="3"><input type="checkbox"/> SUBMITTAL OF INSPECTOR'S CHECKLIST (8.1.2)</td></tr> <tr><td colspan="3">SIGNED BY REP FOR: <input type="checkbox"/> PURCHASER <input type="checkbox"/> VENDOR</td></tr> <tr><td colspan="3">IF DESIGN REQUIRES DISASSEMBLY OF PINION FOR BRG INSPECTION,</td></tr> <tr><td colspan="3"><input type="checkbox"/> FORGO BEARING INSPECTION BASED ON TEST DATA; 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ELECTRIC HEATER																																													
OIL COOLER: (TWIN - WITH TRANSFER VALVE)																																													
<input type="checkbox"/> OPERATING PRESS, (kgf/cm <sup>2</sup> G) SHELL SIDE TUBE SIDE <input type="checkbox"/> MAX ALLOW WORK PRESS, (kgf/cm <sup>2</sup> G) <input type="checkbox"/> MAX ALLOW TEMP, (°C) <input checked="" type="checkbox"/> FOULING FACTOR <input type="checkbox"/> SURFACE AREA _____ (m <sup>2</sup> ) DUTY _____ (kJ/hr) <input checked="" type="checkbox"/> REMOVABLE BUNDLE TO BE FURNISHED <input type="checkbox"/> ASME CODE STAMPED <input type="checkbox"/> DESIGNED TO TEMA <input checked="" type="checkbox"/> TUBES: No. _____ O.D. _____ (mm) LENGTH _____ (mm) WALL THICKNESS _____ (mm) <input type="checkbox"/> AVG <input type="checkbox"/> MIN <input checked="" type="checkbox"/> MATERIALS CHANNELS/HEADS _____ SHELL _____ TUBES _____ TUBE SHELL _____ CHANNEL COVERS _____ TUBE SUPPORTS _____																																													
OIL FILTERS: (TWIN - WITH TRANSFER VALVE)																																													
<input checked="" type="checkbox"/> MICRON RATING <input type="checkbox"/> NOMINAL <input type="checkbox"/> ABSOLUTE <input checked="" type="checkbox"/> ΔP: (kgf/cm <sup>2</sup> ) CLEAN _____ DIRTY _____ COLLAPSE _____ <input checked="" type="checkbox"/> ELEMENT: MAKE _____ MODEL _____ <input type="checkbox"/> NO. ELEMENTS _____ <input checked="" type="checkbox"/> MEDIA _____ <input checked="" type="checkbox"/> CORE MATL _____ <input checked="" type="checkbox"/> HSG MATL _____ <input type="checkbox"/> HSG MAWP _____ (kgf/cm <sup>2</sup> G) <input type="checkbox"/> MAX ALLOW TEMP _____ (°C) MATERIAL: STAINLESS STEEL OIL HEATER: <input checked="" type="checkbox"/> STEAM HEATER REQD <input type="checkbox"/> ELECTRIC HEATER REQD <input type="checkbox"/> RATING _____ (kJ/hr) <input type="checkbox"/> WATT DENSITY _____ (W/in <sup>2</sup> )																																													
OIL RESERVOIR:																																													
<input checked="" type="checkbox"/> RETENTION TIME _____ MIN <input type="checkbox"/> CAPACITY _____ (l) <input type="checkbox"/> FREE SURFACE AREA _____ (cm <sup>2</sup> ) <input type="checkbox"/> INTERNAL BAFFLES MATERIAL:																																													
STANDBY PUMP CONTROL RESET:																																													
<input type="checkbox"/> MANUAL <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> HOA SELECTOR SWITCH																																													
SILENCERS																																													
INLET AIR FILTER/SILENCER: (7.7)																																													
<input type="checkbox"/> MFR _____ MODEL _____ <input type="checkbox"/> DESCRIPTION _____ <input type="checkbox"/> PIPING CONNECTION _____ <input type="checkbox"/> CLEAN ΔP, AS QUOTED _____ (kgf/cm <sup>2</sup> G) <input checked="" type="checkbox"/> CORROSION PROTECTION <input type="checkbox"/> FILTER WILL BE REMOTE MOUNTED BY PURCHASER AT A DISTANCE _____ (m) FROM COMPRESSOR <input type="checkbox"/> FILTER WILL BE ELEVATED _____ (m) ABOVE GRADE																																													
DISCHARGE BLOWOFF SILENCER: (7.8)																																													
<input type="checkbox"/> MFR _____ MODEL _____ <input type="checkbox"/> DESCRIPTION _____ <input type="checkbox"/> FLANGE CONNECTION _____ MOUNTING <input checked="" type="checkbox"/> HORIZONTAL <input checked="" type="checkbox"/> VERTICAL SUPPORTED BY <input checked="" type="checkbox"/> PIPING <input type="checkbox"/> OTHER _____ <input checked="" type="checkbox"/> SPL (dBA) (@ 1 m) FROM DISCHARGE OF SILENCER _____ NOTES _____ _____ _____																																													
BASED ON THE ANNEX A API STD 672 INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE. FORM OWNED TO PETROBRAS N-2649 REV. B - ANNEX B - SHEET 06/12.																																													





DATA SHEET		No.	REV.
 <b>PETROBRAS</b>	TITLE:	SHEET 7 of 12	
	<b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>		
CONTROLS AND INSTRUMENTATION (7.4)			
1 LOCAL CONTROL PANEL: (7.4.3)			
2 <input type="radio"/> ELECTRICAL AREA CLASSIFICATION:			
3 CL _____ GR _____ DIV _____			
4 PURGE REQUIREMENT: (7.4.3.2)			
5 <input checked="" type="checkbox"/> NONE <input type="checkbox"/> INSTRUMENT AIR <input type="checkbox"/> NITROGEN			
6 <input checked="" type="checkbox"/> TYPE X - REDUCES THE CLASSIFICATION FROM DIV 1 TO NONHAZARDOUS			
7 <input checked="" type="checkbox"/> NEMA TYPE 4X ENCLOSURE MATERIAL: _____			
8 <input checked="" type="checkbox"/> NEMA TYPE 7 (INDOOR EXPLOSION-PROOF FOR HAZARDOUS GAS AREAS) REQUIRED			
9 <input checked="" type="checkbox"/> TYPE Y - REDUCES THE CLASSIFICATION FROM DIV 1 TO DIV 2			
10 PANEL FEATURES: (7.4.3.2)			
11 <input type="checkbox"/> VIBRATION ISOLATORS <input type="checkbox"/> STRIP HEATER <input type="checkbox"/> INTERNAL COOLING <input type="checkbox"/> TYPE Z - REDUCES THE CLASSIFICATION FROM DIV 2 TO NONHAZARDOUS			
12 <input type="checkbox"/> WEATHERHOOD <input checked="" type="checkbox"/> PURGE CONNECTIONS <input type="checkbox"/> OTHER			
13 <input type="checkbox"/> TROPICALIZATION REQUIRED			
14 <input checked="" type="checkbox"/> INSTRUMENT SUPPLIERS:			
15	PRESSURE GAUGES:	MFR _____	SIZE & TYPE _____
16	TEMPERATURE GAUGES:	MFR _____	SIZE & TYPE _____
17	LEVEL GAUGES:	MFR _____	SIZE & TYPE _____
18	DIFF PRESSURE GAUGES:	MFR _____	SIZE & TYPE _____
19	PRESSURE SWITCHES:	MFR _____	SIZE & TYPE _____
20	TEMPERATURE SWITCHES:	MFR _____	SIZE & TYPE _____
21	LEVEL SWITCHES:	MFR _____	SIZE & TYPE _____
22	PRESSURE TRANSMITTERS:	MFR _____	SIZE & TYPE _____
23	TEMPERATURE TRANSMITTERS:	MFR _____	SIZE & TYPE _____
24	LEVEL TRANSMITTERS:	MFR _____	SIZE & TYPE _____
25	CONTROL VALVES:	MFR _____	SIZE & TYPE _____
26	PRESSURE RELIEF VALVES:	MFR _____	SIZE & TYPE _____
27	THERMAL RELIEF VALVES:	MFR _____	SIZE & TYPE _____
28	TEMPERATURE CONTROL VALVES:	MFR _____	SIZE & TYPE _____
29	SIGHT FLOW INDICATORS:	MFR _____	SIZE & TYPE _____
30	PURGE FLOW INDICATORS:	MFR _____	SIZE & TYPE _____
31	SOLENOID VALVES:	MFR _____	SIZE & TYPE _____
32	ANNUNCIATOR:	MFR _____	SIZE & TYPE _____
33	TUBE FITTINGS	MFR _____	SIZE & TYPE _____
34		MFR _____	SIZE & TYPE _____
35		MFR _____	SIZE & TYPE _____
36		MFR _____	SIZE & TYPE _____
37		MFR _____	SIZE & TYPE _____
38 SWITCH CLOSURES: (7.4.5.3.2)			
39 ALARM CONTACTS SHALL: <input type="radio"/> OPEN <input type="radio"/> CLOSE TO SOUND ALARM AND BE NORMALLY <input type="radio"/> ENERGIZED <input type="radio"/> DE-ENERGIZED			
40 SHUTDOWN CONTACTS SHALL: <input type="radio"/> OPEN <input type="radio"/> CLOSE TO TRIP AND BE NORMALLY <input type="radio"/> ENERGIZED <input type="radio"/> DE-ENERGIZED			
41 (NOTE: NORMAL CONDITION IS WHEN COMPRESSOR IS IN OPERATION)			
42 <input type="radio"/> SHUTDOWN SYSTEMS ARE NOT TO BE PROVIDED WITH A MEANS TO PERMIT TESTING WITHOUT SHUTTING DOWN THE UNIT (7.4.5.3.4)			
43 <input type="radio"/> NON-SHUTDOWN DEVICES ARE NOT REQUIRED TO HAVE VALVING TO PERMIT REPLACEMENT DURING OPERATION			
44 <input type="radio"/> ISOLATION VALVES ARE REQUIRED FOR SHUTDOWN SENSING DEVICES			
45 MISCELLANEOUS INSTRUMENTATION:			
46 <input type="radio"/> THROUGH FLOWING INSTRUMENT SENSING LINE REQUIRED			
47 <input type="radio"/> LIQUID-FILLED GAUGES ARE REQUIRED FOR AREAS SUBJECT TO VIBRATION			
48 <input type="radio"/> RELIEF VALVES MAY HAVE BODIES IN MATERIALS OTHER THAN STEEL			
49 <input type="radio"/> THERMAL RELIEF VALVES REQUIRED FOR COMPONENTS THAT CAN BE ISOLATED			
50 <input type="radio"/> FLOW INDICATOR TYPE/MATERIAL IF OTHER THAN BULLS EYE TYPE WITH STEEL BODY			
51 <input type="radio"/> PURGE REQUIRED FOR ANNUNCIATOR (7.4.3.2) <input type="radio"/> X <input type="radio"/> Y <input type="radio"/> Z <input type="radio"/> CONNECTION ONLY			
52 <input type="radio"/> COMBINATION BLOCK AND BLEED VALVES MAY BE SUBSTITUTED			
53 <input type="radio"/>			
54 <input type="radio"/>			
55 NOTES:			
56 _____			
57 _____			
58 _____			
59 _____			
60 BASED ON THE ANNEX A API STD 672			
61 INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.			
62 FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 07/12.			

		No.
	<b>DATA SHEET</b>	REV. _____
		SHEET      8    of    12
TITLE:	<b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>	
<b>INSTRUMENTATION SCOPE OF SUPPLY</b>		
	<b>ELEMENT</b>	<b>INDICATOR</b>
	PROV BY TYPE LOCATION INSTALL BY PROV BY LOCATION	
VENDOR PURCHASER DIRECT READOUT SWITCH TRANSMITTER <sup>(1)</sup> VENDOR PKG LOCAL PANEL PURCH PIPING VENDOR PURCHASER VENDOR PURCHASER VENDOR PKG PURCH PIPING LOCAL PANEL ALARM SHUTDOWN REPEAT SIGNAL <sup>(2)</sup>		
PRESSURE:		
COMPRESSOR SUCTION STAGE		
COMPRESSOR DISCHARGE STAGE		
LUBE OIL DISCHARGE (LOW)		
LUBE OIL FILTER ΔP (HIGH)		
LUBE OIL SUPPLY		
AIR FILTER/SILENCER ΔP (HIGH)		
WATER MANIFOLD IN AND OUT		
TEMPERATURE:		
COMPRESSOR SUCTION STAGE		
COMPRESSOR DISCHARGE STAGE		
OIL COOLER OUTLET		
COMPRESSOR PINION JOURNAL BRG		
BULL GEAR JOURNAL BRG		
BULL GEAR OR PINION THRUST BRG		
DRIVER JOURNAL BRG		
DRIVER THRUST BRG		
RESERVOIR		
LEVEL:		
LUBE OIL RESERVOIR		
SEPARATOR		
VIBRATION:		
RADIAL VIBRATION EACH STAGE		
RADIAL VIBRATION BULL GEAR SHAFT		
AXIAL POSITION BULL GEAR SHAFT		
AXIAL POSITION		
RADIAL VIBRATION ON DRIVER		
AXIAL POSITION ON DRIVER SHAFT		
ACCELEROMETER ON GEAR BOX		
FLOW:		
OIL RETURN		
MISCELLANEOUS:		
STANDBY L.O. PUMP RUNNING		
PANEL PUGE FAILURE		
ANNUNCIATOR PURGE FAILURE		
SURGE RECOGNITION		
OIL HEATER ON		
COMMON REMOTE ALARM INDICATION		
COMMON REMOTE SHUTDOWN INDICATION		
NOTE 1 TRANSMITTERS SUPPLIED BY VENDOR SHALL INCLUDE SENSING ELEMENT.		
NOTE 2 SUPPLY "REPEAT SIGNAL" FOR CONTROL ROOM ALSO.		

BASED ON THE ANNEX A API STD 672

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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 08/12.



PETROBRAS


N-2649

REV. B

ENGLISH

06 / 2013


DATA SHEET		No.	REV.
		SHEET 9 of 12	
TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>			
1 (INTER-) (AFTER-) COOLER(S)			
2 SERVICE OF UNIT: _____ TEM No _____			
3 SIZE: _____ TYPE: _____ <input type="checkbox"/> HORIZ <input type="checkbox"/> VERT CONNECTED IN <input type="checkbox"/> PARALLEL <input type="checkbox"/> SERIES			
4 SURF/UNIT: (GROSS/EFF) _____ (m <sup>2</sup> ) SHELLS/UNIT: _____ SURF/SHELL: (GROSS/EFF) _____ (m <sup>2</sup> )			
5			
6 PERFORMANCE OF ONE UNIT			
7 8 <input type="checkbox"/> FLUID NAME 9 <input type="checkbox"/> FLUID QUANTITY, TOTAL (kg/h) 10 VAPOR-IN/OUT 11 LIQUID-IN/OUT 12 <input type="checkbox"/> TEMPERATURE-IN/OUT (°C) 13 <input type="checkbox"/> SPECIFIC GRAVITY 14 <input type="checkbox"/> VISCOSITY, LIQUID (mPa-s) 15 <input type="checkbox"/> SPECIFIC HEAT, (kJ/kg °C) 16 <input type="checkbox"/> THERMAL CONDUCTIVITY, (kJ/m h °C) 17 <input type="checkbox"/> LATENT HEAT, (kJ/kg °C) 18 <input type="checkbox"/> INLET PRESSURE, (kgf/cm <sup>2</sup> G) 19 <input checked="" type="checkbox"/> VELOCITY, (m/s) 20 <input checked="" type="checkbox"/> PRESSURE DROP-ALLOW/CALC, (kgf/cm <sup>2</sup> ) 21 <input checked="" type="checkbox"/> FOULING RESISTANCE-MINIMUM (hr m <sup>2</sup> °C/kJ)		SHELL SIDE AIR TUBE SIDE WATER	
22			
23 <input type="checkbox"/> HEAT EXCHANGED _____ (kJ/hr) MTD CORRECTED _____ (°C)			
24 <input type="checkbox"/> TRANSFER RATE, (kJ/hr m <sup>2</sup> °C) SERVICE _____ CLEAN _____			
25			
26 <input type="checkbox"/> CONSTRUCTION OF ONE SHELL		SKETCH: BUNDLE NOZZLE ORIENTATIONS	
27 28 DESIGN/TEST PRESSURE, (kgf/cm <sup>2</sup> G) 29 DESIGN TEMPERATURE, (°C) 30 No. PASSES PER SHELL 31 CORROSION ALLOWANCE, (mm) 32 NOZZLES: _____ INLET 33 SIZE & _____ OUTLET 34 RATING _____ INSP. NOZZLE		SHELL SIDE TUBE SIDE	
35 TUBE NO. _____ O.D. _____ (mm) THK (MIN) (AVG) _____ (mm) LENGTH _____ (m) PITCH _____ (mm)		36 TUBE TYPE _____ MATERIAL _____	
37 SHELL MATL _____ I.D. _____ (mm) O.D. _____ (mm)		38 CHANNEL OR BONNET MATL _____	
39 TUBESHEET-STATIONARY MATL _____		40 TUBESHEET-FLOATING MATL _____	
41 BAFFLES-CROSS MATL _____ TYPE _____		42 BAFFLES-LONG MATL _____	
43 SUPPORTS-TUBE _____ U-BEND _____		44 BYPASS SEAL ARRANGEMENT _____	
45 GASKETS-SHELL SIDE _____		46 GASKETS-TUBE SIDE _____	
47 ASME SECTION VIII CODE REQUIREMENTS: <input type="checkbox"/> DESIGN & TEST <input type="checkbox"/> STAMP <input type="checkbox"/> NOT APPLICABLE		TEMA CLASS _____	
48 WEIGHT/SHELL _____ (kg) FILLED WITH WATER _____ (kg)		49 BUNDLE _____ (kg)	
50 NOTES:			
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BASED ON THE ANNEX A API STD 672			
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 09/12.			

DATA SHEET		No.	REV.
 <b>PETROBRAS</b>	TITLE:		SHEET
	10 of 12		
	<b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>		
NEMA FRAME INDUCTION MOTORS TO IEEE 841			
1 MFR	MODEL	SERIAL No.	NEMA FRAME
2			
3 DRIVEN EQUIPMENT TYPE	DRIVEN EQUIPMENT ITEM No.		MOTOR ITEM No.
4			
○ OPERATION CONDITIONS			
6			
7 SITE DATA:		8 DRIVE SYSTEM:	
9 ELECTRICAL SUPPLY: VOLTS _____ PHASE _____ HERTZ _____		○ DIRECT CONNECTED ○ EXTERNAL GEAR	
10 ELECTRICAL AREA CLASSIFICATION: ○ NON-HAZARDOUS		○ OTHER _____	
11 ○ CLASS _____ GROUP _____ DIVISION _____			
12 ATMOSPHERIC MIXTURE: _____		STARTING: (7.1.2.2)	
13 IGNITION TEMPERATURE: _____ (°C) TEMP CODE: _____		○ FULL VOLTAGE ○ REDUCED VOLTAGE _____ %	
14 ALTITUDE: ○ LESS THAN (1 000 m) ○ 595 (m)		○ LOADED ○ UNLOADED	
15 AMBIENT TEMPERATURE MINIMUM _____ (°C) _____ (°C)		○ VOLTAGE DIP _____ %	
16 UNUSUAL CONDITIONS: _____			
□ PERFORMANCE			
17			
19 NO LOAD CURRENT, AMPS _____		LOAD	
20 FULL LOAD TORQUE, (N-m) _____		CURRENT AMP	
21 STARTS PER HOUR: _____ HOT _____ COLD		EFFICIENCY	
22 ACCELERATION TIME: _____ SEC		POWER FACTOR	
		FULL	
		75%	
		50%	
		LOCKED ROTOR	
□ CONSTRUCTION FEATURES [6] [7] [8] [19]			
25			
26 NAMEPLATE (KW) _____ (rpm) S.F. _____		MOTOR ROTATION: (FACING END OPPOSITE SHAFT EXTENSION)	
27 NEMA TORQUE DESIGN: ○ A ○ B ○ C ○ D		○ CW ○ CCW ○ BI-DIRECTIONAL	
28 NEMA LOCKED ROTOR IKA CODE LETTER: _____			
29			
30 EFFICIENCY: ○ STANDARD ○ HIGH ○ PREMIUM		INSULATION CLASS: ○ B ○ F ○ OTHER _____	
31		○ NON-HYGROSCOPIC ○ TROPICALIZED	
32 NOISE DESIGN: ○ STANDARD ○ LOW NOISE		○ TEMPERATURE RISE: (DEFAULT IS 80°C ABOVE 40°C BY RES @ 1.0)	
33 ○ MAX SOUND PRESSURE LEVEL (dBA) (@ 1 m) _____		_____ °C ABOVE _____ °C BY _____ @ _____ S.F.	
34 ○ EXPECTED SPL (dBA) (@ 1 m) _____		○ MOTOR TO BE "THERMALLY PROTECTED"	
35		○ MOTOR TO BE "OVER TEMP PROTECTED"	
36 ENCLOSURE: ○ TEAC ○ TENV ○ EXPLOSION PROOF		○ TYPE #1-WINDING-RUNNING AND LOCKED-ROTOR PROTECTED"	
37		○ TYPE #2-WINDING-RUNNING PROTECTED"	
38 MOUNTING: ○ HORIZONTAL ○ VERTICAL		○ TYPE #3-WINDING-PROTECTED, NON-SPECIFIC"	
39 ○ FOOT MOUNTED ○ FLANGE MOUNTED			
40 ○ SHAFT UP ○ SHAFT DOWN		○ SPACE HEATER REQD □ RATED AT: _____ WATTS	
41		○ VOLTS _____ PHASE _____ HERTZ _____	
42 MAIN TERMINAL BOX MOUNTING LOCATION: ○ F-1 ○ F-2		○ MAX SHEATH TEMPERATURE: _____ °C	
43		○ SEPARATE JUNCTION BOX FOR SPACE HEATER LEADS	
44 FAN: ○ REVERSIBLE ○ UNI-DIRECTIONAL			
45 ○ NON-SPARKING		MOTOR THRUST LOAD: ○ _____ (kg) ○ NONE	
46 BEARING TYPE: ○ BALL ○ ROLLER ○ SLEEVE		DIRECTION OF THRUST: ○ TOWARD COUPLING	
47 BRG LUBRICATION: ○ GREASE ○ RING OIL ○ FORCED LUBRIF.		○ AWAY FROM COUPLING	
48 GREASE FITTING: ○ PLUGGED ○ ALEMITE ○ OTHER _____		□ MOTOR THRUST RATING: _____ (kg)	
49 BRG SHIELDING: ○ SINGLE ○ DOUBLE ○ SEALED FOR LIFE			
TESTING		MISCELLANEOUS	
51 IEEE TESTING: ○ OBSVD ○ WIT ○ SUBMIT CERT'D RESULTS		PAINTING: ○ IEEE 841 STD ○ OTHER _____	
52 ○ SPECIAL TESTING: _____		○ PETROBRAS N-1735 _____	
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BASED ON THE ANNEX A API STD 672

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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 10/12.


 <b>PETROBRAS</b>	<b>DATA SHEET</b>	No.	REV.
			SHEET 11 of 12
	TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>		


  


ALLOWABLE PIPING FORCES AND MOMENTS							
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59		COMPRESSOR INLET		COMPRESSOR DISCHARGE		PACKAGE OUTLET	
		FORCE, (kg)	MOMENT, (N-m)	FORCE, (kg)	MOMENT, (N-m)	FORCE, (kg)	MOMENT, (N-m)
	AXIAL						
	VERT						
	TRANS						
ADDITIONAL DATA							

BASED ON THE ANNEX A API STD 672	
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 11/12.	

 <b>PETROBRAS</b>	<b>DATA SHEET</b>	No.	REV.
			SHEET 12 of 12
	TITLE: <b>PACKAGED, INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR - METRIC (kgf/cm<sup>2</sup>)</b>		
1	GENERAL NOTES		
2			
3			
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BASED ON THE ANNEX A API STD 672			
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX B - SHEET 12/12.			


 <b>PETROBRAS</b>	<b>DATA SHEET</b>		No.						
	CLIENT:			SHEET of					
	JOB:								
	AREA:								
	TITLE:			<b>VENDOR DRAWINGS AND DATA REQUIREMENTS</b>					
<b>INDEX OF REVISIONS</b>									
<b>REV.</b>	<b>DESCRIPTION AND/OR REVISED SHEETS</b>								
	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE									
DESIGN									
EXECUTION									
CHECK									
APPROVAL									
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 01/08.									


DATA SHEET		No.	REV.
	TITLE:		SHEET of
	<b>VENDOR DRAWINGS AND DATA REQUIREMENTS</b>		
<b>INTEGRALLY GEARED COMPRESSOR AND PACKAGE</b>			
THE DOCUMENTS STATED BELOW SHALL BE SUPPLIED IN ENGLISH OR PORTUGUESE.			
PROPOSAL (Notes 1 and 4) BIDDER SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
REVIEW (Notes 2 and 4) VENDOR SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
FINAL (Notes 2 and 4) VENDOR SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
VENDOR SHALL FURNISH		OPERATING AND MAINTENANCE MANUALS MANUAL	
	FINAL - RECEIVED FROM VENDOR		
DISTRIBUTION	FINAL - DUE FROM VENDOR (Note 3)		
RECORD	REVIEW - RETURNED TO VENDOR		
	REVIEW - RECEIVED FROM VENDOR		
	REVIEW - DUE FROM VENDOR (Note 3)		
	DESCRIPTION		
	1 - CERTIFIED DIMENSIONAL OUTLINE DRAWING AND LIST OF CONNECTIONS		
	2 - CROSS-SECTIONAL DRAWING, COMPLETE PART LIST AND BILL OF MATERIALS.		
	3 - ROTOR ASSEMBLY DRAWING AND BILL OF MATERIALS.		
	4 - THRUST-BEARING ASSEMBLY DRAWING AND BILL OF MATERIALS.		
	4a - INPUT DATA FOR THRUST ANALYSIS.		
	5 - JOURNAL-BEARING ASSEMBLY DRAWING AND BILL OF MATERIALS.		
	5a - RADIAL BEARINGS UNIT LOADINGS.		
	6 - COUPLING ASSEMBLY DRAWING AND BILL OF MATERIALS.		
	7 - LUBE-OIL SCHEMATIC AND BILL OF MATERIALS.		
	8 - LUBE-OIL SYSTEM ASSEMBLY AND ARRANGEMENT DRAWINGS AND LIST OF CONNECTIONS.		
	9 - LUBE-OIL COMPONENT DRAWINGS AND DATA.		
	10 - DRY GAS SEAL SCHEMATIC AND BILL OF MATERIALS.		
	11 - DRY GAS SEAL ARRANGEMENT DRAWING AND LIST OF CONNECTIONS.		
	12 - DRY GAS SEAL COMPONENT DRAWINGS AND DATA.		
	13 - DRY GAS SEAL ASSEMBLY DRAWING AND BILL OF MATERIALS.		
	14 - ELECTRICAL AND INSTRUMENTATION SCHEMATICS AND BILL OF MATERIALS.		
	15 - ELECTRICAL AND INSTRUMENTATION ARRANGEMENT DRAWINGS AND LIST OF CONNECTIONS.		
	16 - BUFFER GAS SEAL SYSTEM SCHEMATIC AND BILL OF MATERIALS.		
	17 - BUFFER GAS SEAL SYSTEM ARRANGEMENT DRAWING AND LIST OF CONNECTIONS.		
	18 - BUFFER GAS SEAL SYSTEM COMPONENT DRAWINGS AND DATA.		
	19 - DATA SHEETS (PETROBRAS AND API PROPOSAL / AS-BUILT).		
	19a - AS-BUILT DIMENSIONS AND DATA.		
	19b - COMPLETE PART LIST.		
	19c - GAS FLOW SCHEME (INCLUDED ALL EQUIPMENT).		
	19d - DESIGN LIMITATIONS FOR ALL EQUIPMENT QUOTED.		
	19e - DESENHOS E DADOS DE FOLGA DO LABIRINTO, VEDAÇÃO E MANCAL DO COMPRESSOR.		
	20 - PREDICTED NOISE SOUND LEVEL (IN PROPOSAL).		
	21 - METALURGIA DE COMPONENTES PRINCIPAIS (NA PROPOSTA).		
	22 - LATERAL CRITICAL ANALYSIS REPORT.		
	23 - TORSIONAL CRITICAL ANALYSIS REPORT.		
	23a - TRANSIENT TORSIONAL ANALYSIS REPORT.		
	24 - VIBRATION ANALYSIS DATA.		
	24a - CALCULATED ROTOR UNBALANCE RESPONSE CURVES.		
	24b - ROTOR AND BEARING DYNAMIC SIMULATION.		
	24c - SOMMERFIELD NUMBER VERSUS STIFFNESS AND DAMPENING BEARING CURVES.		
	24d - CRITICAL SPEED MAP.		
	25 - PERFORMANCE CURVES FOR EACH COMPRESSOR SECTION (PROPOSAL / AS BUILT).		
	25a - POLYTROPIC HEAD AND EFFICIENCY VERSUS INLET VOLUME FLOW.		
	25b - DISCHARGE PRESSURE AND POWER VERSUS INLET VOLUME FLOW.		
NOTE 1	PROPOSAL DRAWINGS AND DATA DO NOT HAVE TO BE CERTIFIED OR AS-BUILT.		
NOTE 2	PURCHASER WILL INDICATE IN THIS COLUMN THE TIME FRAME FOR SUBMISSION OF MATERIALS USING THE NOMENCLATURE GIVEN AT THE END OF THIS FORM		
NOTE 3	BIDDER SHALL COMPLETE THESE TWO COLUMNS TO REFLECT HIS ACTUAL DISTRIBUTION SCHEDULE AND INCLUDE THIS FORM WITH THE PROPOSAL.		
NOTE 4	ALL DOCUMENTS AND DRAWINGS SHALL ALSO BE PROVIDED IN MAGNETIC MEDIA AND SHALL BE ISSUED BY VENDOR. THE SOFTWARE SHALL BE IN ACCORDANCE WITH CONTRACT.		
BASED ON THE ANNEX D API STD 672.			
INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.			
FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 02/08.			





		DATA SHEET		No.	REV.
		TITLE:		SHEET	of
		VENDOR DRAWINGS AND DATA REQUIREMENTS			
INTEGRALLY GEARED COMPRESSOR AND PACKAGE					
DESCRIPTION (cont'd)					
		25c - SPEED VERSUS STARTING TORQUE.			
		26 - IMPELLER OVERSPEED PROCEDURE AND TEST REPORT (MAIN AND SPARE ROTORS).			
		27 - MECHANICAL RUNNING PROCEDURE AND TEST REPORT (MAIN & SPARE ROTORS, SHOP & FIELD TESTS).			
		28 - COUPLING SELECTION AND RATING.			
		29 - LIST OF RECOMMENDED SPARE PARTS.			
		30 - LIST OF SPECIAL TOOLS.			
		31 - PREPARATION FOR STORAGE AT JOB SITE BEFORE INSTALLATION.			
		32 - WEATHER PROTECTION (IF NECESSARY) AND TROPICALIZATION REQUIRED AT JOB SITE.			
		33 - TABULATION OF ALL UTILITIES.			
		34 - LIST OF SIMILAR MACHINES.			
		35 - OPERATING RESTRICTIONS TO PROTECT EQUIPMENT DURING START-UP OPERATION AND SHUTDOWN.			
		36 - LIST OF COMPONENTS REQUIRING PURCHASER'S APPROVAL.			
		37 - SUMMARY OF MATERIALS AND HARDNESS OF MATERIALS EXPOSED TO H <sub>2</sub> S.			
		38 - SEAL LEAKAGE RATES.			
		39 - COOLER SYSTEM DATA.			
		40 - DRAWINGS, DETAILS AND DESCRIPTION OF INSTRUMENTATION AND CONTROLS.			
		41 - MINIMUM LENGTH OF STRAIGHT PIPE REQUIRED AT MACHINE INLET OR SIDE INLETS.			
		42 - MAXIMUM AND MINIMUM ALLOWABLE SEAL PRESSURE FOR EACH COMPRESSOR.			
		43 - STATEMENT OF MANUFACTURER'S TESTING CAPABILITIES.			
		44 - PERFORMANCE TEST DATA AND CURVES.			
		44a - PERFORMANCE SHOP TEST PROCEDURE AND REPORT.			
		44b - PERFORMANCE FIELD TEST PROCEDURE AND REPORT.			
		45 - BACK-TO-BACK IMPELLER MACHINE VENDOR TO PROVIDE THRUST BEARING LOADS VERSUS DIFFERENTIAL PRESSURE CURVE.			
		46 - BALANCE PISTON LEAKAGE RATES.			
		47 - CURVES OF BALANCE PISTON LINE DIFFERENTIAL PRESSURE VERSUS THRUST LOAD.			
		48 - PRODUCTION / DELIVERY SCHEDULES.			
		48a - COMPRESSOR AND AUXILIARY SYSTEMS COMPLETE SCHEDULE FOR THE MANUFACTURER TESTING DELIVERY AND FOR "FIELD ASSEMBLY CLEANING AND INSPECTION PROCEDURES".			
		48b - ENGINEERING, FABRICATION AND DELIVERY SCHEDULE (PROCESS REPORTS).			
		48c - LIST OF DRAWINGS.			
		49 - TESTING PROCEDURES AND REPORTS.			
		49a - ROTOR BALANCING LOGS AND REPORT (MAIN AND SPARE ROTORS).			
		49b - HYDROSTATIC TEST LOGS AND REPORT.			
		49c - ROTOR COMBINED MECHANICAL AND ELECTRICAL RUNOUT (MAIN AND SPARE ROTORS).			
		49d - WELD PROCEDURES.			
		50 - PROGRES REPORTS.			
		51 - INSTALLATION MANUAL.			
		51a - ERECTION DIAGRAM AND INSTRUCTION FOR ALL ITEMS ASSEMBLED AT SITE.			
		51b - ALIGNMENT DIAGRAM.			
		51c - ALLOWABLE FLANGE LOADING.			
		51d - FOUNDATION PLAN WITH ANCHOR BOLTS LOCATION AND WEIGHTS (INCLUDING DYNAMIC LOADS).			
		52 OPERATING AND MAINTENANCE MANUALS.			
		52a - PROCEDURES FOR CLEANING, INSPECTION AND TEST OF THE CENTRIFUGAL COMPRESSOR, DRIVER, AND ITS AUXILIARIES.			
		52b - LOAD HANDLING CAPACITY AND MAINTENANCE CLEARANCE.			
		52c - COMPRESSOR AND AUXILIARY SYSTEMS EXTENT OF FIELD ASSEMBLY CLEANING AND INSPECTION.			
		53 - TECHNICAL DATA MANUAL.			
		54 - TECHNICAL REQUIREMENTS / INFORMATION FOR ANTI-SURGE CONTROL.			
		55 - MATERIAL SAFETY DATA SHEETS.			
		56 - ASME PRESSURE VESSEL FABRICATION DATA.			
		57 - PRESERVATION, PACKING AND SHIPPING PROCEDURES.			
		58 - LIST OF SUB-SUPPLIERS FOR WHOLE COMPRESSOR PACKAGE.			
		59 - ITEMIZED PRICE LIST OF ALL COMPONENTS FOR WHOLE COMPRESSOR PACKAGE.			
		60 - NAMEPLATES DRAWING FOR EACH PIECE OR PART OF EQUIPMENT OF WHOLE COMPRESSOR PACKAGE.			
		61 - ALLOWABLE EXTERNAL FORCES AND MOMENTS FOR EACH NOZZLE IN TUBULAR FORM (WITH PROPOSAL).			
		62 - GAS QUALITY DOCUMENTATIONS.			
		63 - GEAR TOOTH CONTACT CHECK RESULTS.			
		64 - CERTIFICATES FOR GEAR.			
BASED ON THE ANNEX D API STD 672.					
INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.					
FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 03/08.					

		DATA SHEET		No.	REV.
TITLE:		VENDOR DRAWINGS AND DATA REQUIREMENTS		SHEET of	
<b>ELECTRIC MOTOR</b>					
THE DOCUMENTS STATED BELOW SHALL BE SUPPLIED IN ENGLISH OR PORTUGUESE.					
PROPOSAL (Notes 1 and 4) BIDDER SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
REVIEW (Notes 2 and 4) VENDOR SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
FINAL (Notes 2 and 4) VENDOR SHALL FURNISH		COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
VENDOR SHALL FURNISH		OPERATING AND MAINTENANCE MANUALS MANUAL			
DISTRIBUTION	FINAL - RECEIVED FROM VENDOR				
RECORD	FINAL - DUE FROM VENDOR (Note 3)				
	REVIEW - RETURNED TO VENDOR				
	REVIEW - RECEIVED FROM VENDOR				
	REVIEW - DUE FROM VENDOR (Note 3)				
<b>DESCRIPTION</b>					
	1 - CERTIFIED DIMENSIONAL OUTLINE DRAWING.				
	2 - CROSS-SECTIONAL DRAWING, PARTS LIST AND BILL OF MATERIALS.				
	3 - COUPLING ALIGNMENT DIAGRAM, ASSEMBLY DRAWING, PARTS LIST AND BILL OF MATERIALS.				
	4 - LUBE / CONTROL - OIL SCHEMATICS AND BILL OF MATERIALS. SEE OTHER APPLICABLE ITEMS BELOW.				
	5 - LUBE / CONTROL - OIL ASSEMBLY, ARRANGEMENT DRW, LIST OF CONNECTIONS, PARTS LIST & BILL OF MAT				
	6 - ELECTRICAL AND INSTRUMENTATION SCHEMATICS AND BILL OF MATERIALS.				
	7 - ELECTRICAL AND INSTRUMENTATION ARRANGEMENT DRAWINGS AND LIST OF CONNECTIONS.				
	8 - PERFORMANCE, EFFICIENCY, SPEED AND TORQUE CURVES.				
	9 - VIBRATION ANALYSIS DATA AND REPORT.				
	10 - DAMPED UNBALANCE RESPONSE ANALYSIS (WHEN APPLICABLE)				
	11 - LATERAL CRITICAL SPEED ANALYSIS (WHEN APPLICABLE).				
	12 - TORSIONAL CRITICAL SPEED ANALYSIS (WHEN APPLICABLE).				
	13 - ENGINEERING, FABRICATION, AND DELIVERY SCHEDULES (PROGRESS REPORTS)				
	14 - MECHANICAL RUNNING TEST PROCEDURES, REPORTS, AND DATA.				
	15 - RESIDUAL UNBALANCE CHECK PROCEDURES, REPORT, AND DATA.				
	16 - ROTOR MECHANICAL AND ELECTRICAL RUNOUT CHECK PROCEDURES, REPORT AND DATA.				
	17 - DATA SHEETS (PROPOSAL, AS-BUILT) FOR MAIN AND AUXILIARY EQUIPMENT.				
	18 - AS-BUILT ASSEMBLY CLEARANCES.				
	19 - OPERATION AND MAINTENANCE MANUALS.				
	20 - SPARE PARTS RECOMMENDATIONS, WITH PART NUMBERS AND LIST OF INTERCHANGEABLE PARTS.				
	21 - LIST OF EXCEPTIONS TO THE SPECIFICATIONS.				
	22 - EQUIPMENT GENERAL DESCRIPTION AND CATALOGS.				
	23 - LIST OF DRAWINGS AND DOCUMENTS INDEX (STATUS AND DELIVERY SCHEDULES).				
	24 - NAMEPLATE DRAWINGS.				
	25 - STANDARD / SPECIAL (DETAILED) REFERENCE LISTS.				
	26 - QUALITY PLAN, INSPECTIONS, TESTING AND NDT PROCEDURES, SCHEDULES, REPORTS AND DATA.				
	27 - SPECIAL AND OPTIONAL TESTS PROCEDURES, REPORTS, AND DATA.				
	28 - MATERIALS CERTIFICATES, TESTS PROCEDURES, REPORTS, AND DATA.				
	29 - JOURNAL BEARING DATA SHEETS.				
	30 - JOURNAL BEARING ASSEMBLY DRAWING, PARTS LIST AND BILL OF MATERIALS.				
	31 - JOURNAL BEARING SIZING CALCULATIONS.				
	32 - INSTALLATION MANUAL, FOUNDATION PLAN, ANCHOR BOLTS LOCATION.				
	33 - WEIGHTS, STATIC / DYNAMIC LOADS, CENTERS OF GRAVITY, VERTICAL AND PLAN LOCATION.				
	34 - LIST OF SPECIAL TOOLS FURNISHED (OR NOT) FOR MAINTENANCE.				
	35 - TECHNICAL DATA BOOK MANUAL.				
	36 - PAINTING SPECIFICATION.				
	37 - PREPARATION FOR SHIPMENT PROCEDURES, PACKING AND SHIPPING LISTS.				
NOTA 1	PROPOSAL DRAWINGS AND DATA DO NOT HAVE TO BE CERTIFIED OR AS-BUILT.				
NOTA 2	PURCHASER WILL INDICATE IN THIS COLUMN THE TIME FRAME FOR SUBMISSION OF MATERIALS USING THE NOMENCLATURE GIVEN AT THE END OF THIS FORM				
NOTA 3	BIDDER SHALL COMPLETE THESE TWO COLUMNS TO REFLECT HIS ACTUAL DISTRIBUTION SCHEDULE AND INCLUDE THIS FORM WITH THE PROPOSAL.				
NOTA 4	ALL DOCUMENTS AND DRAWINGS SHALL ALSO BE PROVIDED IN MAGNETIC MEDIA AND SHALL BE ISSUED BY VENDOR. THE SOFTWARE SHALL BE IN ACCORDANCE WITH CONTRACT.				
BASED ON THE ANNEX D API STD 672.					
INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.					
FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 04/06.					

		DATA SHEET		No.	REV.
TITLE:		VENDOR DRAWINGS AND DATA REQUIREMENTS		SHEET	of
<b>OIL SYSTEM</b>					
THE DOCUMENTS STATED BELOW SHALL BE SUPPLIED IN ENGLISH OR PORTUGUESE.					
PROPOSAL (Notes 1 and 4)	BIDDER SHALL FURNISH	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
REVIEW (Notes 2 and 4)	VENDOR SHALL FURNISH	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
FINAL (Notes 2 and 4)	VENDOR SHALL FURNISH	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.			
	VENDOR SHALL FURNISH	OPERATING AND MAINTENANCE MANUALS MANUAL			
	DISTRIBUTION	FINAL - RECEIVED FROM VENDOR			
	RECORD	FINAL - DUE FROM VENDOR (Note 3)			
		REVIEW - RETURNED TO VENDOR			
		REVIEW - RECEIVED FROM VENDOR			
		REVIEW - DUE FROM VENDOR (Note 3)			
<b>DESCRIPTION</b>					
	1 - CERTIFIED DIMENSIONAL OUTLINE DRAWING AND LIST OF CONNECTION.				
	2 - COMPONENT DRAWINGS AND BILLS OF MATERIALS.				
	2a - MAIN & AUXILIARY EQUIPMENT / COMPONENTS (PUMPS, FILTERS, COOLERS, ETC.) LIST.				
	2b - MAIN & AUXILIARY EQUIPMENT/COMPONENTS DRAWINGS, PARTS LISTS, AND BILL OF MATERIALS.				
	3 - SYSTEM SCHEMATICS, BILL OF MATERIALS, COMPONENTS SIZING CRITERIA.				
	3a - ASSEMBLY, ARRANGEMENT DRW, LIST OF CONNECTIONS, PARTS LIST & BILL OF MATERIALS.				
	4 - COMPONENT DATA SHEETS.				
	4a - DATA SHEETS (PROPOSAL) FOR MAIN & AUXILIARY EQUIPMENT / COMPONENT.				
	4b - LIST OF EXCEPTIONS TO THE SPECIFICATIONS.				
	4c - SYSTEM GENERAL DESCRIPTION AND CATALOGS.				
	4d - STANDARD / SPECIAL (DETAILED) REFERENCE LISTS.				
	4e - TABULATION OF UTILITY REQUIREMENTS (UTILITY CONSUMPTIONS LIST).				
	5 - ELECTRICAL AND INSTRUMENTATION WIRING DIAGRAMS, AND BILL OF MATERIALS.				
	5a - ELECTRICAL AND INSTRUMENTATION ARRANGEMENT DRAWINGS AND LIST OF CONNECTIONS.				
	6 - ELECTRICAL AND INSTRUMENTATION TERMINAL BOX LAYOUT AND LIST OF CONNECTIONS.				
	7 - CONSOLE TEST PROCEDURES.				
	7a - MATERIALS CERTIFICATES, TESTS PROCEDURES, REPORTS, AND DATA.				
	7b - SPECIAL AND OPTIONAL TESTS PROCEDURES, REPORTS, AND DATA.				
	8 - WELD PROCEDURES / MAJOR WELD REPAIRS PROCEDURES, REPORTS, AND DATA.				
	9 - CERTIFIED HYDROSTATIC TEST PROCEDURES, REPORTS, AND DATA.				
	10 - OPERATIONAL TEST LOGS				
	10a - MECHANICAL RUNNING / OPERATIONAL TESTS PROCEDURES, REPORTS, AND DATA.				
	11 - AS-BUILT DATA SHEETS.				
	11a - DATA SHEETS (AS-BUILT) FOR MAIN & AUXILIARY EQUIPMENT / COMPONENT.				
	12 - INSTALLATION, OPERATION AND MAINTENANCE MANUALS.				
	12a - FOUNDATION PLAN AND ANCHOR BOLTS LOCATION.				
	12b - WEIGHTS, STATIC/DYNAMIC LOADS, CENTERS OF GRAVITY, VERTICAL AND PLAN LOCATION.				
	12c - LIST OF SPECIAL TOOLS FOR MAINTENANCE.				
	13 - PROGRESS REPORT.				
	13a - LIST OF DRAWINGS, DOCUMENTS INDEX (STATUS & DELIVERY SCHEDULES).				
	13b - QUALITY PLAN, INSPECTIONS, TESTING & NDT PROCEDURES, SCHEDULES, REPORTS, AND DATA.				
	13c - ENGINEERING, FABRICATION, AND DELIVERY SCHEDULES (PROGRESS REPORTS).				
	14 - SPARE PARTS RECOMMENDATIONS AND PRICE LIST, WITH PART NUMBERS AND LIST OF INTERCHANGEABLE PARTS.				
	15 - PRESSURE VESSEL CERTIFICATION DATA.				
	16 - TECHNICAL DATA BOOK MANUAL.				
	17 - MAIN & AUX. EQUIPMENT NAMEPLATE DRAWINGS (INCLUDING APPLICABLE CODE STAMPS).				
	18 - PAINTING SPECIFICATION.				
	19 - PREPARATION FOR SHIPMENT PROCEDURES, PACKING AND SHIPPING LISTS.				
NOTE 1 PROPOSAL DRAWINGS AND DATA DO NOT HAVE TO BE CERTIFIED OR AS-BUILT.					
NOTE 2 PURCHASER WILL INDICATE IN THIS COLUMN THE TIME FRAME FOR SUBMISSION OF MATERIALS USING THE NOMENCLATURE GIVEN AT THE END OF THIS FORM					
NOTE 3 BIDDER SHALL COMPLETE THESE TWO COLUMNS TO REFLECT HIS ACTUAL DISTRIBUTION SCHEDULE AND INCLUDE THIS FORM WITH THE PROPOSAL.					
NOTE 4 ALL DOCUMENTS AND DRAWINGS SHALL ALSO BE PROVIDED IN MAGNETIC MEDIA AND SHALL BE ISSUED BY VENDOR. THE SOFTWARE SHALL BE IN ACCORDANCE WITH CONTRACT.					
BASED ON THE ANNEX D API STD 672.					
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FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 05/08.					

DATA SHEET		No.	REV.
		SHEET _____ of _____	
<b>TITLE: <span style="font-size: 1.2em;">VENDOR DRAWINGS AND DATA REQUIREMENTS</span></b>			
<b>MOTERING SYSTEM AND INSTRUMENTATION</b>			
THE DOCUMENTS STATED BELOW SHALL BE SUPPLIED IN ENGLISH OR PORTUGUESE.			
PROPOSAL (Notes 1 and 4) BIDDER SHALL FURNISH	_____	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
REVIEW (Notes 2 and 4) VENDOR SHALL FURNISH	_____	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
FINAL (Notes 2 and 4) VENDOR SHALL FURNISH	_____	COPIES OF DATA FOR ALL ITEMS INDICATED BY AN X.	
VENDOR SHALL FURNISH	_____	OPERATING AND MAINTENANCE MANUALS	
DISTRIBUTION RECORD	_____	FINAL - RECEIVED FROM VENDOR _____ FINAL - DUE FROM VENDOR (Note 3) _____ REVIEW - RETURNED TO VENDOR _____ REVIEW - RECEIVED FROM VENDOR _____ REVIEW - DUE FROM VENDOR (Note 3) _____	
<b>DESCRIPTION</b>			
1 - CERTIFIED GENERAL ARRANGEMENT OR OUTLINE DRAWING AND LIST OF CONNECTIONS.			
2 - CROSS-SECTIONAL DRAWING, PARTS LIST.			
2a - DESCRIPTION AND DETAILED DRAWINGS FOR THE OPERATION OF INSTRUMENTATION, CONTROLS AND AUXILIARY EQUIPMENTS (INCLUDING LIST WITH MATERIALS AND CATALOG NUMBER).			
2b - INSTRUMENTATION CABLE LIST WITH COMPLETE SPECIFICATION.			
3 - CONTROL AND ELECTRICAL SYSTEM SCHEMATICS AND BILL OF MATERIALS.			
3a - P & I DRAWINGS INCLUDING AS A MINIMUM: ELECTRICAL, OIL, PROCESS AND MONITORING SYSTEM.			
3b - SCHEMATIC DRAWINGS OF THE ELECTRONIC CARDS.			
3c - INTERCONNECTION WIRING DIAGRAMS.			
4 - ELECTRICAL AND INSTRUMENTATION SYSTEM ARRANGEMENT PLANS.			
4a - CAUSE X EFFECT DIAGRAM.			
4b - LOGIC DIAGRAM FOR START UP, ALARM AND SHUTDOWN SYSTEM.			
4c - HOOK-UP DRAWINGS (PNEUM., ELEC., PROCESS).			
4d - LOOP DIAGRAMS.			
4e - PANEL HARDWARE AND SOFTWARE (DESCRIPTION OF LADDER AND BLOCK DIAGRAM, DRAWINGS SPECIFICATION LAY-OUT, DATA SHEETS AND CABLE LIST).			
5 - GROUNDING PLAN.			
6 - CERTIFIED CALIBRATION CURVES.			
7 - ROTOR NODAL POINT ANALYSIS DATA.			
8 - RECOMMENDED ALARM (ALERT) AND SHUTDOWN (DANGER) SETPOINTS.			
8a - CONTROL AND SHUTDOWN / ALARM SPECIFICATION.			
9 - ISA DATA SHEETS.			
9a - INSTRUMENTATION INDEX SHEETS.			
9b - CALCULATION SHEETS.			
9c - INSTRUMENTATION EXCEPTION LIST.			
10 - DIMENSIONS AND DATA.			
11 - INSTALLATION MANUAL.			
12 - OPERATING AND MAINTENANCE MANUAL.			
12a - HARDWARE AND SOFTWARE MANUALS OF CONTROL AND SHUTDOWN / ALARM SYSTEM, (INCLUDING LADDER DIAGRAM, PROGRAMING INSTRUCTION AND COMMUNICATION DRIVERS).			
13 - SPARE PARTS RECOMMENDATIONS, WITH PART NUMBERS AND LIST OF INTERCHANGEABLE PARTS.			
14 - ENGINEERING, FABRICATION AND DELIVERY SCHEDULE (PROGRESS REPORTS).			
15 - LIST OF DRAWINGS AND DATA.			
15a - DOCUMENTATION INDEX.			
16 - SHIPPING LIST.			
17 - SPECIAL WEATHER PROTECTION (IF NECESSARY) AND TROPICALIZATION REQUIREMENTS.			
NOTE 1: PROPOSAL DRAWINGS AND DATA DO NOT HAVE TO BE CERTIFIED OR AS-BUILT. NOTE 2: PURCHASER WILL INDICATE IN THIS COLUMN THE TIME FRAME FOR SUBMISSION OF MATERIALS USING THE NOMENCLATURE GIVEN AT THE END OF THIS FORM. NOTE 3: BIDDER SHALL COMPLETE THESE TWO COLUMNS TO REFLECT HIS ACTUAL DISTRIBUTION SCHEDULE AND INCLUDE THIS FORM WITH THE PROPOSAL. NOTE 4: ALL DOCUMENTS AND DRAWINGS SHALL ALSO BE PROVIDED IN MAGNETIC MEDIA AND SHALL BE ISSUED BY VENDOR. THE SOFTWARE SHALL BE IN ACCORDANCE WITH CONTRACT.			

[illegible]



	<b>DATA SHEET</b>		No.	REV.	
				SHEET	of
	TITLE:				
	<b>VENDOR DRAWINGS AND DATA REQUIREMENTS</b>				
NOTES					
<small>BASED ON THE ANNEX D API STD 672.</small>					
<small>INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.</small>					
<small>FORM OWNED TO PETROBRAS N-2649 REV. B ANNEX C - SHEET 08/08.</small>					

**REV. A**

Affected Parts	Description of Alteration
	General Revision

**REV. B**

[illegible]