PETROBRAS

| N-2916 | REV. A | ENGLISH | 12 / 2012 |
|---|---|---|---|

CONTEC
Comissão de Normalização Técnica

SC-11
Machines

# Centrifugal Fan - Data Sheet

Revalidation

**Revalidated in 03/2020.**

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# Centrifugal Fan - Data Sheet

Procedure

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.



**CONTEC**
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**SC - 11**
Machines

## *Introduction*

*PETROBRAS Technical Standards are prepared by Working Groups - WG (consisting specialized of Technical Collaborators from Company and its Subsidiaries), are commented by Company Units and its Subsidiaries, are approved by the Authoring Subcommittees - SCs (consisting of technicians from the same specialty, representing the various Company Units and its Subsidiaries), and ratified by the Executive Nucleus (consisting of representatives of the Company Units and its Subsidiaries). A PETROBRAS Technical Standard is subject to revision at any time by its Authoring Subcommittee and shall be reviewed every 5 years to be revalidated, revised or cancelled. PETROBRAS Technical Standards are prepared in accordance with PETROBRAS Technical Standard N-1. For complete information about PETROBRAS Technical Standards see PETROBRAS Technical Standards Catalog.*

## Foreword

This Standard is the English version (issued in 12/2012) of PETROBRAS N-2916 REV. A 12/2012. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

## 1 Scope

1.1 This Standard rules the Data Sheet for Centrifugal Fans used in the projects for PETROBRAS.

1.2 This Standard is applicable to procedures started as from the date of its edition.

1.3 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 13705 - Petroleum, Petrochemical and Natural Gas Industries Fired Heaters for General Refinery Service;

API STD 614 - Lubrication, Shaft-sealing and Oil-control Systems and Auxiliaries;

API STD 670 - Machinery Protection Systems;

API STD 673 - Centrifugal Fans for Petroleum, Chemical and Gas for Industry Services;

API STD 676 - Positive Displacement Pumps - Rotary;

API STD 677 - General-Purpose Gear Units for Petroleum, Chemical and Gas Industry Services.

ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard;

ASME B16.47 - Large Diameter Steel Flanges NPS 26 Through NPS 60 Metric/Inch Standard.

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 General Conditions

3.1 For acquisition of fans, the Data Sheet, after completed, shall be attached to a Material Requisition (RM) for constituting a purchasing document.

3.2 The Data Sheet after completed by the designer and complemented by the manufacturer, whenever the case, shall constitute a permanent document for the equipment.

3.3 The blank field on the right of the page number shall be eventually completed by the issuer in order to allow some internal reference.

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| | AREA: | | |
| | TITLE: CENTRIFUGAL FAN | | |

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APPLICABLE TO ☐ PROPOSAL ☐ PURCHASE ☐ AS BUILT

FOR _____ UNIT _____

SITE _____ SERVICE _____

Nº REQ'D _____ MANUFACTURER Nº _____

FAN MFR _____ SIZE _____ TYPE/ARRANGEMENT _____ SERIAL Nº _____

DRIVER MFR _____ DRIVER TYPE _____ RATED POWER, kW _____ SPEED, rpm _____

FURNISHED BY _____ MOUNTED BY _____ PER SPECIFICATION _____

DRIVE SYSTEM FAN ROTATION, FROM DRIVEN END ☐ CW ☐ CCW

☐ DIRECT COUPLED ☐ OTHER _____ APPLIC. ☐ API STD 673 ☐ ISO 13705 ANNEX. E ☐ OTHER _____

**OPERATING CONDITIONS**

| (ALL DATA ON PER UNIT BASIS) | NORMAL | RATED | OTHER CONDITIONS | | | |
|---|---|---|---|---|---|---|
| ☐ OPERATING CONDITIONS/CASE | | | | | | |
| ☐ GAS HANDLED | | | | | | |
| ☐ DENSITY, kg/m$^3$ | | | | | | |
| ☐ Nm³ /h (1,033 kgf/cm$^2$ a & 0 ºC) ☐ WET ☐ DRY | | | | | | |
| ☐ WEIGHT FLOW, kg/h ☐ WET ☐ DRY | | | | | | |
| **INLET CONDITIONS:** | | | | | | |
| ☐ TEMPERATURE, ºC | | | | | | |
| ☐ RELATIVE HUMIDITY, % | | | | | | |
| ☐ MOLECULAR WEIGHT | | | | | | |
| ☐ INLET VOLUME, m³/s ☐ WET ☐ DRY | | | | | | |
| ☐ $C_p/C_v$ ☐ $K_1$ ☐ $K_{avg}$ | | | | | | |
| ☐ COMPRESSIBILITY ☐ $Z_1$ ☐ $Z_{avg}$ | | | | | | |
| ☐ STATIC PRESSURE @ SOUND TRUNK, mm$H_2O$ | | | | | | |
| ☐ PRESSURE LOSS ACROSS SOUND TRUNK, mm$H_2O$ | | | | | | |
| ☐ STATIC PRESSURE @ INLET DAMPERS, mm$H_2O$ | | | | | | |
| ☐ STATIC PRESSURE @ FAN INLET, mm$H_2O$ | | | | | | |
| **DISCHARGE CONDITIONS:** | | | | | | |
| ☐ STATIC PRESSURE @ FAN OUTLET, mm$H_2O$ | | | | | | |
| ☐ STATIC PRESS. @ DISCHARGE DAMPER, mm$H_2O$ | | | | | | |
| ☐ ΔP ACROSS DISCHARGE DAMPER, mm$H_2O$ | | | | | | |
| ☐ ΔP ACROSS EVASE, mm$H_2O$ | | | | | | |
| ☐ STATIC PRESSURE @ EVASE OUTLET, mm$H_2O$ | | | | | | |
| **PERFOMANCE:** | | | | | | |
| ☐ RATED POWER @ TEMP. (ALL LOSSES INCLUDED) kW | | | | | | |
| ☐ FAN SPEED, rpm | | | | | | |
| ☐ GUARANTEE POINT | | | | | | |
| ☐ PEFORMANCE CURVE Nº. | | | | | | |
| ☐ STATIC ΔP ACROSS FAN, mm$H_2O$ | | | | | | |
| ☐ INLET DAMPER / VANE POSITION | | | | | | |
| ☐ DISCHARGE DAMPER POSITION | | | | | | |
| ☐ FAN STATIC EFFICIENCY, % | | | | | | |

**FAN CONTROL:**

☐ AIR SUPPLY _____ ☐ FAN CONTROL FURNISHED BY _____

☐ CONTROL SIGNAL TYPE _____ SOURCE _____ SENSITIVITY _____ RANGE _____

☐ ARRANGEMENT DRWG Nº. _____ CONTROL SIGNAL FAILURE MODE ☐ CLOSE ☐ OPEN ☐ AUTOLOCK

**METHOD:**

| | | |
|---|---|---|
| ☐ INLET DAMPER | ☐ AUTOMATIC | ☐ MANUAL |
| ☐ OUTLET DAMPER | ☐ AUTOMATIC | ☐ MANUAL |
| ☐ INLET GUIDE VANES | ☐ AUTOMATIC | ☐ MANUAL |
| ☐ SPEED VARIATION | ☐ AUTOMATIC | ☐ MANUAL |
| ☐ _____ | ☐ AUTOMATIC | ☐ MANUAL |

☐ STARTING CONDITIONS _____ STARTING METHOD _____

☐ START & STOP RESTRICTIONS _____

☐ VENDOR REVIEW OF CONTROL SYSTEM REQUIRED ☐ OTHER

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# DATA SHEET

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TITLE:

## CENTRIFUGAL FAN

### OPERATING CONDITIONS

| GAS ANALYSIS | SYMBOL | MW | NORMAL | RATED | OTHER CONDITIONS | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| ☐ MOL, % ☐ _____ | | | | | | | | | |
| AIR | - | 28,97 | | | | | | | |
| OXYGEN | $O_2$ | 32,00 | | | | | | | |
| NITROGEN | $N_2$ | 28,02 | | | | | | | |
| WATER VAPOR | $H_2O$ | 18,02 | | | | | | | |
| CARBON MONOXIDE | CO | 28,01 | | | | | | | |
| CARBON DIOXIDE | $CO_2$ | 44,01 | | | | | | | |
| HYDROGEN SULFIDE | $H_2S$ | 34,08 | | | | | | | |
| HYDROGEN CHLORIDE | HCl | 36,47 | | | | | | | |
| SULFUR DIOXIDE | $SO_2$ | 64,06 | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| TOTAL | | | | | | | | | |
| AVG. MOL WT. | | | | | | | | | |

**CORROSIVES:**

☐ CORROSION / EROSION CAUSED BY _____

☐ CORROSION EROSION PROTECTION _____

☐ NACE MR-01-90 MATERIALS REQUIRED _____

### LOCATION AND SITE DATA

**LOCATION:**

☐ INDOOR ☐ HEATED ☐ UNDER ROOF

☐ OUTDOOR ☐ UNHEATED ☐ PARTIAL SIDES

☐ GRADE ☐ MEZZANINE ☐ _____

☐ WINTERIZATION REQ'D ☐ TROPICALIZATION REQ'D

**SITE DATA:**

☐ ELEVATION _____ m ☐ BAR _____ kgf/cm²

☐ RELATIVE HUMIDITY, % _____

☐ WIND LOAD _____ kgf/m² ☐ VELOCITY _____ km/h

☐ MINIMUM DESIGN METAL TEMPERATURE _____ ºC

☐ RANGE OF TEMPERATURE, ºC

| | DRY BULB | WET BULB |
|---|---|---|
| MAXIMUM | | |
| NORMAL | | |
| MINIMUM | | |

UNUSUAL CONDITIONS ☐ DUST ☐ FUMES ☐ SALTY ATMOSPHERE ☐ OTHER _____

### SPECIFICATIONS

**NOISE SPECIFICATIONS:**

☐ APPLICABLE TO MACHINE

SEE SPECIFICATION _____

☐ APPLICABLE TO NEIGHBORHOOD

SEE SPECIFICATION _____

**ACOUSTIC HOUSING:** ☐ YES ☐ NO

_____

**APPLICABLE SPECIFICATION:**

**PAINTING:**

☐ MANUFACTURER'S STD.

☐ OTHER _____

**SHIPMENT:**

☐ DOMESTIC ☐ EXPORT ☐ EXPORT BOXING REQ'D

☐ STORAGE OVER _____ MONTHS

### ELECTRICAL AREA CLASSIFICATION:

☐ CLASS _____ ☐ GROUP _____ ☐ ZONE _____

### ERECTION:

SHIPPED ☐ ASSEMBLED ☐ PARTLY ASSEMBLED

☐ OTHER _____

☐ EXTENT OF FIELD ERECTION & ASSEMBLY _____

_____ MAN HOURS _____

☐ OTHER _____

### GENERAL NOTES:

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# DATA SHEET

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TITLE:

# CENTRIFUGAL FAN

## CONSTRUCTION FEATURES

**SPEEDS:**

MAX CONT. _____ rpm TRIP _____ rpm

MAX TIP SPEEDS _____ rpm @ RATED

_____ rpm @ MAX. CONT

**LATERAL CRITICAL SPEEDS:**

FIRST CRITICAL _____ rpm ☐ DAMPED ☐ UNDAMPED

☐ TRAIN LATERAL ANALYSIS REQUIRED

☐ SUBMIT X-Y PLOT (COUPLED DRIVER & FAN)

**TORSIONAL CRITICAL SPEEDS:**

FIRST CRITICAL _____ rpm SECOND _____ rpm

THIRD _____ rpm FORTH _____ rpm

☐ SUBMIT X-Y PLOT (COUPLED DRIVER & FAN)

☐ TORSIONAL VIBRATION ANALYSIS FOR FAN & DRIVER

☐ TRANSIENT TORSIONAL ANALYSIS FOR SYNCHRONOUS DRIVER UNITS

ALLOWABLE TEST LEVEL _____ mm (PEAK TO PEAK)

**HOUSING:**

MATERIAL _____

CONSTRUCTION _____

AMCA ARR. _____ CONSTRUCTION CLASS _____

☐ INLET BELL _____

☐ EVASE (DETAIL IN PROPOSAL)

☐ INSULATION REQUIRED ☐ INSULATION STUDS BY _____

☐ INSULATION TYPE _____ THICKNESS _____ mm

☐ FAN HOUSING NEAR-CENTERLINE SUPPORT REQUIRED

☐ DRAINS: N°. / SIZE _____ TYPE LOC _____

☐ FAN INLET ACCESS: SPLIT FOR ROTOR REMOVAL

☐ MANWAYS SIZE _____ mm TYPE/LOC _____

SIZE _____ mm TYPE/LOC _____

**BEARING HOUSING:**

☐ CONSTRUCTION _____ MATERIAL _____

**BEARINGS:**

☐ HYDRODYNAMIC ☐ ANTI-FRICTION

MOUNTING PEDESTALS ☐ YES ☐ NO

SOLE PLATES ☐ YES ☐ NO

**RADIAL BEARINGS:**

| | MFG/N° | LOAD, kgf | L'NGT, mm | DIA., mm |
|---|---|---|---|---|
| INBOARD | | | | |
| OUTBOARD | | | | |

Dn FACTOR _____ L-10 _____ h

LOAD FACTOR _____

MAX. SPEED _____ rpm @ _____ °C

CLEARANCE _____ mm

BEARING SPAN (CL - CL) _____ mm

**THRUST BEARINGS:**

TYPE (DUAL BELL, FLAT LAND, TAPERED LAND, TILT-PAD)

_____

MFG/N° _____ AREA _____ $mm^2$

LOADING, $N/m^2$: ACTUAL _____ ALLOW _____

Dn FACTOR _____ L10 _____ h

LOAD FACTOR _____

MAX. SPEED _____ rpm @ _____ °C

☐ THRUST COLLAR (ON INBOARD BEARING): TYPE _____

TYPE ATTACHMENT _____

☐ INTEGRAL THRUST COLLAR REQUIRED

**GENERAL NOTES:**

**BEARING HOUSING (CONT.:):**

☐ TEMP. DETECTORS: ☐ THRUST ☐ JOURNAL

☐ METAL ☐ OIL

TYPE _____ MFG/N° _____ ☐ API STD 670

☐ HEATERS: TYPE _____ MFG/N° _____

☐ END SEALS ☐ LABYRINTH ☐ DOUBLE CONTACT

TYPE _____ MFG/N° _____

LUBRICATION: ☐ FLOOD ☐ RING OIL ☐ C.L.O

☐ PURGE OIL MIST ☐ PURE OIL MIST

☐ FORCED ☐ OTHER _____

COOLANT REQUIRED ☐ NONE ☐ AIR

☐ WATER _____ $m^3/h$ @ _____ °C

**ROTOR**

SHAFT LENGTH _____ mm DIA @ WHEEL _____ mm

MATERIAL _____

CONSTRUCTION / TYPE _____

N° STAGES _____

TIR @SLEEVE _____ mm DIA. @ BEARING BRG _____ mm

SHAFT END MOVEMENTS (TOLER. PLUS THERMAL) _____ mm

**BLADES:**

N° OF BLADES _____ DIAMETERS _____ mm

TYPE (HOLLOW OR SOLID AIR FOIL., SINGLE, THICKNESS ETC)

_____

TYPE FABRICATION _____

MATERIAL _____ COATING TYPE _____

WEAR PLATES _____ MATERIAL _____

HUB ☐ SHRINK FIT ☐ KEYED

MATERIAL _____ CONSTRUCTION _____

ROTOR WT., kgf _____ $WK^2$, $kg/m^2$ _____

KEY WAY. N°. _____ DIM _____ X _____ X _____ mm

☐ MAX. HEATING/COOLING RATE _____ / _____ °C/min

**SHAFT SLEEVES:**

LENGTH _____ mm DIA. _____ mm

SHRINK FIT _____ ☐ CORROSION RESISTANT MATL.

**SHAFT SEALS:**

TYPE _____ MATERIAL _____

BUFFER OR EDUCTOR CONNECTIONS _____

DETAILS _____

**MAIN CONNECTIONS:**

☐ INLET N° _____ SIZE _____ X _____ AREA _____ $m^2$

☐ FLANGE SIZE _____ BOLTING _____

☐ LOCATION/ORIENTATION _____

☐ EXP. JOINT REQ'D _____ FURN. BY _____

☐ OUTLET N° _____ SIZE _____ X _____ AREA _____ $m^2$

☐ FLANGE SIZE _____ BOLTING _____

☐ LOCATION/ORIENTATION _____

☐ EXP. JOINT REQ'D _____ FURN. BY _____

☐ MATING FLG BY VENDOR ☐ ASME B16.5 ☐ ASME B16.47

**OTHER CONNECTIONS:**

| SERVICE | N° | SIZE | TYPE |
|---|---|---|---|
| LUBE OIL INLET | | | |
| LUBE OIL OUTLET | | | |
| COOLING WATER INLET | | | |
| COOLING WATER OUTLET | | | |
| PRESSURE GAGE | | | |
| TEMP. GAGE | | | |
| CONDENSATE DRAINS | | | |

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**CONSTRUCTION FEATURES (CONT.)**

**NOISE ATTENUATION:**

- ☐ MAX. ALLOW SOUND PRESS LEVEL ____ dBA @ ____ m
- ☐ PREDICTED SOUND PRESS LEVEL ____ dBA @ ____ m
- ☐ ATTENUATION METHOD ____
- ☐ FURNISHED BY ____
- ☐ SILENCER MFG/MODEL N° ____
- ☐ ACOUSTIC PERF ____
- ☐ AERODYNAMIC PERF ____ $m^3/s$ ____ °C
  LOSS ____ $mmH_2O$
- ☐ ACCESSORIES ____

**FAN CLEANING SYSTEM:**

- ☐ REQUIRED ____ CLEANING MEDIUM ____
- ☐ MRF./MODEL ____ FURN BY ____
- ☐ INSTALLED BY ____
- ☐ DETAILS/DWG.N° ____
- ☐ AIR FILTER; ΔP ____

**BASEPLATES & SOLEPLATES:**

- ☐ TRIDIRECTIONAL ADJUSTING SCREWS FOR EQUIP.
- ☐ PILOT HOLES FOR DOWELS
- ☐ TYPE GROUT ____ TYPE PRECOAT ____
  SOLEPLATES FOR ☐ BEARING PEDESTALS ☐ GEAR ☐ DRIVER ☐ FAN HOUSING SUPPORTS
  BASE PLATE
- ☐ COMMON (UNDER FAN, GEAR, DRIVER) ☐ FAN ALONE
- ☐ OTHER ☐ DIMENSIONS ____ X ____ X ____ m
  DECKING ☐ NON SKID ☐ OPEN CONSTRUCTION
- ☐ DRIP RIM ☐ OPEN DRAIN
  SUITABLE FOR ☐ COLUMN OR ☐ PERIMETER SUPPORT
- ☐ LEVELING PADS W / REMOVABLE COVER
- ☐ SUBSOLE PLATES REQUIRED
- ☐ API STD 676 REQUIREMENTS

| FAN ITEMS: | ☐ CORROSION ALLOWANCE | ☐ SIZE / THICKNESS (INCL. CA.) | ☐ MATERIAL | ☐ MATERIAL SPECIFICATION |
|---|---|---|---|---|
| SHAFT | | | | |
| BLADES | | | | |
| HUB | | | | |
| CENTER PLATE | | | | |
| SHROUDS | | | | |
| SLEEVES | | | | |
| SEALS | | | | |
| HOUSING | | | | |
| DAMPERS | | | | |
| GUIDE VANES | | | | |
| EXPANSION JOINTS | | | | |
| RAIN HOODS | | | | |
| INLET BELTS | | | | |
| EVASE (DISCHARGE, DIFFUSER) | | | | |
| SOUND TRUNK | | | | |
| INLET DUCT | | | | |
| WEAR PLATES | | | | |

| COUPLINGS: | DRIVER-FAN | DRIVER-GEAR | GEAR-FAN |
|---|---|---|---|
| COUPLING & GUARD FURNISHED BY | | | |
| TYPE | | | |
| MFG. | | | |
| MODEL /NUMBER | | | |
| LUBRICATION | | | |
| MOUNT CPLG. HALVES | | | |
| FAN | | | |
| DRIVE | | | |
| GEAR | | | |
| SPACER LENGTH | | | |
| LTD. END FLOAT REQ'D | | | |
| COUPLING GUARD REQ'D | | | |
| SERVICE FACTOR | | | |
| CPLG. RATING HP/100 rpm | | | |
| KEYED OR HYDR FIT | | | |
| MATERIALS | | | |

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## CONSTRUCTION FEATURES (CONT.)

**ALLOWABLE EXTERNAL LOADS:**

| | INLET | | DISCHARGE | |
|---|---|---|---|---|
| | FORCE kgf | MOMT. kgf.m | FORCE kgf | MOMT. kgf.m |
| AXIAL | | | | |
| VERTICAL | | | | |
| HORIZ. 90° | | | | |

**VIBRATION DETECTORS:**

- ☐ PROVISIONS FOR VIBRATION TRANSDUCERS (THREADED CONN.)
- ☐ FLAT SURFACES FOR MAGNETIC MOUNTED TRANSDUCERS
- ☐ SEISMIC SENSOR COVER(S) BY _____
- ☐ PROVISIONS FOR MOUNTING NON-CONTACTING VIB. PROBES
- ☐ PER API STD 670

**SPEED DETECTORS (ON OUTDOOR BEARING):**

- ☐ NON-CONTACT PROBE ☐ SPEED SWITCH
- ☐ OTHER _____
- ☐ TYPE _____ ☐ MODEL _____
- ☐ MFG _____
- ☐ LOCATION _____
- ☐ SCALE RANGE _____ rpm
- ☐ SHAFT TOOTH WHEEL

**SHOP INSPECTIONS & TESTS:**

| | REQ'D | OBS | WIT |
|---|---|---|---|
| SHOP INSPECTION | ☐ | ☐ | ☐ |
| CLEANLINESS INSPECTION | ☐ | ☐ | ☐ |
| HARDNESS VERIFICATION | ☐ | ☐ | ☐ |
| CHARPY IMPACT TESTING | ☐ | ☐ | ☐ |
| SHAFT RUN OUT CHECK | ☐ | ☐ | ☐ |
| ROTOR BALANCING | ☐ | ☐ | ☐ |
| REBAL. AFTER MOUNTING CPLG | ☐ | ☐ | ☐ |
| RESIDUAL BALANCE CHECK | ☐ | ☐ | ☐ |
| CALIBRT'N CK. OF BALNC'G EQUIP | ☐ | ☐ | ☐ |
| NDT EXAMINATION | ☐ | ☐ | ☐ |
| ASSEMBLY & FIT UP CHECK | ☐ | ☐ | ☐ |
| INITIAL &/OR FINAL ALIGN | ☐ | ☐ | ☐ |
| GEAR TOOTH CONTACT CHK. (API STD 677) | ☐ | ☐ | ☐ |
| MECHANICAL RUN TEST | ☐ | ☐ | ☐ |
| FULL UNIT MECHANICAL RUN TEST | ☐ | ☐ | ☐ |
| VIBRATION TEST | ☐ | ☐ | ☐ |
| SOUND LEVEL TEST | ☐ | ☐ | ☐ |
| MAT'L CERTIFICATION | ☐ | ☐ | ☐ |
| SURFACE & SUBSURFACE INSPECT | ☐ | ☐ | ☐ |
| TYPE | _____ | | |
| PRESSURE TEST | ☐ | ☐ | ☐ |
| HOUSING | ☐ | ☐ | ☐ |
| DUCTING | ☐ | ☐ | ☐ |
| LUBE OIL SYSTEM | ☐ | ☐ | ☐ |
| RUN & CHECK LUB CONSOLE | ☐ | ☐ | ☐ |
| SHOP PERFORMANCE TEST | ☐ | ☐ | ☐ |
| PRE-SHIPMENT INSPECTION | ☐ | ☐ | ☐ |
| DRIVER / AUX. MOUNTED | ☐ | ☐ | ☐ |
| QUALITY CONTROL REVIEW | ☐ | ☐ | ☐ |
| FIELD PERFORMANCE TEST | ☐ | ☐ | ☐ |

**WEIGHTS, kgf:**

FAN _____ DRIVER _____ BASE _____
ROTORS FAN _____ DRIVER _____ BASE _____
GEAR UPPER CASE _____
SOUND TRUNK _____ EVASE _____
SYSTEMS: LUBE _____ CLEANING _____
CONTROL PANEL _____
MAX. FOR MAINTENANCE (IDENTIFY) _____
TOTAL SHIPPING WEIGHT _____

**SPACE REQUIREMENTS, mm:**

COMPLETE UNIT L _____ W _____ H _____
CONTROL PANEL L _____ W _____ H _____
_____ L _____ W _____ H _____

**UTILITY REQUIREMENTS:**

STEAM _____ AIR _____
WATER _____ GAS _____
ELECTRIC _____

**DRIVER(S):**

- ☐ SINGLE DRIVER ☐ DUAL DRIVER WITH CLUTCH
- ☐ ELECTRIC MOTOR ☐ STEAM TURBINE ☐ OTHER
- ☐ ITEM _____ / _____
- ☐ MANUFAC. _____ / _____
- ☐ DATA SHEET _____ / _____
- ☐ FURNISHED BY _____ / _____
- ☐ MOUNTED BY _____ / _____
- ☐ POWER, kW _____ / _____
- ☐ SPEED, rpm _____ / _____
- ☐ SPEED VARIATION

**CLUTCH:**

- ☐ ITEM _____
- ☐ MANUFAC. _____
- ☐ DATA SHEET _____

**GEAR:**

- ☐ ITEM _____
- ☐ MANUFAC. _____
- ☐ DATA SHEET _____

**MISCELLANEOUS:**

- ☐ VENDOR'S REVIEW & COMMENTS ON FOUNDATION DESIGN
- ☐ VENDOR'S REV & C'MNTS ON CONTRACTOR'S DUCT DESIGN
- ☐ TORSIONAL ANALYSIS REPORT REQUIRED
- ☐ TURNING GEAR, TYPE DRIVER _____
- ☐ AUTO ☐ MANUAL ENGAGE ☐ START FROM REST
- ☐ RAIN HOOD & CAP
- ☐ INLET AIR FILTER
- ☐ INLET DAMPER
- ☐ INLET GUIDE VANE
- ☐ INLET TRASH SCREEN
- ☐ OUTLET DAMPER
- ☐ INLET / OUTLET DAMPER EXTERNAL POSITION INDICATOR
- ☐ SOUND TRUNK (INLET BOX / SILENCER)
- ☐ BOLTING & GASKETS
- ☐ REQUIREMENTS FOR PERSONAL ACCESS AND MAINTENANCE

**NOTES:**

PETROBRAS

# DATA SHEET

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TITLE:

# CENTRIFUGAL FAN

## LUBRICATION SYSTEM

APPLICABLE STD: ☐ API STD 614 CHAPTER _____ ☐ OTHER _____

**PIPING MATERIALS:**

| | CARBON STEEL | STAINLESS STELL |
|---|---|---|
| ☐ COMPLETE SYSTEM | | |
| ☐ DOWNSTREAM OF FILTERS | | |
| ☐ RETURN PIPING | | |
| _____ | | |

☐ CARBON STEEL SLIP-ON FLANGES ON S.S. PIPING

**SYSTEM COMPONENT SUPPLIERS:**

| | MFR | MODEL |
|---|---|---|
| ☐ MAIN PUMP | | |
| ☐ STANDBY PUMP | | |
| ☐ ELECTRIC MOTOR(S) | | |
| ☐ STEAM TURBINE(S) | | |
| ☐ OIL COOLER(S) | | |
| ☐ OIL FILTER(S) | | |
| ☐ ACCUMULATOR(S) | | |
| ☐ SUCT. STRAINER(S) | | |
| ☐ CHECK VALVE(S) | | |
| ☐ SWITCH VALVE(S) | | |
| ☐ PUMP COUPLING(S) | | |
| ☐ TEMP. INDICATORS | | |
| ☐ L.P. SHUTDOWN SWITCH | | |

**SYSTEM PRESSURES:**

☐ DESIGN ____ kgf/cm² g ☐ HYDROTEST _____ kgf/cm² g

☐ PUMP RELIEF VALVE (S) SETTINGS _____ kgf/cm² g

**BASIC SYSTEM REQUIREMENTS: (NORMAL OIL FLOW)**

| ☐ LUBE OIL | m³/h | kgf/cm² g | SSU @ 38° | SSU @ 99ºC |
|---|---|---|---|---|
| FAN | | | | |
| DRIVER | | | | |
| GEAR | | | | |

☐ COMMON LUBE SYSTEM _____

**PUMPS:**

| | MAIN | STANDBY |
|---|---|---|
| ☐ HORIZONTAL | | |
| ☐ VERTICAL | | |
| ☐ SUBMERGED | | |
| ☐ MOTOR DRIVEN | | |
| ☐ TURBINE DRIVEN | | |
| ☐ SHAFT DRIVEN | | |
| ☐ CENTRIFUGAL | | |
| ☐ GEAR/SCREW | | |
| ☐ FLANGE CONNECTED | | |
| ☐ FLOW, m³/h (RATED) | | |
| ☐ @ kgf/cm² g | | |
| ☐ BKW @ 100 SSU | | |
| ☐ DRIVER POWER, kW | | |
| ☐ CASING MATERIAL | | |
| ☐ SPEED | | |
| ☐ COUPLING | | |
| ☐ GUARD | | |
| ☐ MECH. SEAL | | |

**EMERGENCY LUBE OIL PUMP:**

☐ AIR MOTOR DRIVEN ☐ OTHER _____

☐ SAFETY GUARD REQUIRED

**GENERAL NOTES:**

**STANDBY PUMP CONTROL:**

☐ RESET ☐ MANUAL ☐ AUTOMATIC

☐ AUTOMATIC START

☐ "ON-OFF-AUTO" SELECTOR SWITCH

**RESERVOIR:**

☐ MATERIAL _____

RETENTION TIME _____ min CAPACITY _____ m³

☐ BASEPLATE MOUNTED ☐ FABRICATED STEEL BASE

☐ BAFFLE REQUIRED ☐ INTERIOR COATING

FREE SURFACE AREA _____ m²

☐ HEATER (S) ☐ ELECT. ☐ STEAM ☐ MIN SITE _____ ºC

☐ FLTR./BRTHR ☐ FLANGED VNT HEAT-UP TIME _____ h

☐ PRESS. RELIEF VENT ☐ INSULATION SUPPORTS

☐ SPRING LOADED FILL CAP WITH S.S. STRAINER

**OIL COOLERS:**

☐ AIR ☐ WATER _____ m³/h @ _____ ºC

☐ SINGLE ☐ TWIN

☐ W/ BY-PASS & TEMP. CNTRL VALVE ☐ MANUAL ☐ AUTO

☐ ASME CODE STAMP

☐ HEATING STEAM _____ kgf/cm² g @ _____ ºC

☐ FOUL FACTR. SHELL SIDE _____ TUBE SIDE _____

☐ MAKE _____ ☐ TYPE _____

☐ DUTY _____ W ☐ SURFACE _____ ºC

☐ CODE (S) _____

☐ DESIGN PRESS., kgf/cm² g : SHELL SIDE ____ TUBE SIDE ____

☐ TUBES: O.D. ____ mm ☐ TOTAL SURFACE AREA _____ m²

WALL THICKNESS (AVE/MIN) _____ / _____ mm

LENGTH _____ mm NUMBER _____

☐ MATERIALS

TUBES _____

TUBE SHEETS _____

SHELL _____

TUBE SUPPORT _____

SHELL COVER/FLANGE _____

**ACCUMULATOR:**

☐ SINGLE ☐ MULTI

☐ ASME CODE DESIGN ☐ ASME CODE STAMP

☐ MATERIAL _____

☐ CORROSION ALLOWANCE, mm _____

☐ CAPACITY (TOTAL), m³ _____

☐ PRE-CHARGE PRESS., kgf/cm² g _____

☐ DIRECT CONTACT TYPE ☐ BLADDER TYPE

☐ BLADDER MATERIAL _____

☐ WITH SUPPLY REGULATOR ☐ MANUAL CHARGE VALVE

**FILTERS:**

MFR: _____

☐ SINGLE ☐ TWIN

☐ ASME CODE DESIGN ☐ ASME CODE STAMP

☐ MICROM, µ _____

☐ FILTER MEDIUM _____

☐ DESIGN PRESS., kgf/cm² g _____

☐ ΔP CLEAN, kgf/cm² _____

☐ ΔP COLLAPSE, kgf/cm² _____

☐ CASING MATERIAL _____

☐ CARTRIDGE IDENT NO. _____

☐ FURNISH SET OF SPACE CARTRIDGE W/ FILTERS

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## INSTRUMENTATION

☐ PER API STD 614 AND STD 670 ☐ OTHER _____

**LOCAL CONTROL PANEL:**

FURNISHED BY ☐ VENDOR ☐ PURCHASER ☐ OTHERS

☐ BASE MOUNTED ☐ FREE STANDING ☐ WEATHERPROOF ☐ TOTALLY ENCLOSED ☐ EXTRA CUTOUTS

☐ VIBRATION ISOLATORS ☐ STRIP HEATERS ☐ PURGE CONNECTIONS ☐ WITH DOORS

☐ ANNUNCIATOR WITH FIRST OUT INDICATION LOCATED ON LOCAL PANEL

☐ CUSTOMER CONNECTIONS BROUGHT OUT TO TERMINAL BOXES BY VENDOR

☐ ONLINE MONITORING ☐ CUSTOMER CONTROL SYSTEM _____

**INSTRUMENT SUPPLIERS:**

| | | | | |
|---|---|---|---|---|
| PRESSURE GAGES | MFR | | SIZE & TYPE | |
| TEMPERATURE GAGES | MFR | | SIZE & TYPE | |
| LEVEL GAGES | MFR | | SIZE & TYPE | |
| DIFF. PRESSURE GAGES | MFR | | SIZE & TYPE | |
| PRESSURE TRANSMITTERS | MFR | | SIZE & TYPE | |
| DIFF. PRESSURE TRANSMITTERS | MFR | | SIZE & TYPE | |
| TEMPERATURE TRANSMITTERS | MFR | | SIZE & TYPE | |
| LEVEL TRANSMITTERS | MFR | | SIZE & TYPE | |
| CONTROL VALVES | MFR | | SIZE & TYPE | |
| PRESSURE RELIEF VALVES | MFR | | SIZE & TYPE | |
| SIGHT FLOW INDICATORS | MFR | | SIZE & TYPE | |
| VIBRATION EQUIPMENT | MFR | | SIZE & TYPE | |
| TACHOMETER | MFR | | RANGE &TYPE | |
| SOLENOID VALVES | MFR | | SIZE & TYPE | |
| ANNUNCIATOR | MFR | | MODEL & No. POINTS | |
| DAMPER/VANE ACTUATOR | MFR | | MODEL | |
| FURNISHED BY _____ | TYPE | | MAX. TORQUE, kgf.m | |

**PRESSURE GAUGE REQUIREMENTS:**

| FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM | FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM |
|---|---|---|---|---|---|---|---|
| FAN INLET | ☐ | ☐ | ☐ | LUBE OIL PUMP DISCHARGE | ☐ | ☐ | ☐ |
| FAN OUTLET | ☐ | ☐ | ☐ | LUBE OIL FILTER ΔP | ☐ | ☐ | ☐ |
| CONTROL AIR | ☐ | ☐ | ☐ | LUBE OIL SUPPLY | ☐ | ☐ | ☐ |
| INLET AIR FILTER ΔP | ☐ | ☐ | ☐ | | | | |

**TEMP. GAUGE REQUIREMENTS:**

| FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM | FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM |
|---|---|---|---|---|---|---|---|
| FAN INLET | ☐ | ☐ | ☐ | OIL COOLER INLET & OUTLET | ☐ | ☐ | ☐ |
| FAN BEARINGS | ☐ | ☐ | ☐ | JOURNAL OIL BEARING OUTLET | ☐ | ☐ | ☐ |
| DRIVER BEARINGS | ☐ | ☐ | ☐ | THRUST OIL BEARING OUTLET | ☐ | ☐ | ☐ |

**DISPLACEMENT AND VIBRATION GAUGE REQUIREMENTS:**

| FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM | FUNCTION | LOCALLY MOUNTED | LOCAL PANEL | CONTROL ROOM |
|---|---|---|---|---|---|---|---|
| AXIAL DISPLACEMENT | ☐ | ☐ | ☐ | PHASE ANGLE | ☐ | ☐ | ☐ |
| VIBRATION INDICATORS | ☐ | ☐ | ☐ | _____ | ☐ | ☐ | ☐ |

**SWITCH CLOSURES:**

ALARM CONTACTS SHALL ☐ OPEN ☐ CLOSE TO SOUND ALARM AND BE NORMALLY ☐ ENERGIZED ☐ DE-ENERGIZED

SHUTDOWN CONTACTS SHALL ☐ OPEN ☐ CLOSE TO TRIP AND BE NORMALLY ☐ ENERGIZED ☐ DE-ENERGIZED

**GENERAL NOTES:**

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**INSTRUMENTATION (CONT.)**

**MISCELLANEOUS:**

ALARM AND SHUTDOWN SWITCHES SHALL BE SEPARATE

ELECTRICAL AND INSTRUMENT CONNECTIONS WITHIN THE CONFINES OF THE FAN BASE SHALL BE BROUGHT OUT TO TERMINAL BOXES

COMMENTS REGARDING INSTRUMENTATION _____

_____

**ALARM & SHUTDOWN SWITCHES:**

| FUNCTION | ALARM | TRIP | FUNCTION | ALARM | TRIP |
|---|---|---|---|---|---|
| HIGH FAN BEARING TEMPERATURE | ☐ | ☐ | LOW LUBE OIL PRESSURE | ☐ | ☐ |
| HIGH INLET AIR FILTER ΔP | ☐ | ☐ | HIGH LUBE OIL FILTER ΔP | ☐ | ☐ |
| HIGH FAN VIBRATION | ☐ | ☐ | LOW LUBE OIL RESERVE LEVEL | ☐ | ☐ |
| HIGH FAN AXIAL DISPLACEMENT | ☐ | ☐ | AUX. LUBE OIL PUMP START | ☐ | ☐ |
| HIGH DRIVER BEARING TEMP. | ☐ | ☐ | _____ | ☐ | ☐ |
| DRIVER SHUTDOWN | ☐ | ☐ | _____ | ☐ | ☐ |

**MISCELLANEOUS INSTRUMENTATION:**

☐ SIGHT FLOW INDICATORS EACH JOURNAL & THRUST BEARING OIL RETURN LINE

☐ LEVEL GAUGES, LUBE OIL RESERVOIR(S)

☐ VIBRATION READOUT EQUIPMENT

☐ VIBRATION READOUT LOCATED ON: ☐ LOCAL PANEL ☐ OTHER _____

☐ FAN SPEED PICK-UP DEVICES

☐ FAN SPEED INDICATORS

☐ FAN SPEED CONTROL: ☐ LOCAL ☐ REMOTE _____

☐ FAN SPEED INDICATORS LOCATED ON: ☐ LOCAL PANEL ☐ OTHER _____

☐ ALARM HORN & ACKNOWLEDGEMENT SWITCH

☐ _____

☐ _____

**GENERAL NOTES:**

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**GENERAL NOTES**

| INDEX OF REVISIONS | |
|---|---|
| | |
| | |
| **REV. A** | |
| **Affected Parts** | **Description of Alteration** |
| All | Revision without technical changes to alignment the versions Portuguese / English. |
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