



# TECHNICAL REQUIREMENTS

## MECHANICAL

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## MACHINERY

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# GENERAL-PURPOSE CENTRIFUGAL FANS

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## 1. SCOPE

- 1.1** The **API Standard 673 Third Edition, December 2014 "Centrifugal Fans for Petroleum, Chemical and Gas Industry Services"**, is an integral part of this job specification. The numbering of sections and paragraphs is the same as in API 673. The type of change, e.g. addition, deletion, modification or substitution is noted for each item.
- 1.2** Compliance with this job specification does not relieve the manufacturer nor the vendor of the responsibility for furnishing equipment of proper design and construction and fully suitable for all specified operating conditions.
- 1.3** Exceptions to this and other applicable standards shall be clearly stated in vendor's proposals.
- 1.4** Vendor shall either submit a list of exceptions or a statement to the effect that its proposal is in full accordance with these standards. In this latter case the purchaser shall assume that the proposal includes the cost of the requirements of any of the applicable standards.
- 1.5** Vendor is responsible that materials supplied by its subvendors comply with the requirements of these standards.

## 2. REFERENCES

### 2.1 General

For references see:

- Paragraph 2.1 of API Std. 673-3.

The latest editions of the following publications are to be used with this Specification as applicable:

### 2.2 OL Specifications

OL-TR-GR-000	<i>General Requirements</i>
OL-TR-GR-001	<i>General. Noise Level</i>
OL-TR-CR-011	<i>Civil. Corrosion Protection and Lining. Painting</i>
OL-TR-MR-000	<i>Mechanical. General</i>
OL-TR-MRR-000	<i>Mechanical. Machinery. General</i>

### 2.3 Local, State, National Codes and Legislations

Legislation of the Republic of Lithuanian	<i>Law on the Supervision of Potentially Dangerous Equipment No. I-1324 („Lietuvos Respublikos Potencialiai pavojingų įrenginių priežiūros įstatymas Nr. I-1324 (aktuali redakcija nuo 2011 -07-19)“)</i>
Legislation of the Republic of Lithuanian	<i>Law on Assessment of Conformity VIII-870 („Atitikties įvertinimo įstatymas VIII-870“)</i>
Legislation of the Republic of Lithuanian	<i>Technical Regulation on Pressure Equipment (Slėginių įrenginių techninis reglamentas)</i>

**Legislation of the  
Republic of Lithuanian**

*Technical Regulations for Equipment and Protection  
Systems Used in Potentially Explosive Atmosphere  
(„Įrangos ir apsaugos sistemų, naudojamų potencialiai  
sprogioje aplinkoje, techninis reglamentas“)*

**STR 1, 2 (Legislation of  
the Republic of  
Lithuanian)**

*Technical regalement's of construction*

**2.4 Others**

Equipment shall comply also with the following:

**2.4.1 Data sheet acc. to API Std. 673-3, Annex A (pages 73-79, US units).**

**2.4.2** Pressure equipment, as defined in Pressure Equipment Directive (P.E.D.) 97/23/CE article 1, shall fully satisfy the P.E.D. essential safety requirements. In particular, design and construction shall be carried out by Manufacturer according to ASME or EN code, as amended under the supervision and approval of the nominated Notified Body, to fulfill P.E.D. requirements;

**2.4.3** Equipment and Protection Systems intended for use in Potentially Explosive Atmospheres, shall be in full compliance with Directive 94/9/CE (ATEX) requirements.

**NOTES:**

- (1) Detailed information relevant to Area Classification, Group, Ignition Temperature etc., shall be as indicated on individual Material Requisition.*
- (2) Manufacturer shall affix the CE marking and shall prepare a declaration of conformity for the Equipment. Nomination of a Notified Body shall be made as needed.*

**2.4.4** Compliance with European Directives includes all needed/requested CE nameplates, marking, declaration of conformity, operating instruction manuals etc.

**3. TERMS AND DEFINITIONS**

For terms and definitions see:

- Section 3 of API Std. 673-3.

**4. REVISIONS TO API STANDARD 673**

All headings contained herein correspond to paragraph numbering within API Std. 673-3 and reflect additions, substitutions, modifications, and deletions. All provisions not modified or deleted remain in force.

**4.1 Modifications to Section 6: Design**

**6.1.1 Exception: General**

Fans, drivers, and auxiliaries shall be designed for at least 8000 hours of continuous service, except as otherwise specified.

**6.1.3 Addition: General**

Fans and auxiliaries shall be suitable for outdoor installation in the climatic zone specified.

**6.1.4 Exception: General**

Regarding bearing arrangement, impeller overhung designs are acceptable.

**6.1.7 Addition: General**

Fan vendor shall submit noise emission data for the quoted machine, in accordance with OL-TR-GR-001.

**6.2.2 Addition: Fan Housing**

Doors shall be provided for access to inlet guide vanes.

**6.2.3 Addition: Fan Housing**

Internal bolting, if used within the fan housing, shall be self-locking.

**6.3.2.12.11 Addition: Auxiliary Connections. Pipe Flanges**

Drain connections shall be valved.

**6.8.3 Exception: Bearings and Bearing Housings. Hydrodynamic Radial Bearings**

Radial bearings shall be of the Vendor's standard type.

**6.8.4 Exception: Bearings and Bearing Housings. Thrust Bearings**

Thrust bearings shall be of the Vendor's standard type.

**6.8.5 Addition: Bearings and Bearing Housings. Bearing Housings**

Material for cooling coils shall be per ASTM B 111 or ASTM B 111M (as applicable) Alloy C44300, C44400, or C44500. Pipe connections inside the bearing housing are prohibited.

**6.8.5 Addition: Bearings and Bearing Housings. Bearing Housings**

Shaft bearings shall be accessible without dismantling duct work or fan casing.

**6.9.1 Addition: Lubrication**

The following requirements for oil mist lubrication shall apply to anti-friction bearings only. Fans and gears specified for oil mist lubrication shall comply with the following:

- a. An oil mist inlet connection, NPS 1/4 (8 mm) shall be provided in the top half of the bearing housing located so that oil mist will flow through anti-friction bearings. Alternatively, where oil mist connections are between each housing shaft enclosure and the bearings, one vent central to the housing shall be supplied.
- b. A vent connection, NPS 1/4 (8 mm) shall be provided on the housing or end cover for each of the spaces between anti-friction bearings and the housing shaft closures.
- c. Shielded, sealed, or double-row type anti-friction bearings shall not be used.
- d. When pure oil mist is specified, oil rings or flingers (if any), constant level oilers, shall not be provided, and a mark indicating oil level is not required. When purge mist lubrication is specified, these items shall be provided. The oiler shall be piped so that it is maintained at the internal pressure of the bearing housing.

**6.9.2 Addition: Lubrication**

Where a pressurized lubrication system is required for the fan, its driver, or gear unit, the lube oil system shall be mounted within the confines of the main unit base area, unless mounting on a console assembly base is specified.

**6.9.3 Addition: Lubrication**

As a minimum, instrumentation to be furnished for a fan or gear unit utilizing pressurized lubrication shall measure:

- a. Lube oil outlet temperature at each bearing;
- b. Lube oil header pressure;
- c. Lube oil filter pressure drop.

**6.10.1.1 Addition: Materials. General**

Fan housing and inlet box construction shall be of carbon steel unless otherwise specified.

**6.10.1.8 Addition: Materials. General**

Fan components exposed to wet H<sub>2</sub>S service shall conform to NACE MR0175. Wet H<sub>2</sub>S exposure includes trace quantities present during startup and shutdown.

**6.10.2.2. Addition: Materials. Castings**

Steel casting repairs shall comply with ASTM A 488/A 488M or ASME SEC VIII D1.

**4.2 Modifications to Section 7: Accessories**

**7.1.2.2 Addition: Drivers. Motors**

Motors used for auxiliary drivers shall be in accordance with OL-TR-ER-009.

**7.1.3.1 Addition: Drivers. Steam Turbines**

If a steam turbine is specified for the main driver, it shall be per OL-TR-MRR-041, except speed governors shall be NEMA SM 23 Class C or better for fan units to be operated in parallel.

**7.4.1.1 Addition: Mounting Plates. General**

Soleplates shall be provided for each bearing pedestal.

**7.4.2.12 New Paragraph: Mounting Plates. Baseplates**

Driver and gear combinations shall be mounted on a common baseplate.

**7.5.1.2. Addition: Controls and Instrumentation. General**

All instruments and controls including alarm and shutdown devices, shall be installed with sufficient valving to permit testing and removal while the system is in operation.

**7.5.1.10 New Paragraph: Controls and Instrumentation. Control Systems**

Alarm circuits shall be "normally energized" and protective system circuits shall be "normally de-energized" when the fan is in operation. Contacts shall open to alarm.

**7.5.4.6 New Paragraph: Control and Instrumentation. Dampers and Inlet Guide Vanes**

For a parallel fan operation, each fan shall be provided with an outlet guillotine shut-off gate or louvered damper with a spectacle blind, as specified.

**7.6.1 Exception: Piping. General**

All auxiliary piping shall be per OL-TR-MPR-000.

**4.3 Modifications to Section 8: Inspection, Testing and Preparation for Shipment**

**8.3.3.5 New Paragraph: Testing. Mechanical Running Tests**

All fans shall have a shop mechanical run test using oil of equivalent viscosity grade as specified for use in the field.

Mechanical testing shall include:

- a. Fan shall be operated from 0–110 percent of rated speed for turbine drives and at 100 percent of rated speed for motor drives, with an uninterrupted minimum period of four hours at these maximum speeds. Bearing performance and vibration shall be checked.
- b. Operation and function of instrumentation and controls shall be demonstrated to the Inspector, to the extent practical.

- c. The Vendor shall maintain a log of all final tests including vibration and bearing oil temperature data. Shaft vibration measurements shall be recorded throughout the specified speed range.
- d. Hydrodynamic type bearings shall be removed, inspected, and reassembled in the fan after completion of the mechanical running test. The test and subsequent inspection shall be repeated until a satisfactory test, and inspection results, are accepted by the Inspector.

#### **4.4 Modifications to Section 9: Vendor Data**

##### **9.2.2.3 New Paragraph: Proposals. Drawings**

Detailed drawings of dampers and guide vane control systems and linkages shall be furnished. Torque requirement for these devices shall be included.

#### **4.5 New Section 10: Guarantee and Warranty**

##### **10.1 New Paragraph: Guarantee and Warranty**

Fan vendor shall be responsible for the commercial and engineering coordination, supply, delivery and satisfactory operation of the complete fan unit, including driver, gear, transmission, oil system and any other auxiliary equipment in vendor's scope of supply.

##### **10.2 New Paragraph: Guarantee and Warranty**

Fan vendor shall be responsible for parts supplied by its sub suppliers.

##### **10.3 New Paragraph: Guarantee and Warranty**

Unless exceptions are recorded in vendor proposal, it shall be understood that the vendor agrees to the guarantees and warranties specified below:

##### **10.3.1 New Paragraph: Guarantee and Warranty. Mechanical**

Unless otherwise specified in the purchase order, all equipment and component parts shall be warranted by the vendor against defective materials, design and workmanship for 1 year after being placed in service or 18 months after date of delivery whichever is the earliest.

##### **10.3.2 New Paragraph: Guarantee and Warranty. Performance**

The fan shall be guaranteed for head, capacity, and satisfactory performance at all the specified operating points and further shall be guaranteed at the normal or rated operating point as applicable.

##### **10.3.3 New Paragraph: Guarantee and Warranty. Make-Good**

If any performance deficiency or defects occur during the guarantee and warranty period, the vendor shall make all necessary alterations, repairs and replacement at the conditions defined in the purchase documents.