



PRODUCT STANDARD
INDUSTRIAL TURBINES & COMPRESSORS

TC 54329

Rev. No.: 03

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CENTRIFUGAL EXHAUST FAN WITH A.C MOTOR

- 1.0.0 **SCOPE:**
This standard specifies the requirements of design, manufacture, assembly, testing and supply of radial centrifugal exhaust fan with A.C electric motor used in the lubrication oil system of Utility Turbo Generator sets.
- 2.0.0 **FUNCTION:**
- 2.1.0 The centrifugal exhaust fan comes in operation in conjunction with the running of any one of the lube oil pumps. The exhaust fan is to handle oil fumes generated during running of the Turbine. It shall also maintain a partial vacuum in the lube oil tank and bearing pedestals. The oil fumes to be handled by the fan shall contain free droplets of oil The fan is mounted on the lube oil tank.
- 3.0.0 **SPECIFICATIONS:**
- 3.1.0 Centrifugal Fan:
- 3.1.1 Medium : Oil Vapour
- 3.1.2 Continuous discharge capacity : 0.18 M³/Sec.
- 3.1.3 Normal discharge pressure : 200 mm of water column
- 3.1.4 Specific weight of vapour : 1.2 Kg/M³
- 3.1.5 Temperature
- 3.1.5.1 Working temperature of oil vapour : 65°C
- 3.1.5.2 Design Temperature : 100°C
- 3.1.6 Suction branch size & bolt hole drilling : As per attached document TCEG-120MW-OVEF
- 3.1.7 Delivery branch size & bolt hole drilling : As per attached document TCEG-120MW-OVEF
- 3.1.8 Overall dimensions execution : As per attached document TCEG-120MW-OVEF
- 3.1.9 Absorbed power by fan : To be indicated by supplier.
- 3.1.10 Speed : 2900 RPM
- 3.1.11 **MATERIALS:**
- 3.1.11.1 Material of construction : Non-sparking
- 3.1.11.2 Casing with suction & discharge flanges : Grey Iron Casting
- 3.1.11.3 Running wheel (Impeller) : As per Manufacturer's standard.
- 3.2 **ELECTRICAL MOTOR:**
- 3.2.1 Type : Squirrel cage Induction.
- 3.2.2 General requirements : As per BHEL spec TC54175 or TC54370, IS:325
- 3.2.3 Type of starting : Direct online
- 3.2.4 Enclosure & execution : IP 55, TEFC, Flame proof as per IS:2148 suitable for gas groups IIA & IIB.
- 3.2.5 Insulation class : Class "F" temperature rise limited to class "B"

Revisions	Prepared	Approved	Date
Refer to record of revisions	M.V. S.RAJU	K.K.RAO	13.06.08

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- 3.2.6 Cable glands : Cable glands shall be supplied along With motor.
- 3.2.7 Out put : To be furnished by vendor.
Note: It shall have at least 25% reserve power rating over required power to Drive the exhaust fan, when discharging maximum quantity of oil vapour.
- 3.2.8 Speed of motor : 2900 RPM
- 3.2.9 Voltage : 415 V ± 10%
- 3.2.10 Frequency : 50 HZ ± 5%
- 3.2.11 combined voltage & frequency : ± 10%
Variation
- 3.2.12 Ambient temperature : 50° C (or as mentioned in the enquiry)
- 3.2.13 Performance : As per IS: 325 or IEC60034
- 3.2.14 Certification : CMRS
- 3.2.15 Acceptable make of motors : Siemens, BBL, CGL, KEC, ABB, LHP

4.0.0 DESIGN & CONSTRUCTION FEATURES:

- 4.1.0 The overall dimensions and execution of the fan shall be as shown in the attached drawing TCEG-120MW-OVEF.
- 4.2.0 The material of construction shall be Non-sparking type. The materials used shall be such as to resist corrosion and erosion and shall give a long trouble free service.
- 4.3.0 The design shall be such as to keep the friction less and wear caused by thrust, wear in seals and bearings to minimum. The rotor of the fan should be dynamically balanced, so that the vibration of the fan is not greater than 10 microns peak to peak. The noise level should not be greater than 85 Dba to a reference of 0.0002 microbar, when measured at a distance of 1.2 meters above floor level and one meter horizontally from the base of the equipment.
- 4.4.0 The fan bearings shall be designed, so as to assure 50000 hours continuous service for friction bearings and 25000 hours for ball roller bearings.
- 4.5.0 Location of assembly is out door and shall be suitable for continuous service in tropical humid climate.

5.0.0 Documentation:

- 5.1.0 Documentation to be submitted along with offer (2 Hard Copies):
- 5.1.1 General arrangement drawing of the oil vapour exhaust fan giving all dimensions, fixing details, mating flange details & weight of the total unit.
- 5.1.2 Performance curve showing discharging capacity Vs discharge pressure and power consumption.
- 5.1.3 Complete technical literature.
- 5.1.4 Centrifugal pump data sheet.
- 5.1.5 Motor data sheet as per BHEL specification TC54175 or TC54370.
- 5.1.6 Cross-sectional drawing showing 2 year recommended normal operational spares.
- 5.1.7 Cleaning & painting procedure adopted by vendor. The final painting shade is to be indicated.
- 5.1.8 Vendor's standard quality plan
- 5.2.0 Documentation to be submitted after placement of order (3 Hard Copies+1 soft copy):
- 5.2.1 General arrangement drawing of the oil vapour exhaust fan giving all dimensions, fixing details, mating flange details & weight of the total unit.

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- 5.2.2 Performance curve showing discharging capacity Vs discharge pressure and power consumption.
- 5.2.3 Centrifugal pump data sheet.
- 5.2.4 Motor data sheet as per BHEL specification TC54175 or TC54370.
- 5.2.5 Vendor's standard quality plan

5.3.0 Documentation to be submitted along with consignment (3 hard copies & 1 soft copy):

- 5.3.1 Material certificates.
- 5.3.2 Test certificates.
- 5.3.3 Guarantee certificate
- 5.3.4 O & M Manuals

6.0.0 **SCOPE OF SUPPLY:**

- 6.1.0 Motor fan unit as shown in the attached drawing TCEG-120MW-OVEF.
- 6.2.0 Mating flanges for suction and discharge to suit pipe OD 114.3x6.02.
- 6.3.0 Fixing bots & nuts.
- 6.4.0 Cable glands for motor.

7.0.0 **INSPECTION AND TESTING**

Inspection and testing shall be as per quality plan as specified in this specification.

7.1.0 **SCHEDULE OF QUALITY CHECKS FOR CENTRIFUGAL EXHAUST FAN**

S.No	Type of check & Test	Certificate designation	Type of Inspection
1	Material tests (Chemical analysis and mechanical test)	Test reported by manufacturer's Q.C dept.	Verification of test report
2	Dynamic balancing of rotor	Test reported by manufacturer's Q.C dept.	Verification of test report
3	Performance test		
3.1	Discharge capacity Vs discharge pressure and power consumption	Test reported by manufacturer's Q.C dept.	Witness
3.2	Vibration Levels	Test reported by manufacturer's Q.C dept.	Witness
3.3	Noise levels	Test reported by manufacturer's Q.C dept.	Witness
4	Dimensional check of all critical dimensions	Test reported by manufacturer's Q.C dept.	Witness
5	Routine test of motor	Test reported by motor manufacturer's Q.C dept.	Verification of test report
6	Enclosure of motor as per IS:2148	CMRS Certificate	Verification of test report

8.0.0 **TEST AND GUARANTEE CERTIFICATES:**

8.1.0 6-copies of inspection and test certificates shall be supplied for each item of the consignment quoting BHEL Std. No., Purchase Order No. & manufacturer's identification serial number.

8.2.0 **GUARANTEE CERTIFICATE**

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- 8.2.1 A guarantee certificate for 24 months of trouble free performance from date of shipment or 18 months from the date of commissioning whichever is earlier shall be supplied.
- 8.2.2 If any mal-performance or defects occur during the guarantee Period, the vendor shall make all necessary alteration, repairs and replacement free of charge.
- 9.0.0 **CLEANING, PAINTING, CONSTRUCTION & PACKING** :
- 9.1.0 The surface shall be cleaned and prepared for the application of the coatings of blasting with non-silicate abrasive agents. The protective coating shall be oil resistant to prevent contamination of oil specified (ISC VG 46) and to prevent the deterioration of coating itself. The supplier shall give exact and precise details about measures envisaged by him for surface protection. After testing the fan, its internals shall be thoroughly cleaned, dried and conserved before packing it. The fan shall be suitably packed for transportation. It should be packed such that it is safe at least for 2 years in a very damp atmosphere. The equipment shall be properly packed to withstand mechanical damage and rust during transit. The packing for shipment shall be as per seaworthy packing.
- 10.0.0 **MARKING** :
- 10.1.0 Name plate identification marking should be as follows:
- Manufacturer's serial number & year of manufacturing.
 - Type/model number
 - Volumetric flow in M³/Sec.
 - Discharge pressure in mm of water column.
 - Flow medium
 - Operating temperature
 - Absorbed power in KW
 - Motor rating in KW
 - Speed in RPM
 - Voltage & frequency
- 11.0.0 **SPECIAL NOTE** :
- 11.1.0 Vendor to submit the signed & stamped copy of Annexure-I & II

VARIANT TABLE

Var No.	Description	Material Code
01	Oil vapour exhaust fan with motor 415V AC	TC9754329010
02	Spare drive end bearing for Oil vapour exhaust fan motor	TC975432902*
03	Spare non drive end bearing for Oil vapour exhaust fan motor	TC975432903*
04	Spare Cooling fan for Oil vapour exhaust fan motor	TC975432904*
05	Spare end shield cover for DE & NDE brg for OVEF motor	TC975432905*
06	Spare terminal box for OVEF motor	TC975432906*
07	SPARE MOTOR FOR OVEF 0.75KW- IE-3 MOTOR	TC9754329079
08	Oil vapour exhaust fan with motor 415V AC (IE-2 as per TC54370/TC54368)	TC9754329087
09	Oil Vapor exhaust fan with IE3 motor	TC9754329095
10	BARE FAN CAP 0.18M3/HR, 200MM WC	TC9754329109
11	DE BEARING IE3 MOTOR OF EX FAN	TC9754329117
12	NDE BEARING IE3 MOTOR OF EX FAN	TC9754329125
13	TERMINAL BLOCK IE3 MOTOR OF EX FAN	TC9754329133

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