

FANS AND BLOWERS

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1.0 SCOPE

This data sheet contains loss prevention recommendations related to fans and blowers. The terms “fan” and “blower” are considered synonymous for the purposes of this data sheet, and are applicable to axial and centrifugal flow machines with single-stage and multiple-stage configurations.

1.1 Changes

October 2016. Interim Revision. Clarification to recommendation 2.2.1.18 regarding NDE testing on fans and blowers and a note to Table 2, Recommended Monitoring and Inspection Frequencies, were added.

2.0 LOSS PREVENTION RECOMMENDATIONS

2.1 Introduction

Loss prevention recommendations described in this data sheet apply to blowers, ventilation, cooling tower and pollution-control fans, as well as boiler forced-draft and induced-draft fans.

2.2 Equipment and Processes

2.2.1 General

The following loss prevention measures are recommended for fan and blower equipment.

2.2.1.1 Balance rotating parts impeller and rotor prior to installation.

2.2.1.2 Install components in accordance with the instructions of the original equipment manufacturer (OEM).

2.2.1.3 Verify that forced-draft and induced-draft fan rotors were tested by the manufacturer. Report results in FM Global Risk assessment report. Overspeed testing at the factory is important to ensure the long and safe operating life of the fan rotors.

2.2.1.4 Properly align moving parts and drivers.

2.2.1.5 Operate within OEM specifications. Ensure operation for a given application, capacity, and varying speed match values on the characteristic curves.

2.2.1.6 Operate fan within normal performance curve limit. Ensure adequate flow-through to avoid stall and abnormal condition.

2.2.1.7 Provide inlet filtering where applicable to prevent foreign objects damage and contaminants.

2.2.1.8 Monitor vibration level at each point at least daily, and log reading weekly. Vibration measurement should be trended monthly and compared to manufacturer’s vibration limits. Trending is important to tool in detecting degenerative balance and bearing degradations.

2.2.1.9 Where a steam turbine is the primary force used to drive fans, provide controls and safety devices to prevent overspeed and loss of lubrication. Ensure proper bearing selection and lubrication program.

2.2.1.10 Maintain proper cooling and filtration systems for lube oil.

2.2.1.11 Perform infrared inspections of bearings/motors.

2.2.1.12 Perform motor load monitoring, and trend analysis of operational parameters.

2.2.1.13 Perform regular inspections and maintenance. Follow OEM guidelines and procedures.

2.2.1.14 Maintain a spare impeller for fans that are critical to production.

2.2.1.15 If fans are critical to production, keep spare bearings and a spare coupling on site.

2.2.1.16 Properly store all spare parts (e.g., fan impellers, bearings, and couplings).

2.2.1.17 Have on hand an approved manufacturer welding procedure for the impeller and the casing. Welders qualified to these procedures should be readily available whether in-house or contractor. Repaired impellers should be rebalanced per OEM procedures.

2.2.1.18 Perform nondestructive examination (NDE) biennially on fans and blowers, except where used in industries where the gases transferred by the fans and blowers are hot and/or erosive (e.g., cement kilns and finishing mills) where annual NDE should be considered. This includes but is not limited to the following:

- Dye penetrant (PT) or magnetic particle (MT) examination to blade and shroud fillet welds
- PT or MT examination of the blade-to-hub groove welds
- Ultrasonic (UT) thickness readings on the blades and shrouds

2.2.1.19 Use a manufacturer approved procedure to perform erosion cladding of blades and shrouds.

2.2.1.20 Ensure proper rebalancing of the impeller following any cladding or re-cladding procedure.

2.2.1.21 Follow manufacturer's recommendations for vibration alarm and trip settings criteria.

2.2.2 Protective Devices

Provide fans and blowers with protective devices, alarms, and trips in accordance with Table 1.

Table 1. Protective Devices, Alarms, and Trips for Fans and Blowers

Description of Fan	Protective Device	Alarm	Trip
Fans with hydrodynamically-lubricated bearings	Low lube-oil pressure	×	×
Rolling-element bearings with circulating lube-oil systems (splash-bath systems)	Thermocouple on bearing race	×	×
	Low oil flow	×	
	Low oil level in bearing housing	×	
	Low oil level in tank	×	
Grease-packed bearings (above 100,000 cfm, or 50 m ³ /s, capacity)	Thermocouple on bearing race	×	×
Variable-pitch fans	Low hydraulic oil pressure	×	×
Centrifugal fans over 100,000 cfm (50 m ³ /s) capacity circulating oil systems	Vibration instrumentation on all bearings	×	
All variable-pitch, axial-flow fans	Vibration instrumentation on all bearings	×	
Fans with grease-lubricated bearings	Vibration monitoring by handheld instrumentation		
Fans with installed filters	Filter pressure drop	×	

2.3 Operation and Maintenance

2.3.1 Maintenance, Inspection Intervals, and Monitoring Programs

Fans require frequent inspections to detect and correct irregularities that might cause failure.

Fans also have to be properly balanced, both statically and dynamically, per OEM specifications to ensure lasting operation. Check this balance after each scheduled maintenance shutdown, with the fan running at full speed.

2.3.1.1 Monitoring and Inspection Frequencies

Adhere to the monitoring and inspection frequencies in Table 2.