AHRI Guideline G (SI)

2016 Guideline for

Mechanical Balance of Impellers for Fans

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Note:

This guideline supersedes AHRI Guideline G-2011.

For I-P, see AHRI Guideline G (I-P)-2016.

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MECHANICAL BALANCE OF IMPELLERS FOR FANS

Section 1. Purpose

1.1 *Purpose*. The purpose of this document is to provide fundamental information and to guide the industry on Balance as applied to Impellers used in air moving systems. It includes terminology used and methods of Balancing practiced by the industry.

1.1.1 *Intent.* This document is intended for the guidance of component suppliers and equipment manufacturers.

1.1.2 *Review and Amendment.* This document is subject to review and amendment as technology advances.

Section 2. Scope

2.1 *Scope*. This document is intended to apply specifically to system vibration and mechanical Balancing as related to Impellers for Fans. The principles presented can however be generally applied to many rotating components (Rotors).

This document covers Impellers and propellers while fan systems are covered by Air Movement and Control Association International, Inc. (AMCA) Standard 204. For information on system vibration, see Appendix C.

Section 3. Definitions

All terms in this document will follow the standard industry definitions in the *ASHRAE Terminology* website (https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology) unless otherwise defined in this section.

3.1 *Balance.* The unique and ideal condition of a Rotor when it has neither static nor dynamic Unbalance. Such a Rotor does not impart any vibratory force or motion to its Bearings as a result of centrifugal forces.

3.2 *Balancing.* A procedure by which the mass distribution of a Rotor is checked and, if necessary, adjusted in order to ensure that the vibration of the Journals and/or forces on the Bearings at a frequency corresponding to operating speed are within specified limits.

3.2.1 *Dynamic (Two-plane) Balancing.* A procedure by which the mass distribution of a Rigid Rotor is resolved into two planes and adjustments made by adding or removing mass in those planes in order to reduce the primary force and secondary force couple caused by the initial Unbalance.

3.2.2 *Static (Single-plane) Balancing*. A procedure by which the mass distribution of a Rigid Rotor is resolved into one plane and adjustments made by adding or removing mass in that plane only in order to reduce the initial Unbalance force.

3.3 *Balancing Machine.* A machine that provides a measure of the Unbalance in a Rotor which can be used for adjusting the mass distribution of that Rotor.

3.3.1 *Centrifugal (Rotational) Balancing Machine*. A Balancing Machine that provides for the support and rotation of a Rotor and for the measurement of once per revolution vibratory forces or motions due to Unbalance in the Rotor.

3.3.2 *Gravitational (Non-rotating) Balancing Machine*. A Balancing Machine that provides for the support of a Rigid Rotor under non-rotating conditions and provides information on the amount and angle of the static Unbalance.

3.3.3 *Dynamic (Two-plane) Balancing Machine*. A Centrifugal Balancing Machine that furnishes information for performing Two-plane Balancing.

3.3.4 *Static (Single-plane) Balancing Machine*. A Gravitational or Centrifugal Balancing Machine that provides information for accomplishing Single-plane Balancing.

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