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Acoustical Society of America
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AMERICAN NATIONAL STANDARD
Balancing Machines—Enclosures and Other Safety Measures

ABSTRACT

This standard is the U.S. counterpart of ISO 7475-1984. It describes potential hazards presented by a balancing machine to its operator and the surrounding workshop area, relates accident probabilities, and enumerates precautionary measures. The major portion of the standard deals with the danger from rotor particles or components separating during rotation, and specifies safety measures in five different protection classes. The effects of fragment mass, shape, material, and velocity are discussed, and a standard projectile for penetration resistance testing is established. Finally, a table lists parameters for fragment enclosures for a representative series of general purpose balancing machines.

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These standards are developed as a public service to provide standards useful to the public, industry, and consumers, and to Federal, State, and local governments.

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[This Foreword is for information only, and is not a part of American National Standard Balancing Machines—Enclosures and Other Safety Measures, S2.60-1987 (ASA Catalog No. 68-1987).]

This standard was developed by the International Organization for Standardization, ISO Technical Committee 108 with considerable assistance from Accredited Standards Committee S2. The work of Accredited Standards Committee S2 was performed under the Secretariat of the Acoustical Society of America. Except for editorial differences, this standard is identical to ISO 7475-1984 Balancing Machines—Enclosures and Other Safety Measures. Accredited Standards Committee S2, which participated in the development of this standard, has the following scope:

> Standards, specifications, methods of measurement and test, and terminology, in the fields of mechanical shock and vibration, but excluding those aspects which pertain to biological safety, tolerance, and comfort.

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Working Group S2-65, Balancing Technology, which assisted Accredited Standards Committee S2 in the development of this standard, is the U.S. counterpart of ISO/TC 108/SC1/WG3 on Balancing and Balancing Machines. It had the following membership:

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Suggestions for improvements in this standard will be welcomed. They should be sent to the Standards Secretariat, Acoustical Society of America, 335 East 45th Street, New York, NY 10017-3483.

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Balancing Machines—Enclosures and Other Safety Measures

0 INTRODUCTION

In designing balancing machines, efforts are made to minimize hazards arising from the use of the machines themselves. Rising demand for still greater safety in the working environment, however, requires additional protection, especially with respect to the rotor to be balanced. Potential hazards to the operator or the surrounding workshop area may exist, for example, by personnel coming into contact with machine components or the rotor, by rotor components or unbalance correction masses detaching and flying off, or by the rotor lifting from the supports or disintegrating. Particular dangers are posed by protruding rotor components or those that may become detached during rotation in the balancing machine. These potential hazards may theoretically increase with rotor size and balancing speed, but they are generally minimized by appropriate rotor design.

Special purpose balancing machines, for example, those used in the mass production automotive industry, normally incorporate all necessary safety measures because the workpiece, as well as the operating conditions of the machine, is known and can be taken into account by the machine manufacturer. For multi-purpose balancing machines, however, where the workpieces to be balanced are generally unknown to the machine manufacturer, and are thus beyond this control, normal safety measures are limited to obvious hazards, for example, end-drive coupling and/or drive belt covers.

1 SCOPE AND FIELD OF APPLICATION

This standard specifies requirements for enclosures and other safety measures used to minimize hazards associated with the operation of balancing machines under a variety of rotor and balancing conditions. It defines different classes of protection that enclosures and other protective features have to provide, and describes the limits of applicability for each class of protection.

Special enclosure features, such as noise reduction, windage reduction, or vacuum (which is required to spin certain rotors at the balancing speed), are not covered by this standard.

2 REFERENCES

ANSI S2.7-1982 (ASA 42-1982), Balancing Terminology.

ISO 2041-1975, Vibration and Shock—Vocabulary.

ISO 4849-1981, Personal Eye Protectors—Specifications.

3 DEFINITIONS

For the purpose of this International Standard, the definitions given in ANSI S2.7-1982 and ISO 2041-1975 apply.

4 ACCIDENT PROBABILITY AND ITS EFFECT ON SAFETY MEASURES

Most local or national regulations require certain minimum safety measures to be taken. Observance of such requirements in conjunction with the recommendations contained in this standard will generally provide an adequate measure of protection to the balancing machine operator and surrounding workshop personnel. There may be applications, however, where the recommended enclosures or other safety measures are so costly, or their use so time-consuming, that other safety precautions such as vacating the surrounding area for a sufficient distance, remote control of the balancing facility, or work outside normal hours, etc., have to be considered.

The consideration of accident probability may be important if a rotor needs to be balanced or spin-tested at or above its service speed, where major rotor failure cannot be excluded with as much certainty as during low-speed balancing. Maximum service and spin-test speeds are generally placed well below the speed where major rotor failure can be expected.

On the other hand, a rotor being balanced at low speed may consist of an assembly of several components, such as a bladed turbine wheel. It is then important to consider whether an enclosure for low-speed balancing should withstand penetration of a turbine blade, or whether it is sufficient to protect against unbalance correction masses that might fly off during balancing. If the probability of blade separation is practically nonexistent, a light enclosure, which just protects against correction masses, may be sufficient.

Since this standard deals with balancing machines and safety measures in general, no details of the risk can be stated for specific rotor types and balancing facilities. Individual investigations, based on actual rotor parameters, will probably be required in each specific