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Flexible Couplings – Potential Unbalance Classification

ANSI/AGMA 9000-C90

Flexible Couplings – Potential Unbalance Classification
ANSI/AGMA 9000–C90
(Revision of AGMA 515.02 –1976)

ABSTRACT

ANSI/AGMA Standard 9000–C90, *Flexible Couplings – Potential Unbalance Classification* describes potential coupling unbalance and identifies its sources. The Standard breaks down the requirements into usable groups and outlines how to calculate the potential unbalance of the coupling.

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FOREWORD

[This foreword, footnotes, and appendices, if any, are provided for informational purposes only and should not be construed as a part of American Gear Manufacturers Association Standard ANSI/AGMA 9000–C90, *Flexible Couplings – Potential Unbalance Classification.*]

This Standard was developed after intensive study of existing standards, literature, design practices, and manufacturing procedures for the balancing of flexible couplings.

The intent of this document is to offer designers, manufacturers and users standard criteria for the unbalance classification of flexible couplings.

The information contained within this Standard does not necessarily agree with some existing specifications for other rotating components and equipment. This Standard is based upon the design criteria, related to the balancing of couplings, that have evolved over many years of successful industry practice.

At first, the coupling industry informally adopted, by usage, one tenth ounce–inch as a standard of unbalance tolerance. It soon became evident that for larger couplings this was an impractical tolerance. It also became evident that the runout of the balancing arbor as well as its own unbalance were very important factors in the final potential unbalance remaining in the corrected coupling. These facts were pointed out in Paper AGMA 519.01, October, 1967, the first AGMA technical paper written on the subject of flexible couplings. Shortly after the publication of this paper, Product Group 5 asked the Technical Committee to write an AGMA balancing standard for flexible couplings. It was recognized that existing balancing specifications such as MIL–STD 167 (ships) and ISO 1940 did not address flexible couplings.

Standard AGMA 515.01 was intended as a guide to coupling users. The first rough draft of this Standard was made in October of 1968. The first committee draft was prepared in February of 1972. It was approved by the membership on July 9, 1973.

Standard AGMA 515.02 was a revision of AGMA 515.01. It was reviewed by the members of the Flexible Couplings Product Group 5 in January, 1974 and was revised in January, 1975 and again in September, 1975. It was approved by the membership on August 18, 1976.

Standard ANSI/AGMA 9000–C90 is a revision and redesignation of AGMA 515.02. In the revision there are changes and corrections in the method of calculating the total potential unbalance of couplings (including the effects of hardware and eccentricity). The calculations give a more accurate value of the potential unbalance of a coupling. The examples in the appendices are revised to show a generic coupling which illustrates the calculation methods presented. It was approved by the AGMA membership in November 1989, and was adopted as a National Standard on February 28, 1990.

Suggestions for the improvement of this standard will be welcome. They should be sent to the American Gear Manufacturers Association, 1500 King Street, Suite 201, Alexandria, Virginia, 22314.

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1. Scope

This Standard defines standard classes of flexible coupling potential unbalance, one of which the user must select in order to meet the needs of his system. The balancing requirements for a flexible coupling depend upon the rotating system into which it is mounted. The balance classes are derived from consideration of the potential unbalance of the coupling. The AGMA method of computing coupling potential unbalance is provided. A guide is provided for balance class selection for purchasers who have not defined the coupling balancing requirements for their system.

1.1 Application. This Standard is applicable to all flexible couplings, unless otherwise specified by the individual manufacturer. It should be noted that a flexible coupling is generally an assembly of several components having diametral clearance and eccentricities between the pilot surfaces.

1.2 Exclusions. This Standard does not address the unbalance effects caused by such items as:

(1) Shaft runout
(2) Keys that protrude beyond the hub or shaft
(3) Unfilled keyways or keyseats
(4) Coupling mounting surface clearance
(5) Non–homogeneous materials
(6) Curved datum

1.3 Additional Considerations. ISO Standard 1940/1, *Mechanical Vibration – Balance Quality Requirements of Rigid Rotors – Part 1, Determination of Permissible Residual Unbalance,* may be used for balancing coupling components and assemblies in the balancing machine. However, after the coupling is disassembled and reassembled either in the balancing machine or the rotor system, significant potential unbalances are introduced. These potential unbalances, as addressed in this Standard, are primarily the result of:

a. Balancing mounting fixture inaccuracies
b. Displacement of coupling components with respect to the axis of rotation of the rotor system during disassembly and reassembly of the coupling.

2. Definitions and Symbols

The definitions of the elements of unbalance classification and the symbols used in the calculation of potential unbalance are included in this Section.

2.1 Balancing. A procedure by which the mass distribution of a rotating component or assembly 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 service speed are within specified limits.

2.2 Types of Unbalance.

2.2.1 Static Unbalance. Static unbalance is that condition of unbalance for which the central principal axis of inertia is displaced only parallel to the shaft axis. See Fig 2–1.

NOTE: The quantitative measure of static unbalance can be given by the resultant of the two dynamic unbalance vectors.

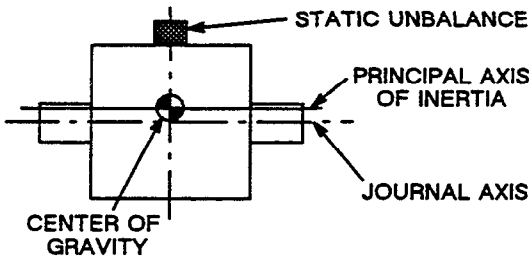

Fig 2–1 Static Unbalance

2.2.2 Couple Unbalance. Couple unbalance is that condition of unbalance for which the central principal axis of inertia intersects the shaft axis at the center of gravity. See Fig 2–2.

NOTE: The quantitative measure of couple unbalance can be given by the vector sum of the moments of the two dynamic unbalance vectors about a certain reference point in the plane containing the center of gravity and the shaft axis.

If static unbalance in a rotor is corrected in any plane other than that containing the reference point, the couple unbalance will be changed.