



AMERICAN NATIONAL STANDARD

ABMA Standard

METAL BALLS FOR UNGROUND BEARINGS AND OTHER USES

Sponsor
The American Bearing
Manufacturers Association, Inc.

Approved March 15, 2001
American National Standards Institute



ABMA
2025 M Street, NW
Suite 800
Washington, DC 20036
202-367-1155
202-3672155 fax
E-mail: abma@dc.sba.com
Web site: www.abma-dc.org

American National Standard

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

American Bearing Manufacturers Association
1200 19th Street, NW, Washington, DC 20036-2422

Copyright © 2001 by American Bearing Manufacturers Association
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

ANSI/ABMA Std. 10A-2001

**METAL BALLS
FOR UNGROUND BEARINGS
AND OTHER USES**

Secretariat
The American Bearing Manufacturers Association, Inc.

Approved March 15, 2001
American National Standards Institute, Inc.

FOREWORD

(This foreword is not a part of American National Standard ANSI/ABMA Std. 10A for Metal Balls, Unground Bearings and Other Uses.)

This standard is new and defines Metal Balls for Unground bearings and other uses. It covers the characteristics of nomenclature, normative references, measurement, material, and hardness.

This standard establishes dimensions and physical properties of balls for use with unground races or other uses. The sizes and properties are generally in/or used in production in the USA. All dimensions are given in both the inch system of measure and the equivalent metric value, using the System International (S. I.) as a convenience for users of this standard.

Suggestions for the improvement of this standard gained through experience with its use will be welcomed. These should be sent to the American National Standards Institute, Inc., 25 West 43rd Street, New York, NY 10036.

The officers of Accredited Standards Committee B3 of the American National Standards Institute and the organizations represented at the time this standard was submitted are as follows:

W. G. Looft, Chairman
James Doebereiner, Secretary

American Bearing Manufacturers Association
Hydraulic Institute
Association for Manufacturing Technology
Society of Tribologists and Lubrication Engineers
U. S. Department of Defense, DISC
U. S. Department of the Navy

Metal Balls for Unground Bearings and Other Uses

Contents

Section	Page
1. Scope.....	1
2. Normative references.....	1
3. Definitions and symbols.....	1
4. Requirements.....	4
4.1 Materials.....	4
4.2 Hardness.....	4
4.3 Case depth.....	6
4.4 Quality of surface.....	6
4.5 Geometric quality.....	7
4.6 Corrosion resistance.....	8
5. Preferred nominal sizes by materials and grades.....	9
6. Quality assurance provisions.....	12
7. Ordering specifications and package marking.....	13
Annexes (informational)	
A Measurement of deviation from spherical form.....	14
B Recommended procedure for microhardness testing of small balls.....	16
C Recommended procedure for measurement of case depth in carburized and hardened carbon steel balls.....	18
D Corrections for hardness readings taken on spherical surfaces.....	23
E Density, quantity and weight of common ball materials.....	24
List of tables.....	ii
List of figures.....	ii

List of Tables

Table	Description	Page
1	Commonly used material specification reference chart	5
2	Case depth requirements for carbon steel balls	6
3	Tolerances by grade for individual balls	7
4	Tolerances by grade for lots of balls.....	7
5	Preferred nominal ball sizes	10
6	Applicable inspection levels and acceptance quality level (AQL)	12
A1	Magnification factor.....	15
D1	Ball hardness corrections for curvatures.....	23
E1	Density of common ball materials	24
E2	Number of balls.....	25
E3	Weight of balls	28

List of Figures

Figure	Title	Page
1	Variations in lot of Grade G10A balls.....	3
A1	Vee block	15
B1	Recommended method of mounting miniature balls for microhardness testing.....	16
C1	Case depth microstructure examination	20
C2	Case depth microhardness examination	21

METAL BALLS FOR UNGROUND BEARINGS AND OTHER USES

1. Scope. This standard establishes the requirements for metal balls for unground rolling contact bearings and other uses. The requirements for finished balls for rolling contact bearings are contained in ANSI/ABMA/ISO 3290.

2. Normative references. The following standards contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards below.

ANSI B89.3.1-1972 (R1988), *Out-of-Roundness, Measurement of*

ANSI/ASME B46.1-1995, *Surface Texture (Surface Roughness, Waviness and Lay)*

ANSI/ASQC Z1.4-1993, *Sampling Procedures and Tables for Inspection by Attributes*

ASTM E18-98, *Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials*

ASTM E140-97e1, *Hardness Conversion Tables for Metals (Relationship Between Brinell Hardness, Vickers Hardness, Rockwell*

Hardness, Rockwell Superficial Hardness, Knoop Hardness and Scleroscope Hardness)

ASTM E384-89 (1997), *Standard Test Method for Microhardness of Materials*

Federal Specification GGG-G-15C (March 20, 1975), *Gage Blocks and Accessories (Inch and*

Metric)

ISO 3290:1998, *Rolling bearings - Balls - Dimensions and Hardness*

ISO 4288:1996, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture*

ISO 4291:1985, *Methods for the assessment of departure from roundness – Measurement of variations in radius*

ISO 6508-1:1999, *Metallic materials – Hardness test – Rockwell test (scales A – B – C – D – E – F – G – H – K)*

3. Definitions and symbols. The following definitions and symbols will apply to terms used in this standard.

3.1 Nominal ball diameter, D_w . The diameter value that is used for the purpose of general identification of a ball size; e.g., ¼ inch, 6 mm, etc.

