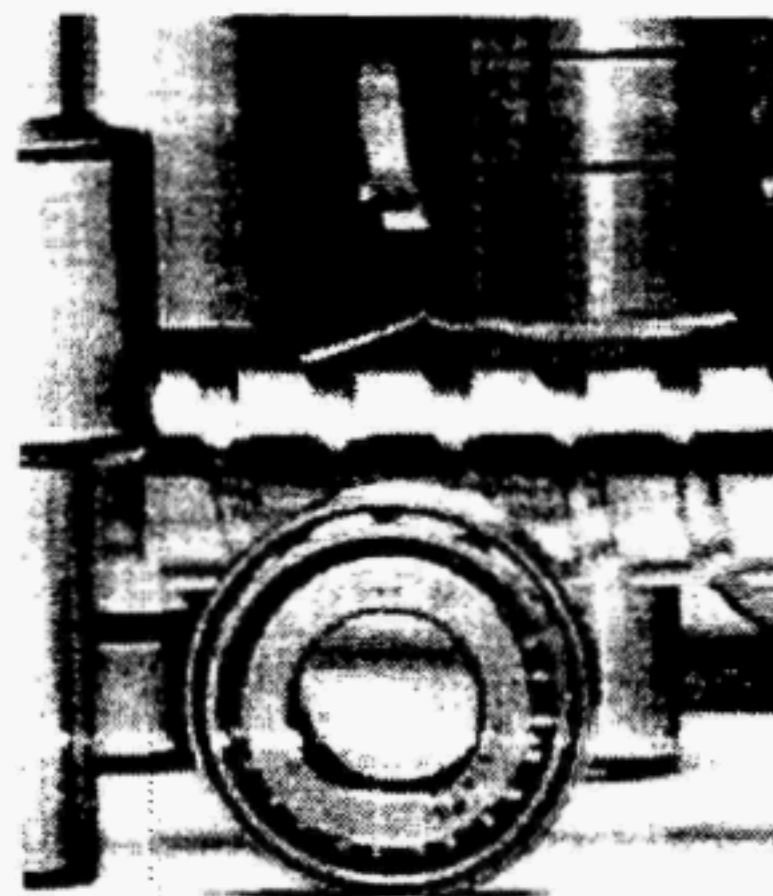


Copyright (c) American Bearing Manufacturers Association, Inc.

This reproduction made under license agreement by Information Handling Services Inc. No further reproduction or transmission is permitted, nor may this material be made part of a network-accessible system, without permission of the copyright owner.

These materials have been prepared by the American Bearing Manufacturers Association. However, the information contained in these materials has not been independently verified by the American Bearing Manufacturers Association or Information Handling Services Inc. Neither organization warrants or assumes any liability for the accuracy or completeness of these materials.



ANSI/ABMA/ISO 14216:1997

AMERICAN NATIONAL STANDARD

**ABMA Standard
ISO Standard**

**Aerospace –
Airframe ball bearings,
double-row, self-aligning,
sealed, heavy duty –
Inch series**

Secretariat
American Bearing Manufacturers Association

Approved July 15, 1999



1200 19th Street, NW
Suite 300
Washington, DC 20036-2422
202-429-5155
202-223-4579 fax
E-mail: abma@dc.sba.com
Web site: www.abma-dc.org

BEST HARDCOPY
AVAILABLE

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 © 1999 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

Aerospace –
Airframe ball bearings,
double-row, self-aligning,
sealed, heavy duty –
Inch series

Secretariat
American Bearing Manufacturers Association

Approved July 15, 1999
American National Standards Institute, Inc.

Foreword

(This foreword is not part of ANSI/ABMA/ISO 14216:1997.)

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committee are circulated to member bodies for voting. Publication as an International Standard requires approval of at least 75% of the member bodies casting a vote.

International Standard 14216 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee 15, *Airframe bearings*.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee B3 on Ball and Roller Bearings. Committee approval of this standard does not necessarily imply that all committee members voted for its approval.

Suggestions for the improvement of this standard gained through experience with its use will be welcomed. These should be sent to: American Bearing Manufacturers Association Secretariat, ANSI ASC B3, 1200 19th Street, NW, Suite 300, Washington DC 20036-2422.

Aerospace — Airframe ball bearings, double-row, self-aligning, sealed, heavy duty — Inch series

1 Scope

This International Standard specifies the characteristics, boundary dimensions, tolerances, internal clearances and permissible loads of inch series, double-row, self-aligning, sealed, heavy duty ball bearings used in airframe applications. These bearings are full complement (without cage) with a double row of balls. These bearings are designed to withstand only slow rotations and oscillations under load and are intended for use between fixed and moving parts of an aircraft structure and their control surfaces.

The airframe ball bearings covered by this International Standard are designed to operate in the temperature range of -54°C to $+150^{\circ}\text{C}$.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 683-17:—¹⁾, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels.*

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions.*

ISO 2082:1986, *Metallic coatings — Electroplated coatings of cadmium on iron or steel.*

ISO 4520:1981, *Chromate conversion coatings on electroplated zinc and cadmium coatings.*

ISO 5593:1997, *Rolling bearings — Vocabulary.*

ISO 8075:1985, *Aerospace — Surface treatment of hardenable stainless steel parts.*

ISO 14190:1998, *Aerospace — Airframe rolling bearings: ball and spherical roller bearings — Technical specification.*

AMS 2417E:1993, *Plating, zinc-nickel alloy.*²⁾

¹⁾ To be published. (Revision of ISO 683-17:1976)

²⁾ Available from: SAE International
400 Commonwealth Drive
Warrendale, PA 15096-0001
USA

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5593 apply.

4 Symbols

4.1 For the purposes of this International Standard, the symbols given in ISO 1132 apply. The symbols (except those for tolerances) shown in figure 1 and the values given in tables 1 and A.1 denote nominal dimensions unless specified otherwise.

4.2 Additional symbols for bearings covered by this International Standard are the following.

C_s permissible static radial load

$F_{a \max}$ permissible static axial load

5 Required characteristics

5.1 Dimensions — Tolerances — Internal clearances — Loads

Values are given in table 1. Where plating is specified, tolerances are applicable after plating.

Configuration is given in figure 1. The configuration for and installation process of seals are at the manufacturer's option.

5.2 Surface roughness

Inner and outer ring raceways and rolling elements shall have a surface roughness of $R_a = 0,2 \mu\text{m max}$.

Bore, side faces and cylindrical outer surface shall have a surface roughness of $R_a = 0,8 \mu\text{m max}$ before surface treatment.

6 Materials

6.1 Low alloy through hardening bearing steel (code letter F, D, M and Z)

Rings: bearing steel — ISO 683-17, type 1, surface hardness 59 HRC to 64 HRC (710 HV to 840 HV).

Balls: bearing steel — ISO 683-17, type 1, heat treated to 59 HRC to 64 HRC (710 HV to 840 HV).

6.2 Corrosion-resistant stainless steel (code letters C and H)

Rings: bearing steel — ISO 683-17, type 21, hardness $\geq 58 \text{ HRC}$ ($\geq 670 \text{ HV}$).

Balls: bearing steel — ISO 683-17, type 21, hardness $\geq 58 \text{ HRC}$ ($\geq 670 \text{ HV}$).

6.3 General

Seals: polytetrafluoroethylene (PTFE) or polytetrafluoroethylene (PTFE) sheet, glass-fabric reinforced.

Seal retainers: corrosion-resistant steel.

7 Surface treatment

0871073 0001836 009

7.1 All elements manufactured from corrosion-resistant steel which are not cadmium plated or zinc-nickel plated (code letter C) shall be passivated in accordance with ISO 8075 or cleaned by a mechanical method.

7.2 If made of corrosion-resistant steel, cadmium plating (code letter H) shall be subject to agreement between the customer and the manufacturer.

7.3 Where cadmium plating is specified (code letters D, M and H), it shall be in accordance with ISO 2082. The external surfaces of bearing rings, except the bore of the inner ring, shall be cadmium plated. Plating on the internal surfaces shall be at the manufacturers option, except the raceways shall not be plated. The thickness of the plating shall not be less than 7 μm and not more than 15 μm , except plating on the chamfers of the bore may vary from the specified thickness. The bearing shall be embrittlement-relieved within 4 h of plating by heat treatment at $140\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ for a minimum of 8 h followed by chromate treatment in accordance with ISO 4520 (code letters D and H only).

7.4 Where zinc-nickel plating is specified (code letter Z), it shall be in accordance with AMS 2417E, type 2. The surface coverage of the plating shall be as specified in 7.3. The thickness of the plating shall not be less than 7 μm or more than 15 μm .

8 Lubrication

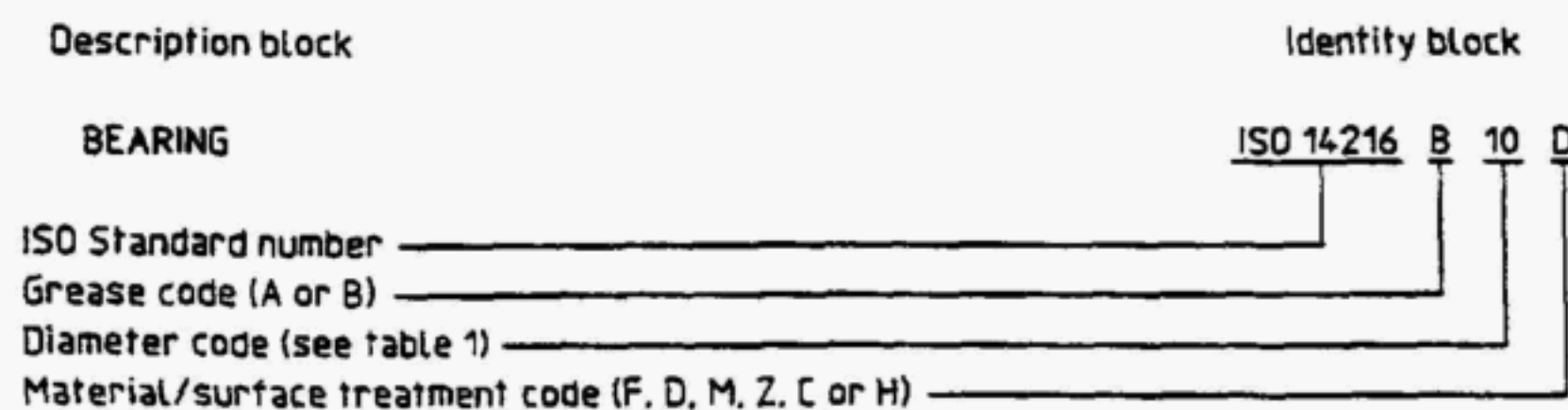
The bearing shall be prelubricated with either grease A or B, as specified by the customer.

NOTE — Descriptions of grease A and grease B are given in ISO 14190:1998, annex H.

9 Designation

Bearings in accordance by this International Standard shall be designated only as shown in the following example.

EXAMPLE



where the following codes are applied:

— greases:

A = ester type grease;

B = synthetic hydrocarbon type grease;

— materials/surface treatments:

F = material: low alloy bearing steel;

surface treatment: none;

D = material: low alloy bearing steel;

surface treatment: cadmium plated with chromate treatment;

M = material: low alloy bearing steel;

surface treatment: cadmium plated without chromate treatment;

- Z = material: low alloy bearing steel;
surface treatment: zinc-nickel plated;
- C = material: corrosion-resistant stainless steel;
surface treatment: none;
- H = material: corrosion-resistant stainless steel;
surface treatment: cadmium plated with chromate treatment.

10 Identification marking

In addition to the manufacturer's name or trademark, each bearing shall be permanently and legibly marked, using the identity block as defined in clause 9. Marking position and method are at the manufacturer's option.

11 Technical specification

Airframe ball bearings supplied to this International Standard shall conform to the requirements of ISO 14190.

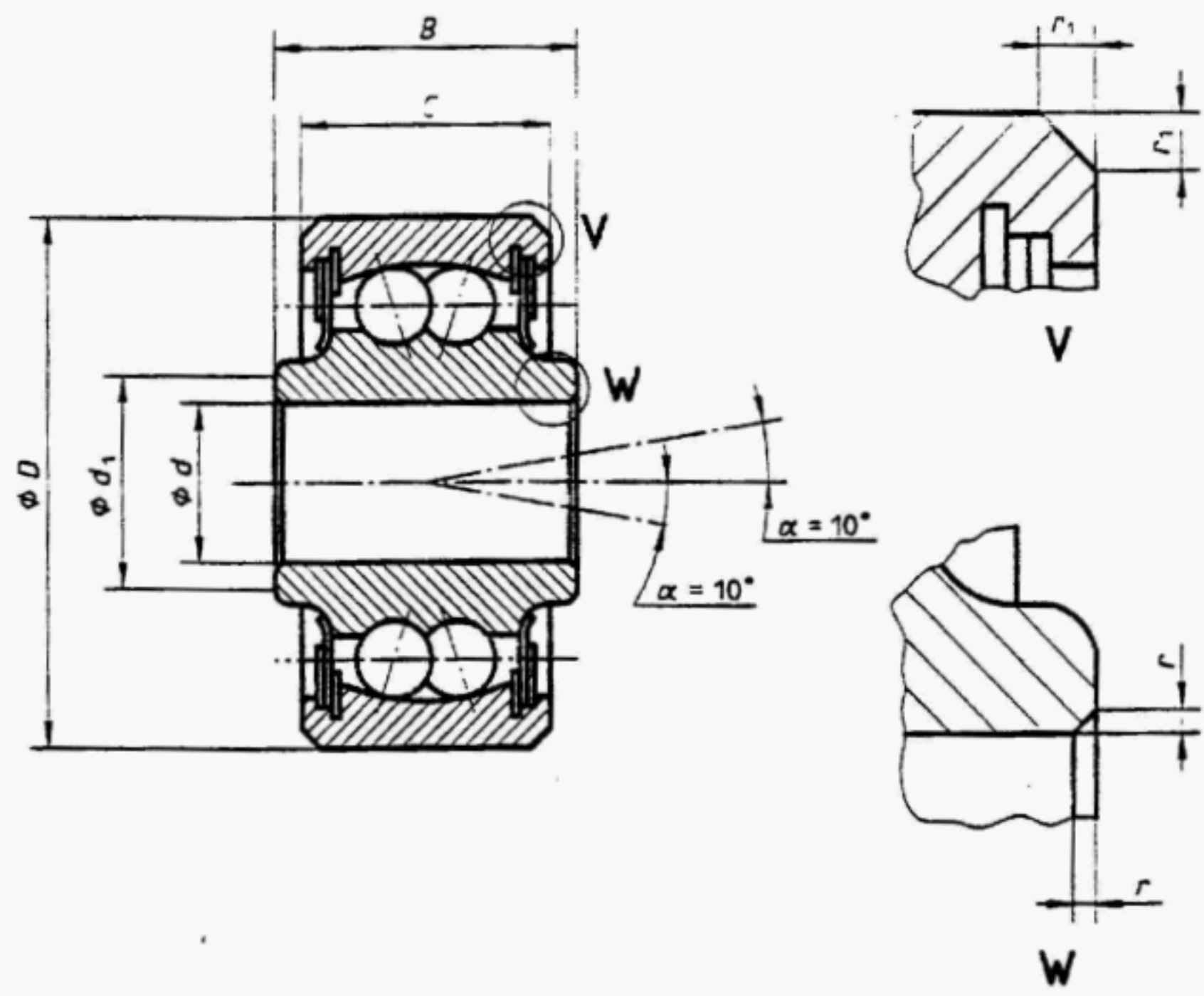


Figure 1

Dimensions in millimetres,
tolerances in micrometres

Diameter code	d +5 -18	D +13 -25	B 0 -127	C 0 -127	Δ_{ump}	Δ_{Dmp}	V_{DS} max.	V_{US} max.	α_1 =	α_2	α_3	Mass g =
03	4,826	19,746	12,7	9,957	0 -13	0 -13	20	20	7,62	0,127 to 0,508	0,559 to 0,838	18
04	6,35	22,896	17,45	11,786					10,92			27
05	7,938	31,75	20,624	16,662					13,21	0,381 to 0,762	0,813 to 1,194	73
06	9,525	36,512	23,8	19,05					14,22			109
08	12,7	42,862	25,4	20,624					19,81			163
10	15,875	49,212	28,575	23,8					22,1			240

Diameter code	Internal clearances		Radial runout tolerances		Starting torque	Permissible static radial load	Permissible static axial load
	μm		max. μm				
	Radial G_r	Axial G_a max.	K_{ia}	K_{sa}			
03	0 to 25	140	25	41	14,1	6,3	0,9
04		152				7,9	1,3
05					21,2	16,6	2,7
06					35,3	22,7	3,6
08					178	42,4	31,7
10		49,4				40	5,8

Annex A (informative) Imperial unit information

Table A.1 gives the Imperial (non-SI) unit information that is the basis for the normative portion of this International Standard.

Table A.1

Dimensions in inches,
tolerances in 0,000 1 inches

Diameter code	d +2 -7	D +5 -10	B 0 -50	C 0 -50	Δ_{dmp}	Δ_{Dmp}	V_{Bs} max.	V_{Cs} max.	d_1 =	r	r_1	Mass lb =
03	0,19	0,777 4	0,5	0,392	0 -5	0 -5	8	8	0,3	0,005 to 0,002	0,022 to 0,033	0,04
04	0,25	0,901 4	0,687	0,464					0,43		0,032 to 0,047	0,06
05	0,312 5	1,25	0,812	0,656					0,52	0,015 to 0,03		0,16
06	0,375	1,437 5	0,937	0,75					0,56		0,24	
08	0,5	1,687 5	1	0,812					0,78		0,044 to 0,059	0,36
10	0,625	1,937 5	1,125	0,937					0,87	0,53		

Diameter code	Internal clearances		Radial runout tolerances max. 0,000 1 in		Starting torque max. in-oz	Permissible static radial load C_s lbf	Permissible static axial load $F_{a \text{ max}}$ lbf
	0,000 1 in						
	Radial G_r	Axial G_a max.	K_{ia}	K_{ea}			
03	0 to 10	55	10	16	2	1 420	200
04		60			3	1 780	300
05					5	3 740	600
06					6	5 100	800
08					7	7 120	1 000
10		70				9 000	1 300

0871073 0001840 53T

ICS 49.035

Descriptors: aircraft industry, rolling bearings, airframe bearings, ball bearings, double-row bearings, self-aligning bearings, specifications, materials specifications, characteristics, load capacity, dimensions, overall dimensions, lubrication, designation, marking, imperial system, heavy duty series.

Price based on 6 pages
