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FEDERAL SPECIFICATION

BEARINGS, ROLLER, CYLINDRICAL; AND BEARINGS, ROLLER, SELF-ALIGNING

This specification was approved by the Commission, Federal Supply Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope.--This specification covers cylindrical and self-aligning roller bearings for general purpose use.

1.1.1 Federal Specification coverage.--Federal specifications do not include all classes and types of the commodity indicated by the titles of the specification, but are intended to cover only those most generally used by the Federal Government.

1.2 Classification.

1.2.1 Grade.--Roller bearings shall be of but one grade, standard.

1.2.2 Classes and types.--Roller bearings .shall be of the following classes and types, as specified (see 6.2):

Class 1.--Radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width).

Type 211.--Two-lip inner ring, cylindrical outer ring with two roller retainment rings (table II).

Type 212.--Two-lip inner ring, cylindrical outer ring (table III).

Type 214.--Cylindrical inner ring and outer ring with two roller retainment rings on outer ring (table IV).

Type 215.--Cylindrical inner ring two-lip outer ring (table V).

Type 216.--Cylindrical inner ring, one-lip outer ring (table VI).

Class 2.--Radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width).

Type 231.--Two-lip inner ring one-lip outer ring (table VII).

Type 232.--Two-lip inner ring one-lip outer ring with one roller retainment ring on outer ring (table VIII).

Type 234.--One lip inner ring - one-lip outer ring (table IX).

Type 236.--One lip inner ring - two-lip outer ring with one roller retainment ring on inner ring (table X).

Class 3.--Radial, cylindrical, two direction locating, single row of rollers

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(metric bore and o.d., inch or metric width).

Type 237.--Two-lip inner ring-two-lip outer ring (table XI).

Type 238.--Two-lip inner ring (one-lip of inner ring separable and extended) two lip outer ring (table XII)

Class 4.--Radial, cylindrical, nonlocating, double row of rollers (metric bore and (o.d., inch or metric width).

Type 244.--Cylindrical inner and outer ring, two roller retainment rings on out ring (table XIII).

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Class 5.--Radial, cylindrical, nonlocating, single row of rollers (all inch dimensions).

Type 251.--Two-lip inner ring, cylindrical outer ring (table XIV).

Type 252.--Cylindrical inner ring, two-lip outer ring (table XV).

Class 6.--Self-aligning.

Type 264.--Double row spherical, self-contained, outer and inner raceways concave (metric bore and o.d., inch or metric width) (table XVI).

Type 265.--Concave, self-contained, outer and inner raceways convex, non-separable assembly, double row, (all metric dimensions).

2. APPLICABLE SPECIFICATIONS AND STANDARDS

2.1 The following specifications and standards, of the issues in effect on date of invitation for bid, form a part of this specification:

Military Specification:

MIL-P-197 - Preservation, Packaging, and Packing of Anti-Friction Bearings, Associated Parts, and Sub-Assemblies.

Navy Department Specification:

General Specifications for Inspection of Material.
Appendix II - Metals.
Part A - Definitions and Tests.

Military Standards:

MIL-STD-102 - Anti-Friction bearing Identification Code.

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D.C.)

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

(Copies of Military specifications, standards, drawings and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

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3.1 Qualification.--Ruler furnished under this specification shall be a product which has been tested and has passed the qualification tests specified in section 4 (see 6.3).

3.2 Material.

3.2.1 Roller bearings shall be made of alloy steel unless corrosion-resisting material is specified (see 6.2). The alloy steel or corrosion-resisting material used for the manufacture of the rolls and rings may be any high grade materials which will produce finished articles capable of meeting the requirements and tests specified herein, except the materials shall be of the composition approved on qualification tests.

3.2.2 Work-hardened rolls or rings are not acceptable for alloy steel.

3.2.3 The metal employed for rolls and rings shall be homogeneous in structure, free from pipes, seams, lamination, excessive inclusion of nonmetallic impurities, and such other defects as would render the material unsuitable for the purpose for which intended. On microscopic examination,

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it shall show a fine grain e and shall be free from signs of overheating. Any bar of metal may be rejected at any time because of injurious imperfections or faults which are revealed by manufacturing operations.

3.2.4 The manufacturer shall use due care in subjecting his metal to suitable check analyses and physical tests to satisfy the purchasers as to the uniformity of the metal used.

3.3 Unless otherwise specified in the contract or order, the running surfaces of the raceways and the rolls shall show a characteristic ground and polished or lapped finish for both alloy steel and corrosion-resisting material bearings. The surfaces shall be free from tool marks, chatter waves, grinding scratches, pits, rust, soft spots, and other surface imperfections visible to the unaided eye.

3.4 Unless otherwise specified in the contract or order, rolls used in the same bearing shall be selected and graded so that the difference in maximum diameter between the largest roll and the smallest roll in an assembled set shall not exceed 0.0001 inch for bearings up to and including 50-mm bore size, and 0.00015 inch for bearings larger than 50-mm bore size. No roll shall show a variation of roundness of more than 0.0001 inch. No cylindrical roll shall show a variation of diameter greater than 0.0001 inch when measured at different positions axially. The variation in length of rolls used in the same bearing shall not exceed 0.005 inch.

3.5 The tolerances of the bearings shall conform to table I.

3.6 Retainers-Unless otherwise specified in the contract or order, all bearings shall have retainers for restraining the rolls within the bearings and for spacing them circumferentially between the rings. They shall be so constructed as not to limit the proper functioning of the bearings to which they are fitted. Retainers shall be made of stamped, pressed, forged, cast, or machined steel, suitable nonferrous alloy, or molded phenolic composition unless one of these is specifically required (see 6.2). The retainer of corrosion-resisting bearings shall be of the composition approved on the qualification tests. The retainers shall be of such a design as to admit the lubricant freely. The retainers shall be of a material, workmanship, and finish, suitable for the purpose intended. They shall run concentrically with the raceways within the limits of ordinary observation.

3.7 Rolls, rings, and assembled bearings shall meet the physical and operating requirements detailed herein, as determined in section 4.

3.8 Neither raceway of any bearing shall have a greater radial runout than that shown in table I.

3.9 All roller bearings shall, unless otherwise specified in the contract or order, be furnished with sufficient internal clearance between rollers and raceways so that, by using shaft and housing fits recommended in 30.8 of this specification, the correct bearing operating fit-up will be uniformly obtained.

3.10 The corner radius of any bearing shall be greater than the maximum shaft or housing fillet radius specified herein but shall be not greater than 1.75 times the maximum shaft or housing fillet radius on the bore and outside diameter, and not greater than 1.50 on the faces. This corner need not be an arc of a circle but the limits of the corner shall be within the limits of the above defined area of circles.

3.11 Military standard code number. The Military standard code numbers specified herein are in accordance with Military Standard MIL-STD-102.

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3.12 Marking. Each assembled bearing shall be marked with the bearing manufacturer’s name or symbol and bearing number and when specified, with the Military standard code. number specified herein.

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3.13 Class 1 - radial cylindrical nonlocating, single row of rollers (metric bore and o.d, inch or metric width) The class I bearings shall be cylindrical, nonlocating, with a single row of rollers. The bearings shall be designed for radial loads. They shall also permit endwise "float" of the shaft relative to the housing.

3.13.1 Type 211--two-lip inner ring, cylindrical outer ring with two roller retainment rings.--Type 211 bearings shall have two roller retainment rings providing a nonseparable assembly. The bearing shall be as shown on figure 1 and shall conform to the dimensions shown in table II.

3.13.2 Type 212--two-lip inner ring, cylindrical outer ring.--Provision shall be made in the design of the inner ring and the roller retainer to hold the rolls in place when the separable outer ring is removed. These bearings shall be as shown on figure 2 and shall conform to the dimensions shown in table III.

3.13.3 Type 214--Cylindrical inner ring, and outer ring with two roller retainment rings on outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the separable inner ring is removed. These bearings shall be as shown on figure 3 and shall conform to the dimensions shown In table IV.

3.13.4 Type 215--Cylindrical inner ring two-lip outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the separable inner ring in removed. These bearings shall be as shown on figure 4 and shall conform to the dimensions shown in table V.

3.12.5 Type 216--Cylindrical inner ring one-lip outer ring.--Provision shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the separable inner ring is removed. These bearings shall be as shown on figure 5 and shall conform to the dimensions shown in table VI.

3.14 Class 2--radial, cylindrical, one direction locating single row of rollers (metric bore and o.d, inch or metric width). Class 2 bearings shall be cylindrical, one direction locating with a single row of rollers and shall be designed primarily for radial loads. They shall also permit light shaft location loads in one direction.

3.14.1 Type 231--two-lip inner ring - one-lip outer ring.--Provisions shall be made in the design of the Inner ring to hold the rolls in place when the separable outer ring is removed. Bearings shall be as shown on figure 6 and shall conform to the dimensions shown In table VII.

3.14.2 Type 232--two-lip inner ring - one-lip outer ring with one roller retainment ring on outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to bold the rolls in place when the separable inner ring is removed. Bearings shall be as shown on figure 7 and shall conform to the dimensions shown in table VIII.

3.14.3 Type 234--one-lip inner ring - one-lip outer ring.--Provisions shall be made in the design so that either the inner or outer ring may be removed. Once one of the rings is removed, the roller assembly can then be removed. Bearings shall be as shown on figure 8 and shall conform to the dimensions shown in table IX.

3.14.4 Type 236--one-lip inner ring - two-lip outer ring with one roller retainment ring on inner ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the

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separable inner ring is removed. Bearings shall be as shown on figure 9 and shall conform to the dimensions shown in table X.

3.15 Class 3--radial cylindrical, two direction locating, single row of rollers (metric bore and o.d., inch or metric width).--Class 3 bearings shall

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be cylindrical, two direction locating with a single row of rollers, and shall be designed for radial loads and light shaft location loads in either direction.

3.15.1 Type 237--two-lip inner ring -two-lip outer ring.--Bearings of this type shall be nonseparable, shall be as shown on figure 10 and shall conform to the dimensions shown in table XI.

3.15.2 Type 238--two-lip inner ring (one-lip of inner ring separable and extended) - two-lip outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the separable inner ring is removed. Bearings shall be as shown on figure 11 and shall conform to the dimensions shown in table XII.

3.16 Class 4--radial, cylindrical nonlocating, double row of rollers (metric bore and o.d., inch or metric width).--Class 4 bearings shall be cylindrical, nonlocating, with a double row of rollers and shall be designed for radial loads. They shall also permit endwise "float" of the shaft relative to the housing.

3.16.1 Type 244--cylindrical inner and outer ring, two roller retainment rings on outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the rolls in place when the separable inner ring is removed. These bearings shall be of the nonlocating type and shall be as shown on figure 12 and shall conform to the dimensions shown in table XIII.

3.17 Class 5--radial, cylindrical, nonlocating, single row of rollers (all inch dimensions).--Class 5 bearings shall be cylindrical, nonlocating with a single row of rollers and shall be designed for radial loads. They shall also permit endwise "float" of the shaft relative to the housing.

3.17.1 Type 251--two-lip inner ring, cylindrical outer ring.--Provisions shall be made in the design of the inner ring and the roller retainer to hold the rolls in place when the separable outer ring is removed. These bearings shall be as shown on figure 13 and shall conform to the dimensions shown in table XIV.

3.17.2 Type 252--Cylindrical inner ring - two-lip outer ring.--Provisions shall be made in the design of the outer ring and the roller retainer to hold the roller in place when the separable inner ring is removed. These bearings shall be as shown on figure 14 and shall conform to the dimensions shown in table XV.

3.18 Class 6--self-aligning.

3.18.1 Type 264--double row, spherical, self-contained, outer and inner raceways concave (metric bore and o.d., inch or metric width).--Bearings of this type shall be designed for radial and thrust loads. The roller path of the outer ring shall be a spherical surface to provide self-alignment. The inner ring shall be designed with roller paths separable by a flange which guides each set of rollers. The bearings shall be nonseparable and of the two direction locating type and shall be as shown on figure 15 and conform to the dimensions shown in table XVI.

3.18.2 Type 265--concave, self-contained, outer and inner raceways convex, nonseparable assembly, double row (all metric dimensions).--Bearings of this type shall be designed to handle radial loads, thrust loads in either direction, or any combination of radial and thrust loads. The bearings shall be self-aligning, angular contact type, with concave rollers operating between convex raceways. The bearings shall consist of a spherical inner raceway, a

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one-piece outer ring with two ground raceways and two roller assemblies. The bearings shall be nonseparable and shall be as shown on figure 16 and shall conform to the dimensions shown in table XVII.

3.19 Life.--The bearings shall be capable of withstanding a life test of 4,000 hours minimum, at the load rating shown for the applicable type and size.

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3.20 Workmanship.--The workmanship shall be in accordance with high grade bearing manufacturing practice.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Qualification tests at a Government laboratory.--Qualification tests shall be conducted at a Government laboratory designated by the Bureau of Ships. These tests shall consist of the tests specified in 4.6 and 4.7.

4.2 Sampling for lot acceptance.

4.2.1 Inspection lot.--For purposes of sampling, a lot shall consist of not more than 2,000 roller bearings of one class, type, material and size offered for delivery at one time.

4.2.2 Sampling procedure for and visual dimensional inspection of assembled bearings (at the place of manufacture).--From each lot of assembled bearings, the Government inspector shall take a random sample in accordance with table XVIII and the procedures of Military Standard MIL-STD-105 for the inspection specified in 4.4.

4.2.3 Sampling for inspection and test of disassembled bearings.--From each lot of assembled bearings, the Government inspector shall take a random sample in accordance with table XIX. Bearings selected under 4.2.2 may be used for these tests. At least half of the rollers shall be subjected to the hardness test of 4.5.5.

4.2.4 Sampling for measurement of internal dimensions of disassembled bearings.--From each lot of assembled bearings, the Government inspector shall take a random sample in accordance with table XIX for the measurement of internal dimensions after disassembly. Bearings taken under 4.2.2 my be used for these measurements.

4.3 Sampling for comparison Government laboratory.

4.3.1 Comparison test lot.--For purposes of sampling of 4.3.2, the Government inspector shall consider the inspection lots in groups of 20 successive lots as offered for Government inspection, without classification as to class, type, material and size. Each group of 20 inspection lots shall constitute one comparison check lot.

4.3.2 Sampling for comparison tests.--From each comparison test lot (see 4.3.1), the Government inspector shall take one lot and from that lot shall take samples in accordance with table XVIII for the tests specified in 4.7. The precise location of each measurement shall be marked and the bearings with a report of the measurements shall be forwarded to the Engineering experiment Station, Annapolis, Maryland.

4.3.3 Field of sampling.--The lots chosen for the sampling of 4.3.2 shall, over a period of time, provide a representative selection of the classes, types, materials and sizes covered by this specification.

4.4 Inspection of assembled bearings.

4.4.1 Visual inspection.--Each of the sample bearings taken in accordance with 4.2.2 shall be subjected to surface examination to verify conformance with this specification regarding finish, markings, and defects. If any sample bearing is rejected, the lot shall also be rejected.

4.4.2 Dimensional inspection.--Each sample bearing taken in accordance

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with 4.2.2 shall be measured to verify compliance with this specification regarding outside diameter, radial runout, bore, and width and such other dimensions as may be specified in the contract or order. If any dimension is outside the specification limits or tolerances, the particular bearing and also the lot shall be rejected.

4.4.2.1 Outside diameter.--For determining the outside diameter, an apparatus arranged for measuring between a flat surface and a rounded calibrated indicator point shall be used. If out-of-roundness and taper

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exist in a particular bearing, a minimum diameter reading D min. and a maximum diameter reading D max. may be obtained. The outside diameter, Dm, of the bearing in question is defined as the arithmetical average of these two readings D min. and D max. When measuring thin section rings, the measuring pressure shall be low so as to avoid distortion of the rings. Large diameter rings with thin sections shall be placed in a horizontal position when measuring.

4.4.2.2 Radial runout.--For determining the radial runout, the bearing shall be mounted on an arbor having a very slight taper (0.0001 to 0.0002 inch on the diameter per inch of length). A calibrated indicator shall be applied on the center of the outer ring. The outer ring shall be stationary and the arbor shall be rotated for measuring inner ring radial runout. For measuring outer ring radial runout, the arbor shall be stationary and the outer ring shall be rotated. The radial runout is the difference between the minimum and maximum reading obtained when either rotating the outer ring one revolution with the arbor stationary for outer ring radial runout, or rotating the arbor one revolution with the outer ring stationary for inner ring radial runout.

4.4.2.3 Bore.--For determining bore diameter, an apparatus arranged for two-point measuring shall be used. If out-of-roundness and taper exist in a particular bearing, a minimum diameter reading D min. and a maximum diameter reading D max. may be obtained. The base diameter, Dm, of the bearing in question is defined as the arithmetical average of these two readings D min. and D max. Large diameter rings with thin section shall be placed in a horizontal position when measuring.

4.4.2.4 Width.--The tolerance for width of the bearings applies to individual rings and not to the total width of the bearing. The outer ring shall be free and the inner ring that is to be measured shall be supported on one side by three buttons. A calibrated indicator shall be applied against the other side directly over one button and readings shall be taken while rotating the ring.

4.5 Inspection and test of disassembled bearings.

4.5.1 Visual inspection of rollers, bearing parts and rings.--Each bearing taken in accordance with 4.2.3 shall be disassembled and each part of the disassembled bearing shall be subjected to surface examination to verify conformance with this specification regarding defects (see 4.5.3), and surface finish (see 4.5.4). If any sample bearing or principal part is rejected, the lot shall also be rejected.

4.5.1.1 Visual inspection of rollers.--All the rollers of the samples shall be submitted to a tray inspection to determine conformance with 3.3. The failure of any one roller shall cause rejection of the bearing from which it was taken. This test shall consist of placing the rollers on a glass plate. screening off the light which falls on them with a piece of parchment paper, and moving the rollers about with a piece of cardboard thrust under them, so that the entire surface may be scrutinized. All of the rollers shall appear to the unaided eye to be free from tool marks, chatter waves, scratches, pits, rust, discoloration, and soft spots.

4.5.2 Measurement of internal dimensions.--All parts of disassembled bearings taken in accordance with 4.2.4 shall be measured to verify conformance with this specification in all dimensions and also in all fits and alignments. The range of roll diameters shall be measured to assure matched sets. If any sample bearing or principal part is rejected, the lot shall also be rejected.

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4.5.2.1 Diameter parallelism and length of rollers.--To determine conformance with 3.4 as to diameter limits, a precision measuring instrument employing the two-point system of measurement shall be used. In taking these measurements, the position of the roller supports shall be adjusted so that

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the axis of the roller comes in line with the upper and lower anvils of the instrument. Each roller shall have the diameter measured at three location at right angles to this plane. Should these results not be the same, additional measurements at other angles shall be made until the maximum and minimum diameters have been found. If any of the rollers of the sample fail to meet the requirements for diameter, parallelism and length, the bearing shall be rejected.

4.5.3 Macroscopic and microscopic inspection of bearing parts.--All contacting surfaces of sample bearing parts shall be examined under a three-power microscope to assure the detection of small irregularities and defects. However, requirements regarding irregularities and defects are the same as for inspection by the unaided eye (see 4.5.1).

4.5.4 Surface finish.--The sample bearing taken in accordance with 4.2.4 shall be examined to verify that the finish of all running surfaces is characteristic of a polishing or lapping process free of tool marks, chatter, waves, grinding, scratches, pits, rust, soft spots, and other surface imperfections visible to) the unaided eye.

4.5.5 Hardness test.

4.5.5.1 Hardness of rolls.--Rollers shall show hardness values of 57 to 65 using the Rockwell C scale, 120-degree cone, and 150 kilogram load. The hardness of the rolls in any lot of bearings shall not vary by more than four points on Rockwell C scale.

4.5.5.2 Ring hardness test.--The hardness of steel rings shall be determined in a Rockwell testing machine with a 120-degree cone and 150-kilogram load. The hardness of all the rings representing one lot shall vary not more than 5 points on the Rockwell C scale and no one ring shall measure less than 60 Rockwell C if made of alloy steel, or 50 Rockwell C if made of corrosion-resisting steel.

4.5.6 Shock test.--rings (corrosion-resisting steel and alloy steel). - Each sample ring shall be dropped a vertical distance of 4 feet to strike on edge on a mild steel plate having dimensions 1/2 inch by 15 by 15 inches. Any splitting, cracking, chipping, or deformation shall be counted a failure and the bearing and also the lot shall be rejected.

4.5.7 Rejected lots.--Any lot rejected on visual and dimensional inspection or any test except the hardness of 4.5.5 may be presented a second time for Government inspection and testing provided the manufacturer has reinspected his entire lot and removed all nonconforming bearings. Lots rejected on the hardness test of 4.5.5 cannot be offered again under this specification.

4.6 Measurement procedures.

4.6.1 Gages.--The standard for measurements shall be gage blocks, plug gages, ring gages, or the special gages calibrated by the National Bureau of Standards at a temperature of 68 deg. F. or checked as directed by the procuring agency,

4.6.2 Calibration of master gages may be made at room temperatures other than 68 deg.F., provided the measurements are corrected to 68 deg. F.

4.6.3 The error of every measurement shall not exceed one half of the last decimal unit specified herein for any dimension.

4.6.4 Measurements shall be rounded off to the accuracy shown in the

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applicable tables of dimensions and tolerances before judgment is made on the conformance of any item with the requirements. Ambiguous cases shall be considered conforming. For example:

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Specification measurement

Bearing	Bore	Tolerance	Observed measurement	Decision
211-02502-00000	.9843	+/- 0.0004	0.98474	Conforming
			.98475	Conforming
			.98476	Nonconforming

4.7 Comparison tests at a Government laboratory.

4.7.1 Dimensional inspection.--Dimensional inspection of each sample taken in accordance with 4.3.2 shall be conducted to verify compliance with this specification regarding outside diameter, radial runout, bore and width and such other dimensions as may be specified in the contract or order.

4.7.2 Corrosion-resistance.--Bearings made of corrosion-resisting steel shall be subject to salt-spray test for 100 hours at a temperature between 65 deg, and 80 deg F., using a 4 percent by weight chemically pure sodium chloride solution.

4.7.2.1 Synthetic sea-salt solution.--When specified (see 6.2), the test solution shall be made in accordance with the formula specified in Appendix II, Part A of the General Specifications for Inspection of Material.

4.7.2.2 Testing tank.--The testing tank shall be constructed in accordance with Appendix II, Part A of the General Specification for Inspection of Material.

4.8 Qualification test.--The bearings shall be subjected to a life test to determine conformance with 3.19.

4.9 Action on the results of inspection and comparison test at a Government laboratory.--The samples taken in accordance with 4.3.2 are not specifically taken to represent one particular bearing or inspection lot, but the Government inspector shall be informed of the results so that he may advise the activity to which this particular lot of bearings was delivered and also that he may take appropriate action in his lot by lot inspection to protect the interests of the Government. When advisable, he shall inform the manufacturer of the unfavorable results, and request such changes of process as will effect improvement. The Bureau of Ships shall be informed of the laboratory findings and shall consider the possible effect on the qualification approval of the product.

5. PREPARATION FOR DELIVERY (For definitions and levels see 6.1).

5.1 Nonmilitary agencies.

5.1.1 Preservation and packaging.

5.1.1.1 Level A.--Level A preservation and packaging shall afford adequate protection against corrosion, deterioration, and physical damage during shipment, handling, intermediate storage and world-wide distribution.

5.1.1.2 Level B.--Level B package shall afford a range varying from level A to level C in which preservation and packaging requirements are a modification of level A or a separate entity, for use under specific conditions. When level B is specified, the procuring agency should state on their procurement documents the conditions under storage, when known (see 6.2).

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5.1.1.3 Level C.--Level C preservation and packaging shall afford adequate protection against corrosion, deterioration, and physical damage during shipment from the supply source to the first receiving activity, for immediate use. This level may be the supplier's commercial practice when such meets the requirements.

5.1.2 Packing.

5.1.2.1 Level A.--Level A packing shall afford adequate protection during,shipment, handling, intermediate storage, and worldwide distribution.

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5.1.2.2 Level B.--Level B packing shall afford, adequate protection against multiple domestic shipment, handling and storage.

5.1.2.3 Level C.--Level C packing shall afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. This level in general shall conform to applicable carrier rules and regulations and may be the supplier's commercial practice when such meets the requirements.

5.1.2.4 Level D.--Level D packing shall be for ocean shipment and covered storage at destination where the end use is to be at the initial receiving activity. This level in general conforms to applicable carrier rules and regulations and may be the supplier's commercial overseas practice when such meets the requirements.

5.1.3 Marking.--Unless otherwise specified, shipping containers shall be marked with the name of the commodity, the type, class, style, and size, and the quantity contained therein, as defined by the contract or, order under which shipment is made (see 6.2).

5.2 Military purchases.

5.2.1 Preservation, packaging, and packing.

5.2.2.2 Roller bearings shall be preserved, packaged, packed and marked in accordance with Military Specification MIL-P-197.

5.2.2 Marking of individual containers. Unless otherwise specified in the contract or order, individual containers shall be marked with the complete identifying number of the roller bearing, including the Military Standard MIL-STD-102 identification number.

6. NOTES

6.1 Federal Standard No. 102 should be referred to for definitions and applications of the various levels of packaging protection for supplies and equipment.

6.2 Ordering data.--On procurement documents, the purchasers should specify the following:

(a) Title, number, and date of this specification.
(b) Class and type required (see 1.2).
(c) If corrosion-resisting bearings are required (see 3.2.1).
(d) When specific material composition is required for retainers (see 3.6).
(e) Military standard code number (see applicable table). (When no special features are required, the Military standard code number constitutes a complete description of the bearing.)
(f) When synthetic sea-salt solution should be used for salt spray test (see 4.7.2.1).
(g) State whether the commodity shall be afforded preservation and packaging in accordance with level A, B, or C (see 5.1.1.1, 5.1.1.2, and 5.1.1.3). If level B is specified, state storage conditions.
(h) State whether the commodities shall be afforded packing in accordance with level A, B, C, or D (see 5.1.2.1, 5.1.2.2, 5.1.2.3 and 5.1.2.4). If level B is specified, state the storage conditions.
(i) Whether for domestic shipment, immediate use; domestic shipment and storage, or overseas shipment (see 5.2.1.1 and 5.2.2).

6.3 In the procurement of products requiring qualification, the right is

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reserved to reject bids on products that have not been subjected to the required tests and found satisfactory for inclusion on the Qualified Products List. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Government, tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products covered by this specification may be obtained from the Department of the Navy, Bureau of Ships, Washington, D.C.

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6.4 Unmounted bearings with standard internal clearances are proportioned so that part of the roller clearance is taken up when the bearing is mounted with fits recommended in the Appendix of this specification. This degree of clearance should be used unless special conditions warrant specifying other clearances.

6.5 Where it is impractical to employ bearings listed, or where the official drawings of the procuring agency require bearings with special internal fit-ups or other requirements not listed herein, such bearings should be purchased under this specification with the necessary variations outlined completely.

6.6 Corrosion-resisting roller bearings should only be used even approved by the procuring agency where the corrosion-resisting features are of primary importance since these bearings have extremely low load speed capacities (see 30.4).

6.7 Engineering data.

6.7.1 Nomenclature.

6.7.1.1 Radial runout.--The radial runout of the inner ring is the difference between the maximum and minimum reading made on a nonrotating outer ring when the inner ring is rotated one revolution on true centers. The radial runout of the outer ring is the difference between the maximum and the minimum reading made on the outer ring when the outer ring is rotated one revolution with the inner ring fixed upon a stationary arbor.

6.7.1.2 Clearance.--Clearance between the raceways and the rollers is the remainder left when twice the roller diameter is subtracted from the difference between the diameter at the bottom of the grooves of the outer and inner raceways respectively. It may be positive or negative. Where it is negative, the rollers and raceways are deformed elastically.

6.7.1.3 Gaging.--The tolerances specified refer to the dimensions of the roller bearings and not to the dimensions of the measuring instruments. When it is desired to measure bearings with maximum and minimum gages, the dimensions of the maximum gage should be 0.0001 inch larger than the maximum bearing dimensions and the dimension of the minimum gage should be 0.0001 inch less than the minimum bearing dimension.

6.7.1.4 Width measurements.--The width of roller bearings is measured on the individual rings.

6.7.1.5 Metric conversions.--The conversion of metric dimensions to equivalent decimal inches figured to five decimal places is according to the formula:

$$1 \text{ mm.} = 0.0393700 \text{ inch}$$

Only four decimal places are retained in the tables. Where the fifth digit in the decimal is less than five, the fifth decimal is dropped but where it is five or greater, the fourth digit is increased by one.

6.8 Superseding data.--This specification supersedes types A and B, grade 3, classes a, b and c of Federal Specification FF-B,-186.

6.9 Transportation description the applicable transportation description is:

Bearings, not otherwise indexed by name, roller.

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Carload minimum weight 30,000 pounds.
Truckload minimum weight 30,000 pounds.

Patent notice.--When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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TABLE I.--Tolerances

All types inner ring

Bore				Tolerance for Bore[1]				Radial runout Max.
Metric (mm.)		Inches		Dm		D max.	D min.	
Over	Incl.	Over	Incl.	Plus	Minus	Plus	Minus	
				Inch	Inch	Inch	Inch	
0	9	0.0000	0.3543	0.0000	0.0003	0.0001	0.0004	0.0003
9	18	.3543	.7087	.0000	.0003	.0001	.0004	.0004
18	30	.7087	1.1811	.0000	.0004	.0001	.0005	.0005
30	50	1.1811	1.9685	.0000	.0005	.0002	.0007	.0006
50	80	1.9685	3.1496	.0000	.0006	.0002	.0008	.0008
80	120	3.1496	4.7244	.0000	.0008	.0003	.0011	.0010
120	180	4.7244	7.0866	.0000	.0010	.0003	.0013	.0012
180	250	7.0866	9.8425	.0000	.0012	.0004	.0016	.0016

Outer ring

Outside diameter				Tolerance for outside diameter[1]				Radial runout Max.
Metric (mm)		Inches		Dm		D max.	D min.	
Over	Incl	Over	Incl.	Plus	Minus	Plus	Minus	
				Inch	Inch	Inch	Inch	Inch
0	18	0.0000	0.7087	0.0000	0.0004	0.0005	0.0001	0.0006
18	30	.7087	1.1811	.0000	.0004	.0005	.0001	.0006
30	50	1.1811	1.9685	.0000	.0005	.0007	.0002	.0008
50	80	1.9685	3.1496	.0000	.0005	.0007	.0002	.0010
80	120	3.1496	4.7244	.0000	.0006	.0009	.0003	.0014
120	150	4.7244	5.9055	.0000	.0008	.0011	.0003	.0016
150	180	5.9055	7.0866	.0000	.0010	.0013	.0003	.0018
180	250	7.0866	9.8425	.0000	.0012	.0016	.0004	.0020
250	315	9.8425	12.4016	.0000	.0014	.0018	.0004	.0024
315	400	12.4016	15.7480	.0000	.0016	.0020	.0004	.0028
400	500	15.7480	19.6850	.0000	.0018	.0023	.0005	.0032

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TABLE I.--Tolerances--(Continued)

Width					
Nominal bore				Width tolerance	
Metric (mm.)		Inches			
Over	Incl.	Over	Incl.	Plus	Minus
0	80	0.0000	3.1496	0.0000	0.005
80	180	3.1496	7.0866	.0000	.005
180	315	7.0866	12.4016	.0000	.010
315	400	12.4016	15.7480	.0000	.016

[1] See 4.4.2.1 and 4.4.2.3.
Note.--Width tolerances are applicable to individual rings.

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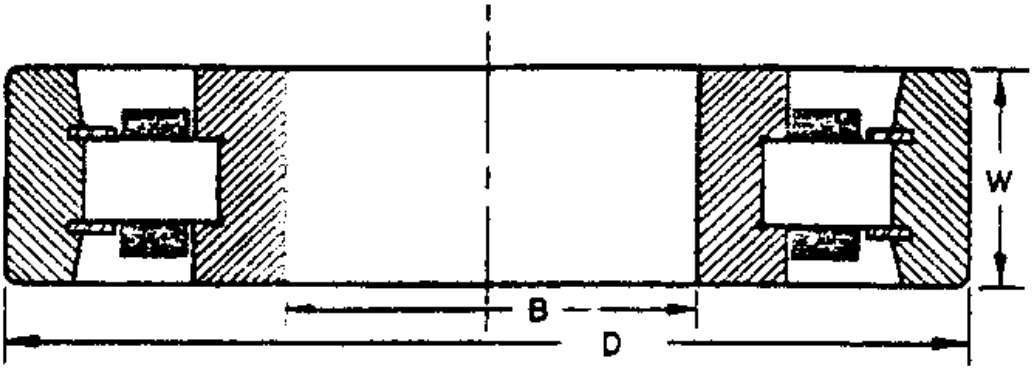

FIGURE 1.—Class 1, type 211, radial, cylindrical, nonlocating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring, cylindrical outer ring with two roller retainment rings.

Single Row of Rollers.]

TABLE II.--Class 1, type 211, radical cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring, cylindrical outer ring with two roller retainment rings

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
211-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
211-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
211-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
211-01203-0000.....	12	.4724	37	1.4567	12	.4724	.039
211-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
211-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
211-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
211-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
211-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
211-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
211-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
211-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
211-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
211-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
211-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
211-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
211-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
211-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059

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211-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
211-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE II.--Class, type 211, radial, cylindrical, nonlocating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring, cylindrical outer ring with two roller retainment rings--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
211-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
211-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
211-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
211-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
211-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
211-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
211-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
211-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
211-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
211-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
211-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
211-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
211-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
211-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
211-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
211-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
211-09002-0000.....	90	3.5433	160	6.6929	32	1.2598	.079
211-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
211-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
211-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
211-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
211-10003-0000.....	100	3.9737	215	8.4646	47	1.8504	.098
211-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
211-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
211-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
211-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
211-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
211-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
211-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
211-13003-0000.....	130	5.1181	280	11.0236	58	2.2835	.118
211-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
211-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE II.--Class 1, type 211, radical cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring, cylindrical outer ring with two roller retainment rings--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius [1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
211-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
211-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
211-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
211-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
211-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
211-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
211-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
211-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
211-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
211-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
211-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
211-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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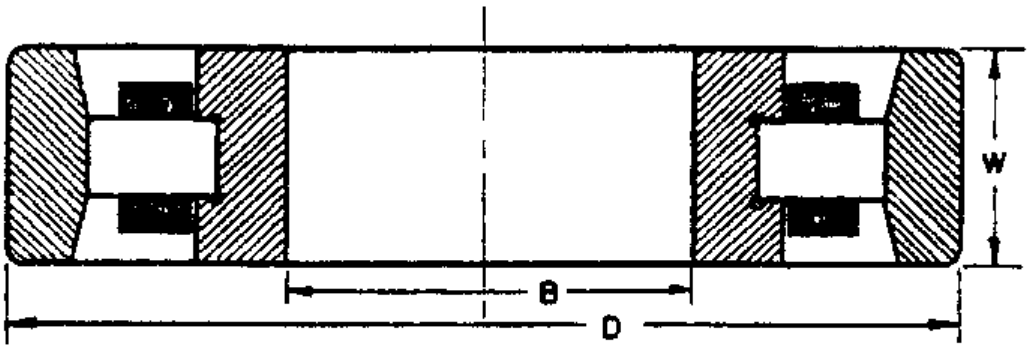

FIGURE 2.—Class 1, type 212, radial, cylindrical, nonlocating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring, cylindrical outer ring.

Single Row of Roller.]

TABLE III.--Class 1, type 212, radial, cylindrical nonlocating, single row of rollers (metric bore and o.d., inch or metric width) two-lip inner ring, cylindrical outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
212-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
212-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
212-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
212-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
212-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
212-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
212-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
212-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
212-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
212-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
212-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
212-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
212-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
212-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
212-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
212-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
212-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
212-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
212-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
212-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE III.--Class 1, type 212, radial, cylindrical nonlocating, single row of rollers (metric bore and o.d., inch or metric width) two-lip ring, cylindrical outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
212-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
212-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
212-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
212-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
212-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
212-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
212-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
212-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
212-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
212-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
212-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
212-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
212-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
212-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
212-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
212-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
212-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
212-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
212-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
212-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
212-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
212-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
212-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
212-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
212-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
212-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
212-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
212-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
212-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
212-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
212-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
212-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE III.--Class 1, type 212, radial, cylindrical nonlocating, single row of rollers (metric bore and o.d., inch or metric width) two-lip ring, cylindrical outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
212-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
212-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
212-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
212-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
212-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
212-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
212-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
212-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
212-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
212-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
212-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
212-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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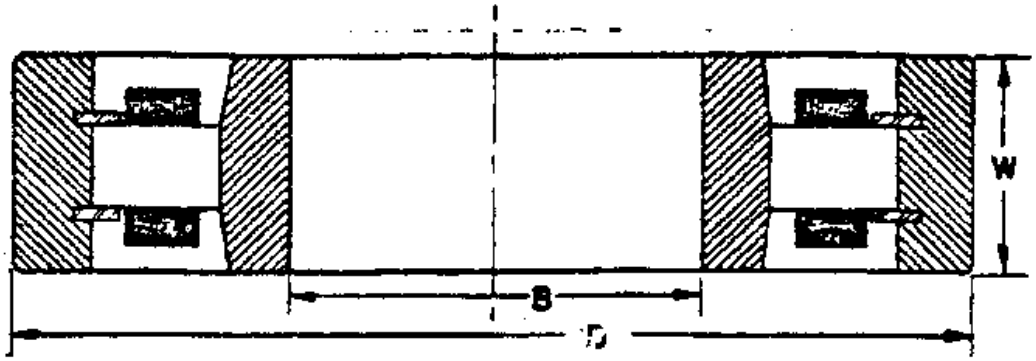

FIGURE 3.—Class 1, type 214, radial, cylindrical nonlocating, single row of rollers (metric bore and o. d., inch or metric width), cylindrical inner ring, and outer ring with two roller retainment rings on outer ring.

Single Row of Rollers.]

TABLE IV.--Class 1, type 214, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width) cylindrical inner ring and outer ring with two roller retainment rings on outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
214-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
214-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
214-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
214-01203-0000.....	12	.4724	37	1.4567	12	.4724	.039
214-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
214-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
214-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
214-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
214-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
214-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
214-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
214-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
214-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
214-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
214-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
214-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
214-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
214-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
214-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039

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214-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE IV.--Class 1, type 214, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), cylindrical inner ring, and outer ring with two roller retainment rings on outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
214-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
214-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
214-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
214-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
214-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
214-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
214-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
214-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
214-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
214-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
214-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
214-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
214-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
214-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
214-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
214-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
214-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
214-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
214-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
214-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
214-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
214-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
214-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
214-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
214-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
214-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
214-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
214-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
214-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
214-13003-0000.....	130	5.1181	280	11.0236	58	2.2835	.118
214-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
214-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE IV.--Class 1, type 214, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), cylindrical inner ring, and outer ring with two roller retainment rings on outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
214-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
214-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
214-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
214-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
214-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
214-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
214-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
214-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
214-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
214-19003-0000.....	190	7.4083	400	15.7480	78	3.0709	.158
214-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
214-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10.

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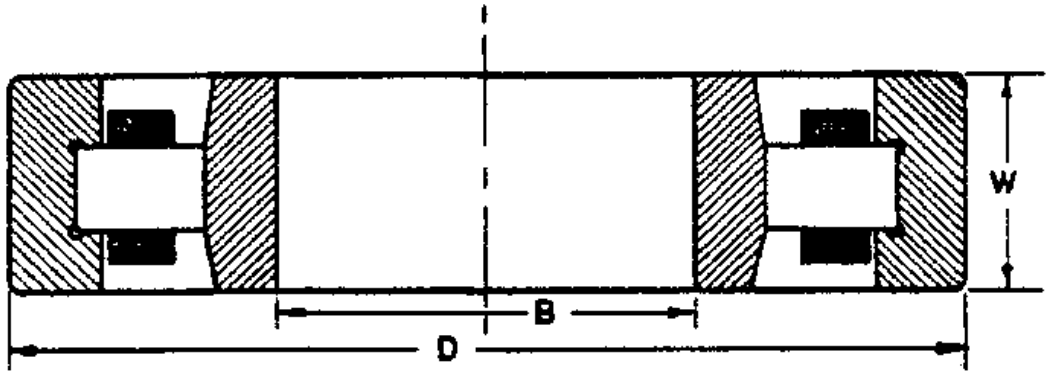

FIGURE 4.—Class 1, type 215, radial, cylindrical, nonlocating, single row of rollers (metric bore and o. d., inch or metric width), cylindrical inner ring — two-lip outer ring.

Single Row of Rollers]

TABLE V.--Class 1, 215, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., or metric width) cylindrical inner ring--two lip outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
215-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
215-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
215-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
215-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
215-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
215-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
215-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
215-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
215-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
215-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
215-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
215-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
215-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
215-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
215-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
215-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
215-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
215-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
215-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039

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215-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE V.--Class 1, 215, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., or metric width) cylindrical inner ring--two lip outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
215-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
215-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
215-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
215-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
215-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
215-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
215-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
215-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
215-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
215-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
215-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
215-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
215-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
215-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
215-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
215-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
215-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
215-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
215-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
215-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
215-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
215-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
215-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
215-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
215-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
215-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
215-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
215-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
215-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
215-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
215-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
215-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE V.--Class 1, 215, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., or metric width) cylindrical inner ring--two lip outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
215-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
215-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
215-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
215-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
215-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
215-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
215-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
215-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
215-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
215-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
215-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
215-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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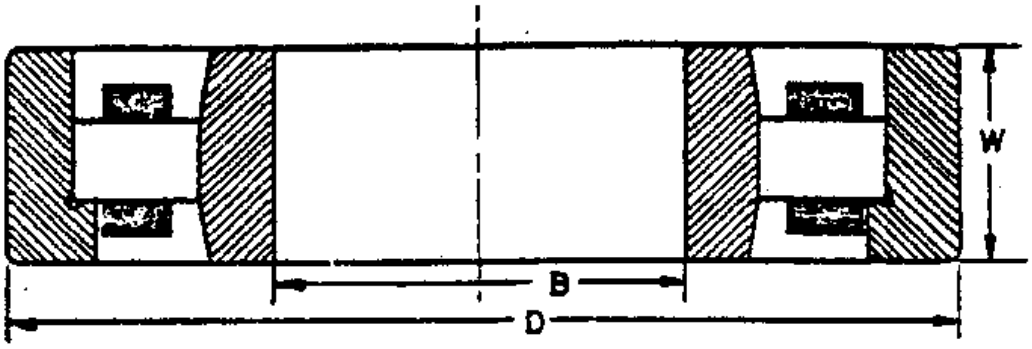

FIGURE 5.—Class 1, type 216, radial, cylindrical, nonlocating, single row of rollers (metric bore and o. d., inch or metric width), cylindrical inner ring, one-lip outer ring.

Single Row of Rollers]

TABLE VI.--Class 1, type 216, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), cylindrical inner ring, one-lip outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
216-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
216-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
216-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
216-01203-0000.....	12	.4724	37	1.4567	12	.4724	.039
216-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
216-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
216-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
216-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
216-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
216-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
216-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
216-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
216-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
216-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
216-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
216-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
216-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
216-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
216-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
216-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE VI.--Class 1, type 216, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), cylindrical inner ring, and one-lip ring (Con.)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
216-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
216-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
216-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
216-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
216-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
216-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
216-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
216-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
216-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
216-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
216-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
216-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
216-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
216-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
216-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
216-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
216-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
216-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
216-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
216-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
216-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
216-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
216-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
216-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
216-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
216-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
216-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
216-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
216-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
216-13003-0000.....	130	5.1181	280	11.0236	58	2.2835	.118
216-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
216-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE VI.--Class 1, type 216, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), cylindrical inner ring, and one-lip outer ring (Cont.)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
216-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
216-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
216-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
216-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
216-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
216-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
216-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
216-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
216-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
216-19003-0000.....	190	7.4083	400	15.7480	78	3.0709	.158
216-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
216-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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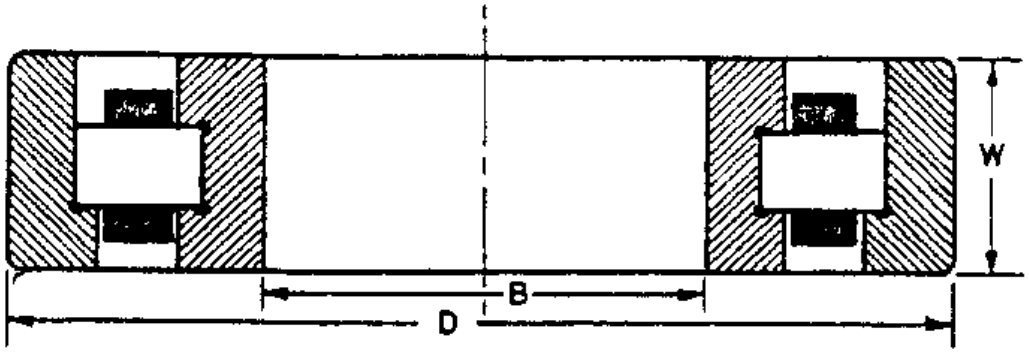

FIGURE 6.—Class 2, type 231, radial, cylindrical, one direction locating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring, one-lip outer ring.

Locating, Single Row of Rollers.]

TABLE VII.--Class 2, 231, radial, cylindrical, one direction locating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring, one-lip outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
231-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
231-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
231-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
231-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
231-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
231-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
231-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
231-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
231-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
231-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
231-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
231-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
231-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
231-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
231-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
231-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
231-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
231-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
231-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
231-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE VII.--Class 2, type 231, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring, one-lip outer ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
231-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
231-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
231-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
231-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
231-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
231-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
231-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
231-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
231-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
231-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
231-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
231-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
231-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
231-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
231-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
231-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
231-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
231-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
231-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
231-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
231-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
231-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
231-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
231-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
231-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
231-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
231-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
231-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
231-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
231-13003-0000.....	130	5.1181	280	11.0236	58	2.2835	.118
231-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
231-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE VII.--Class 2, type 231, radial, cylindrical, nonlocating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring, one-lip outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
231-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
231-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
231-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
231-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
231-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
231-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
231-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
231-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
231-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
231-19003-0000.....	190	7.4083	400	15.7480	78	3.0709	.158
231-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
231-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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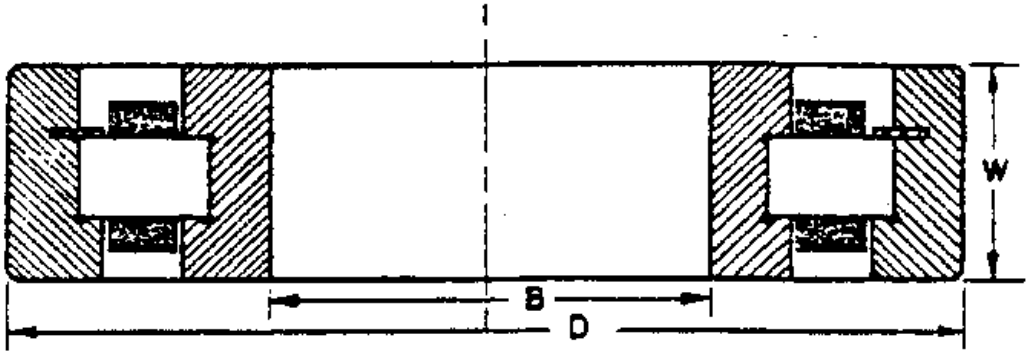

FIGURE 7.—Class 2, type 232, radial, cylindrical, one direction locating, single row of rollers (metric bore and o. d., inch or metric width) two-lip inner ring—one-lip outer ring with one roller retainment ring on outer ring.

Locating, Single Row of Rollers]

TABLE VIII.--Class 2, 232, radial, cylindrical, one direction, single row of rollers (metric bore and o.d., or metric width) two-lip inner ring--one-lip outer ring with one roller retainment ring on outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
232-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
232-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
232-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
232-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
232-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
232-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
232-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
232-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
232-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
232-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
232-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
232-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
232-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
232-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
232-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
232-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
232-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
232-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
232-04502-0000	45	1.7717	85	3.3465	19	.7480	.039

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232-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE VIII.--Class 2, 232, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., or metric width), two-lip inner ring--one-lip outer ring with one roller retainment ring on outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
232-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
232-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
232-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
232-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
232-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
232-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
232-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
232-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
232-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
232-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
232-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
232-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
232-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
232-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
232-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
232-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
232-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
232-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
232-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
232-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
232-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
232-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
232-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
232-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
232-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
232-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
232-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
232-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
232-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
232-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
232-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
232-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE VIII.--Class 2, 232, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., or metric width), two-lip inner ring--one-lip outer ring with one roller retainment ring on outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
232-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
232-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
232-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
232-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
232-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
232-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
232-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
232-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
232-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
232-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
232-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
232-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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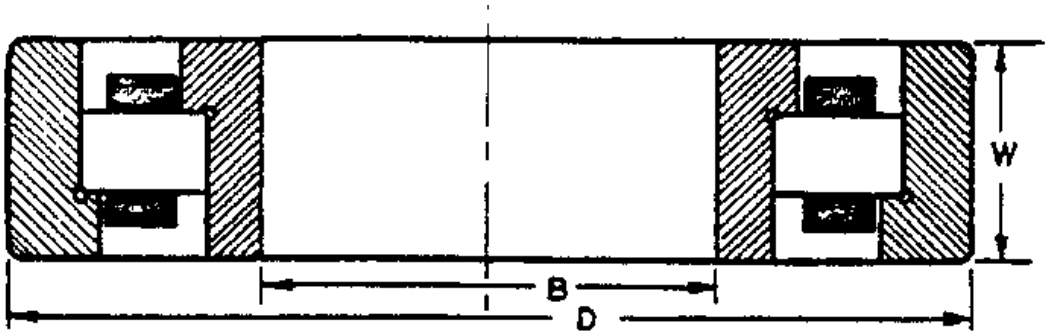

FIGURE 8.—Class 2, type 234, radial, cylindrical, one direction locating, single row of rollers (metric bore and o. d., inch or metric width), one-lip inner ring — one-lip outer ring.

Locating, Single Row of Rollers.]

TABLE IX.--Class 2, type 234, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width), one-lip outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
234-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
234-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
234-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
234-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
234-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
234-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
234-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
234-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
234-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
234-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
234-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
234-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
234-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
234-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
234-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
234-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
234-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
234-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
234-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
234-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE IX.--Class 2, 234, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., or metric width), one-lip outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
234-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
234-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
234-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
234-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
234-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
234-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
234-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
234-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
234-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
234-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
234-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
234-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
234-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
234-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
234-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
234-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
234-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
234-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
234-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
234-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
234-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
234-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
234-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
234-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
234-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
234-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
234-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
234-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
234-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
234-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
234-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
234-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE IX.--Class 2, 234, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., or metric width), one-lip inner ring--one-lip outer ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
234-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
234-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
234-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
234-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
234-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
234-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
234-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
234-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
234-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
234-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
234-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
234-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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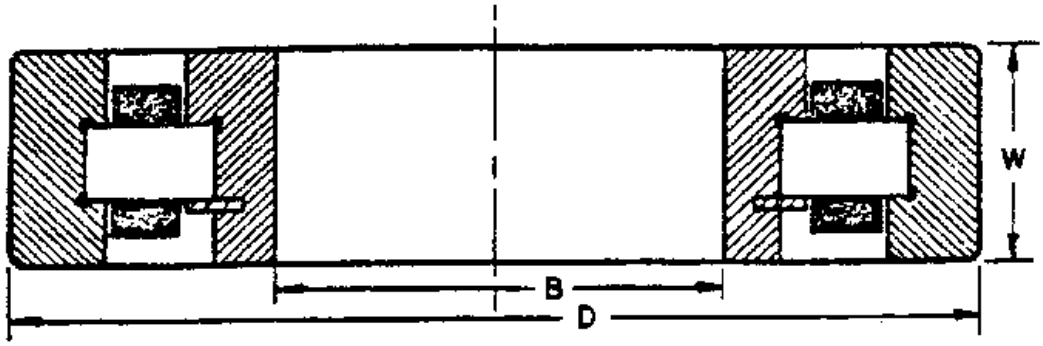

FIGURE 9.—Class 2, type 236, radial, cylindrical, one direction locating, single row of rollers (metric bore and o. d., inch or metric width), one-lip inner ring — two-lip outer ring with one roller retainment ring on inner ring.

Locating, Single Row of Rollers.]

TABLE X.--Class 2, type 236, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width), one-lip inner ring--two-lip outer ring with one roller retainment ring on inner ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
236-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
236-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
236-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
236-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
236-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
236-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
236-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
236-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
236-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
236-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
236-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
236-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
236-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
236-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
236-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
236-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
236-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
236-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
236-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
236-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE X.--Class 2, type 236, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width), one-lip inner ring--two-lip outer ring with one roller retainment ring on inner ring--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
236-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
236-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
236-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
236-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
236-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
236-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
236-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
236-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
236-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
236-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
236-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
236-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
236-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
236-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
236-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
236-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
236-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
236-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
236-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
236-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
236-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
236-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
236-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
236-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
236-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
236-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
236-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
236-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
236-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
236-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
236-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
236-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE X.--Class 2, type 236, radial, cylindrical, one direction locating, single row of rollers (metric bore and o.d., inch or metric width), one-lip inner ring--two-lip outer ring with one roller retainment ring on inner ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
236-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
236-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
236-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
236-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
236-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
236-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
236-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
236-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
236-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
236-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
236-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
236-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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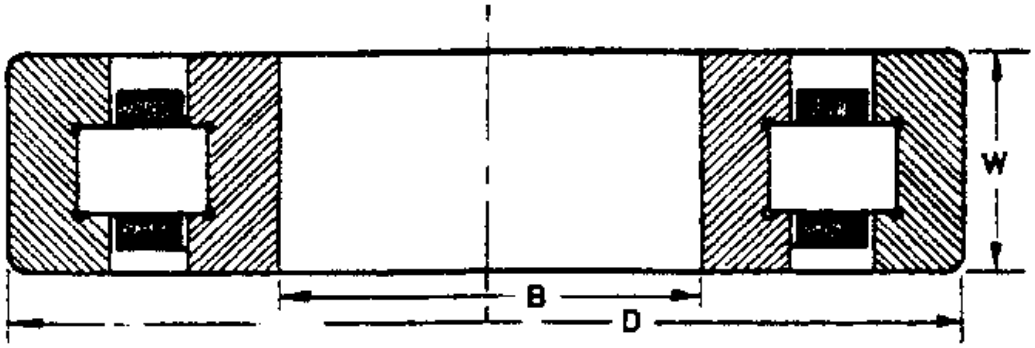

FIGURE 10.—Class 3, type 237, radial, cylindrical, two direction locating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring — two-lip outer ring.

Locating, Single Row of Roller.]

TABLE XI.--Class 3, type 237, radial, cylindrical, two direction locating, single row of roller (metric bore and o.d., or metric width), two-lip inner ring--two-lip outer ring.

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
237-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
237-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
237-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
237-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
237-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
237-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
237-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
237-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
237-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
237-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
237-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
237-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
237-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
237-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
237-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
237-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
237-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
237-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059
237-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039

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237-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE XI.--Class 3, type 237, radial, cylindrical, two direction locating, single row of roller (metric bore and o.d., or metric width), two-lip inner ring--two-lip outer ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
237-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
237-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
237-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
237-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
237-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
237-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
237-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
237-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
237-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
237-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
237-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
237-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
237-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
237-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
237-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
237-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
237-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
237-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
237-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
237-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
237-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
237-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
237-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
237-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
237-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
237-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
237-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
237-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
237-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
237-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
237-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
237-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE XI.--Class 3, type 237, radial, cylindrical, two direction locating, single row of roller (metric bore and o.d., or metric width), two-lip inner ring--two-lip outer ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
237-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
237-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
237-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
237-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
237-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
237-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
237-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
237-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
237-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
237-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
237-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
237-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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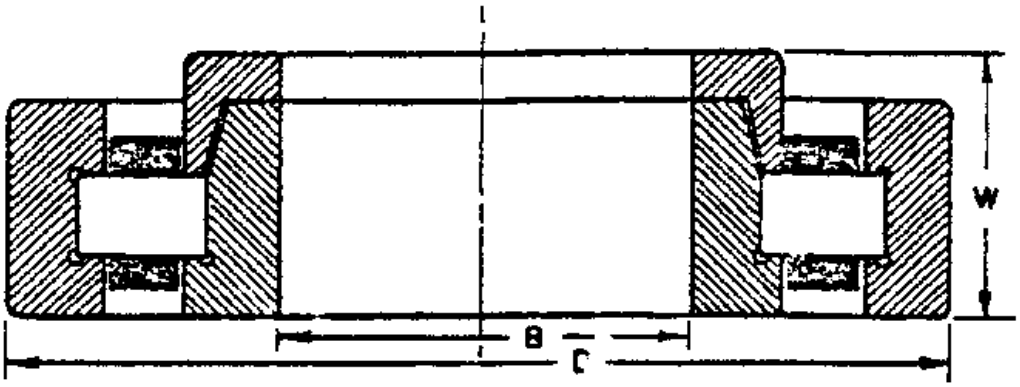

FIGURE 11.—Class 3, type 238, radial, cylindrical, two direction locating, single row of rollers (metric bore and o. d., inch or metric width), two-lip inner ring (one lip of inner ring separable and extended) — two-lip outer ring.

Locating, Single Row of Rollers.]

TABLE XII.--Class 3, type 238, radial, cylindrical, two direction locating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring (one lip of inner ring separable and extended)--two-lip outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
238-01002-0000.....	10	0.3937	30	1.1811	9	0.3543	0.024
238-01003-0000.....	10	.3937	35	1.3780	11	.4331	.024
238-01202-0000.....	12	.4724	32	1.2598	10	.3937	.024
238-01203-0000.....	12	.4724	37	1.6535	12	.4724	.039
238-01502-0000.....	15	.5906	35	1.3780	11	.4331	.024
238-01503-0000.....	15	.5906	42	1.6535	13	.5118	.039
238-01702-0000.....	17	.6693	40	1.5748	12	.4724	.024
238-01703-0000.....	17	.6693	47	1.8504	14	.5512	.039
238-02002-0000.....	20	.7874	47	1.8504	14	.5512	.039
238-02003-0000.....	20	.7874	52	2.0472	15	.5906	.039
238-02502-0000.....	25	.9843	52	2.0472	15	.5906	.039
238-02503-0000.....	25	.9843	62	2.4409	17	.6693	.039
238-03002-0000.....	30	1.1811	62	2.4409	16	.6299	.039
238-03003-0000.....	30	1.1811	72	2.8346	19	.7480	.039
238-03502-0000.....	35	1.3780	72	2.8346	17	.6693	.039
238-03503-0000.....	35	1.3780	80	3.1496	21	.8268	.059
238-04002-0000.....	40	1.5748	80	3.1496	18	.7087	.039
238-04003-0000.....	40	1.5748	90	3.5433	23	.9055	.059

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238-04502-0000.....	45	1.7717	85	3.3465	19	.7480	.039
238-04503-0000.....	45	1.7717	100	3.9370	25	.9843	.059

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TABLE XII.--Class 3, type 238, radial, cylindrical, two direction locating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring (one lip of inner ring separable and extended)--two-lip outer ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
238-05002-0000.....	50	1.9685	90	3.5433	20	0.7874	0.039
238-05003-0000.....	50	1.9685	110	4.3307	27	1.0630	.079
238-05502-0000.....	55	2.1654	100	3.9370	21	.8268	.059
238-05503-0000.....	55	2.1654	120	4.7244	29	1.1417	.079
238-06002-0000.....	60	2.3622	110	4.3307	22	.8661	.059
238-06003-0000.....	60	2.3622	130	5.1181	31	1.2205	.079
238-06502-0000.....	65	2.5591	120	4.7244	23	.9055	.059
238-06503-0000.....	65	2.5591	140	5.5118	33	1.2992	.079
238-07002-0000.....	70	2.7559	125	4.9213	24	.9449	.059
238-07003-0000.....	70	2.7559	150	5.9055	35	1.3780	.079
238-07502-0000.....	75	2.9528	130	5.1181	25	.9843	.059
238-07503-0000.....	75	2.9528	160	6.2992	37	1.4567	.079
238-08002-0000.....	80	3.1496	140	5.5118	26	1.0236	.079
238-08003-0000.....	80	3.1496	170	6.6929	39	1.5354	.079
238-08502-0000.....	85	3.3465	150	5.9055	28	1.1024	.079
238-08503-0000.....	85	3.3465	180	7.0866	41	1.6142	.098
238-09002-0000.....	90	3.5433	160	6.2992	30	1.1811	.079
238-09003-0000.....	90	3.5433	190	7.4803	43	1.6929	.098
238-09502-0000.....	95	3.7402	170	6.6929	32	1.2598	.079
238-09503-0000.....	95	3.7402	200	7.8740	45	1.7717	.098
238-10002-0000.....	100	3.9370	180	7.0866	34	1.3386	.079
238-10003-0000.....	100	3.9370	215	8.4646	47	1.8504	.098
238-10502-0000.....	105	4.1339	190	7.4803	36	1.4173	.079
238-10503-0000.....	105	4.1339	225	8.8583	49	1.9291	.098
238-11002-0000.....	110	4.3307	200	7.8740	38	1.4961	.079
238-11003-0000.....	110	4.3307	240	9.4488	50	1.9685	.098
238-12002-0000.....	120	4.7244	215	8.4646	40	1.5748	.079
238-12003-0000.....	120	4.7244	260	10.2362	55	2.1654	.098
238-13002-0000.....	130	5.1181	230	9.0551	40	1.5748	.098
238-13003-0000.....	130	5.1811	280	11.0236	58	2.2835	.118
238-14002-0000.....	140	5.5118	250	9.8425	42	1.6535	.098
238-14003-0000.....	140	5.5118	300	11.8110	62	2.4409	.118

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TABLE XII.--Class 3, type 238, radial, cylindrical, two direction locating, single row of rollers (metric bore and o.d., inch or metric width), two-lip inner ring (one lip of inner ring separable and extended)--two-lip outer ring.--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
238-15002-0000.....	150	5.9055	270	10.6299	45	1.7717	0.098
238-15003-0000.....	150	5.9055	320	12.5984	65	2.5591	.118
238-16002-0000.....	160	6.2992	290	11.4173	48	1.8898	.098
238-16003-0000.....	160	6.2992	340	13.3858	68	2.6772	.118
238-17002-0000.....	170	6.6929	310	12.2047	52	2.0472	.118
238-17003-0000.....	170	6.6929	360	14.1732	72	2.8346	.118
238-18002-0000.....	180	7.0866	320	12.5984	52	2.0472	.118
238-18003-0000.....	180	7.0866	380	14.9606	75	2.9528	.118
238-19002-0000.....	190	7.4803	340	13.3858	55	2.1654	.118
238-19003-0000.....	190	7.4803	400	15.7480	78	3.0709	.158
238-20002-0000.....	200	7.8740	360	14.1732	58	2.2835	.118
238-20003-0000.....	200	7.8740	420	16.5354	80	3.1496	.158

[1] See 3.10

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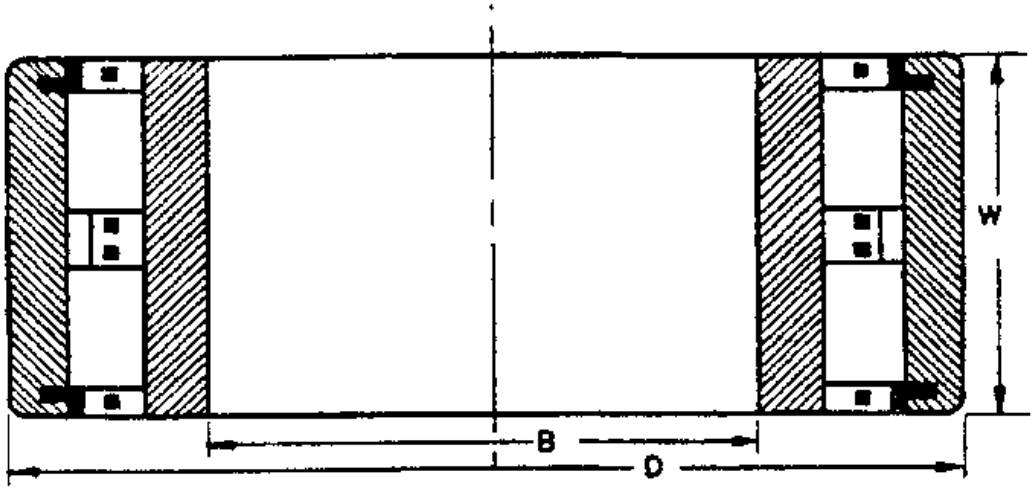

FIGURE 12.—Class 4, type 244, radial, cylindrical, nonlocating, double row of rollers (metric bore and o.d., inch or metric width), cylindrical inner and outer ring, two roller retainment rings on outer ring.

Double Row of Rollers.]

TABLE XIII.--Class 4, type 244, radial, cylindrical, nonlocating, double row of rollers (metric bore and o.d., inch or metric width), cylindrical inner and outer ring, two roller retainment ring on outer ring

Military standard code	Bore (B)		Outside diameter (D)		Width (W)	Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Inches	Inch
244-02582-0000.....	25	0.9843	52	2.0472	1.625	0.039
244-03082-0000.....	30	1.1811	62	2.4409	1.875	.039
244-03582-0000.....	35	1.3780	72	2.8436	2.125	.039
244-05082-0000.....	50	1.9685	90	3.5433	2.375	.079
244-06082-0000.....	60	2.3622	110	4.3307	2.785	.079
244-07082-0000.....	70	2.7559	125	4.9213	3.125	.079
244-08082-0000.....	80	3.1496	140	5.5118	3.500	.079
244-09582-0000.....	95	3.7402	170	6.6929	4.125	.098
244-10082-0000.....	100	3.9370	180	7.0866	4.750	.098
244-12082-0000.....	120	4.7244	215	8.4646	6.000	.098
244-15082-0000.....	150	5.9055	270	10.6299	7.000	.118
244-16082-0000.....	160	6.2992	290	11.4173	7.750	.118
244-18082-0000.....	180	7.0866	320	12.5984	8.500	.118

[1] See 3.10.

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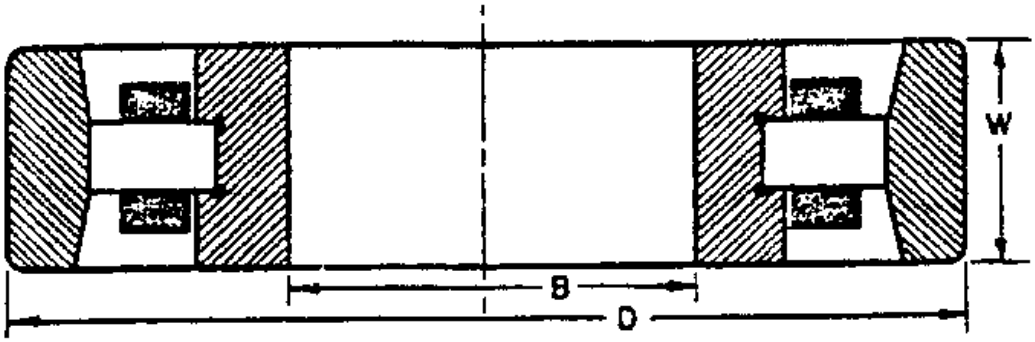

FIGURE 13.—Class 5, type 251, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), two-lip inner ring, cylindrical outer ring.

Single Row of Rollers]

TABLE XIV.--Class 5, type 251, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), two-lip inner ring, cylindrical outer ring

Military standard code	Bore (B)	Outside diameter (D)	Width (W)	Shaft and housing fillet radius[1]
	Inches	Inches	Inches	Inch
251-01603-0000.....	1.0000	2.4995	0.7500	0.047
251-02003-0000.....	1.2500	3.1243	.8750	.047
251-02203-0000.....	1.3750	3.4993	.8750	.063
251-03003-0000.....	1.8750	4.4993	1.0630	.078
251-03201-0000.....	2.0000	3.3118	.6250	.047
251-03203-0000.....	2.0000	4.4993	1.0630	.078
251-03601-0000.....	2.2500	3.5618	.6250	.047
251-03801-0000.....	2.3750	3.7493	.6880	.047
251-04201-0000.....	2.6250	4.1250	.6880	.047
251-04401-0000.....	2.7500	4.1250	.6880	.047
251-04402-0000.....	2.7500	5.2490	.9380	.063
251-04601-0000.....	2.8750	4.4993	.7500	.047
251-04801-0000.....	3.0000	4.4993	.7500	.047
251-04802-0000.....	3.0000	5.7490	1.0630	.063
251-04803-0000.....	3.0000	6.9990	1.5630	.078
251-05001-0000.....	3.1250	4.7490	.7500	.047
251-05201-0000.....	3.2500	4.7493	.7500	.047
251-05203-0000.....	3.2500	7.4990	1.5830	.109
251-05403-0000.....	3.3750	7.4990	1.5630	.109
251-05602-0000.....	3.5000	6.4990	1.1250	.094
251-05801-0000.....	3.6250	5.2490	0.7500	.063
251-06001-0000.....	3.7500	5.2490	.7500	.063
251-06002-0000.....	3.7500	6.7490	1.1250	.094
251-06201-0000.....	3.8750	5.6240	.8750	.063
251-06401-0000.....	4.0000	5.6240	.8750	.063
251-06402-0000.....	4.0000	7.2490	1.2500	.094
251-06403-0000.....	4.0000	8.4990	1.7500	.109
251-06601-0000.....	4.1250	5.9990	.8750	.063
251-06801-0000.....	4.2500	5.9990	.8750	.063

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TABLE XIV.--Class 5, type 251, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), two-lip inner ring, cylindrical outer ring.--(Continued)

Military standard code	Bore (B)	Outside diameter (D)	Width (W)	Shaft and housing fillet radius[1]
	Inches	Inches	Inches	Inch
251-06802-0000.....	4.2500	7.4990	1.2500	0.094
251-06803-0000.....	4.2500	8.7490	1.7500	.109
251-07202-0000.....	4.5000	7.9990	1.3130	.094
251-07203-0000.....	4.5000	9.3740	2.0000	.109
251-07603-0000.....	4.7500	9.9990	2.0000	.109
251-08002-0000.....	5.0000	8.9990	1.3750	.094
251-08003-0000.....	5.0000	9.9990	2.0000	.125
251-08601-0000.....	5.3750	7.4990	1.0000	.094
251-08801-0000.....	5.5000	7.4990	1.0000	.094
251-08802-0000.....	5.5000	9.4990	1.3750	.094
251-09601-0000.....	6.0000	7.9990	1.0000	.094
251-09602-0000.....	6.0000	10.4990	1.5640	.094
251-10402-0000.....	6.5000	10.9990	1.5630	.125
251-12802-0000.....	8.0000	12.9990	1.7500	.125
251-13201-0000.....	8.2500	10.9990	1.3750	.125
251-15201-0000.....	9.5000	12.7490	1.6250	.125
251-16001-0000.....	10.0000	13.2490	1.6250	.125
251-16801-0000.....	10.5000	13.9990	1.7500	.125
251-19201-0000.....	12.0000	15.9990	2.0000	.125

[1] See 3.10.

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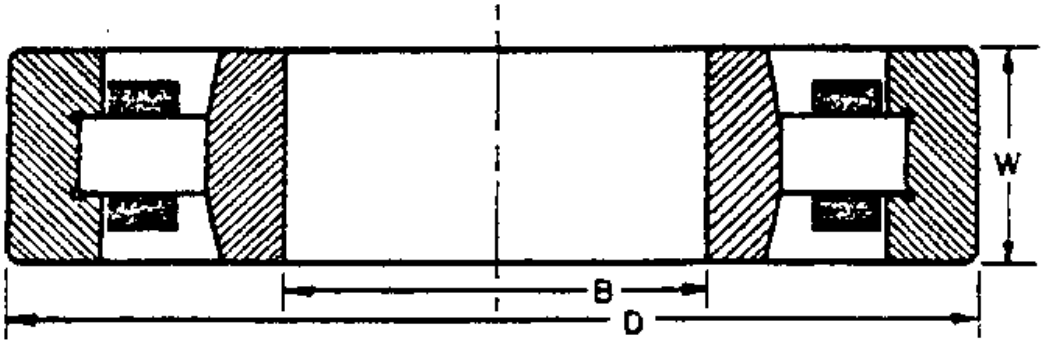

FIGURE 14.—Class 5, type 252, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), cylindrical inner ring, two-lip outer ring.

Single Row of Rollers.]

TABLE XV.--Class 5, type 252, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), cylindrical inner ring, two-lip outer ring

Military standard code	Bore (B)	Outside diameter (D)	Width (W)	Shaft and housing fillet radius[1]
	Inches	Inches	Inches	Inch
252-01603-0000.....	1.0000	2.4995	0.7500	0.047
252-02003-0000.....	1.2500	3.1243	.8750	.047
252-02203-0000.....	1.3750	3.4993	.8750	.063
252-03003-0000.....	1.8750	4.4993	1.0630	.078
252-03201-0000.....	2.0000	3.3118	.6250	.047
252-03203-0000.....	2.0000	4.4993	1.0630	.078
252-03601-0000.....	2.2500	3.5618	.6250	.047
252-03801-0000.....	2.3750	3.7493	.6880	.047
252-04201-0000.....	2.6250	4.1250	.6880	.047
252-04401-0000.....	2.7500	4.1250	.6880	.047
252-04402-0000.....	2.7500	5.2490	.9380	.063
252-04601-0000.....	2.8750	4.4993	.7500	.047
252-04801-0000.....	3.0000	4.4993	.7500	.047
252-04802-0000.....	3.0000	5.7490	1.0630	.063
252-04803-0000.....	3.0000	6.9990	1.5630	.078
252-05001-0000.....	3.1250	4.7490	.7500	.047
252-05201-0000.....	3.2500	4.7493	.7500	.047
252-05203-0000.....	3.2500	7.4990	1.5830	.109
252-05403-0000.....	3.3750	7.4990	1.5630	.109
252-05602-0000.....	3.5000	6.4990	1.1250	.094
252-05801-0000.....	3.6250	5.2490	0.7500	.063
252-06001-0000.....	3.7500	5.2490	.7500	.063
252-06002-0000.....	3.7500	6.7490	1.1250	.094
252-06201-0000.....	3.8750	5.6240	.8750	.063
252-06401-0000.....	4.0000	5.6240	.8750	.063
252-06402-0000.....	4.0000	7.2490	1.2500	.094
252-06403-0000.....	4.0000	8.4990	1.7500	.109
252-06601-0000.....	4.1250	5.9990	.8750	.063
252-06801-0000.....	4.2500	5.9990	.8750	.063

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TABLE XV.--Class 5, type 252, radial, cylindrical, nonlocating, single row of rollers (all inch dimensions), cylindrical inner ring, two-lip outer ring.--(continued)

Military standard code	Bore (B)	Outside diameter (D)	Width (W)	Shaft and housing fillet radius[1]
	Inches	Inches	Inches	Inch
252-06802-0000.....	4.2500	7.4990	1.2500	0.094
252-06803-0000.....	4.2500	8.7490	1.7500	.109
252-07202-0000.....	4.5000	7.9990	1.3130	.094
252-07203-0000.....	4.5000	9.3740	2.0000	.109
252-07603-0000.....	4.7500	9.9990	2.0000	.109
252-08002-0000.....	5.0000	8.9990	1.3750	.094
252-08003-0000.....	5.0000	9.9990	2.0000	.125
252-08601-0000.....	5.3750	7.4990	1.0000	.094
252-08801-0000.....	5.5000	7.4990	1.0000	.094
252-08802-0000.....	5.5000	9.4990	1.3750	.094
252-09601-0000.....	6.0000	7.9990	1.0000	.094
252-09602-0000.....	6.0000	10.4990	1.5640	.094
252-10402-0000.....	6.5000	10.9990	1.5630	.125
252-12802-0000.....	8.0000	12.9990	1.7500	.125
252-13201-0000.....	8.2500	10.9990	1.3750	.125
252-15201-0000.....	9.5000	12.7490	1.6250	.125
252-16001-0000.....	10.0000	13.2490	1.6250	.125
252-16801-0000.....	10.5000	13.9990	1.7500	.125
252-19201-0000.....	12.0000	15.9990	2.0000	.125

[1] See 3.10.

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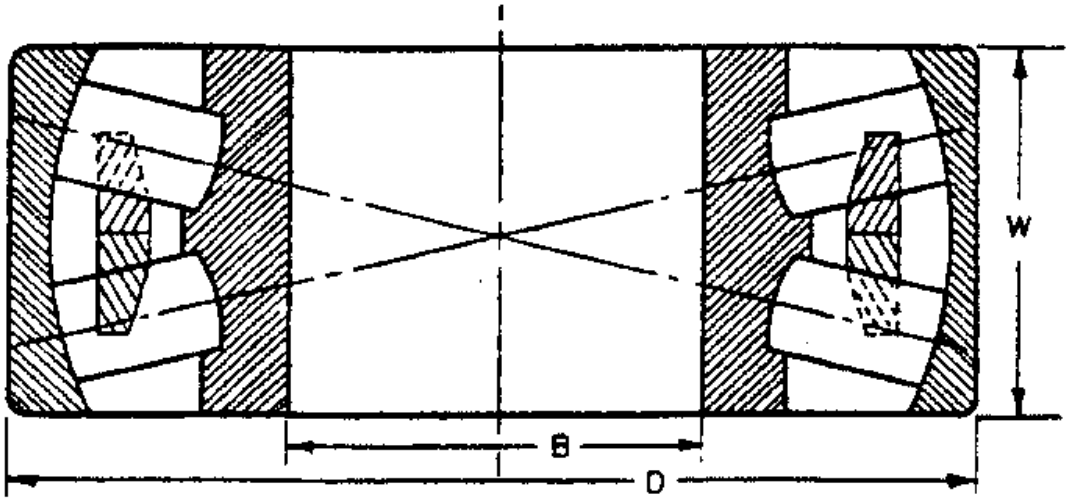

FIGURE 15.—Class 6, type 264, self-aligning, double row, spherical, self contained, outer and inner raceways, concave (metric bore and o. d., inch or metric width).

Self Contained, Outer and Inner Raceways, Concave.]

TABLE XVI.--Class 6, type 264, self-aligning, double row spherical, self contained, outer and inner raceways, concave (metric bore and o.d., inch or metric width)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
264-04023-0000.....	40	1.5748	90	3.5433	33	1.2992	0.059
264-04523-0000.....	45	1.7717	100	3.9370	36	1.4173	.059
264-05023-0000.....	50	1.9685	110	4.3307	40	1.5748	.079
264-05523-0000.....	55	2.1654	120	4.7244	43	1.6929	.079
264-06023-0000.....	60	2.3622	130	5.1181	46	1.8110	.079
264-06523-0000.....	65	2.5591	140	5.5118	48	1.8898	.079
264-07023-0000.....	70	2.7559	150	5.9055	51	2.0079	.079
264-07523-0000.....	75	2.9528	160	6.2992	55	2.1654	.079
264-08022-0000.....	80	3.1496	140	5.5118	33	1.2992	.079
264-08023-0000.....	80	3.1496	170	6.6929	58	2.2835	.079
264-08522-0000.....	85	3.3465	150	5.9055	36	1.4173	.079
264-08523-0000.....	85	3.3465	180	7.0866	60	2.3622	.098
264-09022-0000.....	90	3.5433	160	6.2992	40	1.5748	.079
264-09023-0000.....	90	3.5433	190	7.4803	64	2.5197	.098
264-09522-0000.....	95	3.7402	170	6.6929	43	1.6929	.079
264-09523-0000.....	95	3.7402	200	7.8740	67	2.6378	.098
264-10022-0000.....	100	3.9370	180	7.0866	46	1.8110	.079
264-10042-0000.....	100	3.9370	180	7.0866	60.3	2.3750	.079
264-10023-0000.....	100	3.9370	215	8.4646	73	2.8740	.098

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264-11031-0000.....	110	4.3307	180	7.0866	56	2.2047	.079
264-11022-0000.....	110	4.3307	200	7.8740	53	2.0866	.079
264-11042-0000.....	110	4.3307	200	7.8740	69.8	2.7500	.079
264-11023-0000.....	110	4.3307	240	9.4488	80	3.1496	.098

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TABLE XVI.--Class 6, type 264, self-aligning, double row spherical, self contained, outer and inner raceways, concave (metric bore and o.d., inch or metric width)--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
264-12030-0000.....	120	4.7244	180	7.0866	46	1.8110	0.079
264-12031-0000.....	120	4.7244	200	7.8740	62	2.4409	.079
264-12022-0000.....	120	4.7244	215	8.4646	58	2.2835	.079
264-12042-0000.....	120	4.7244	215	8.4646	76	2.9921	.079
264-12023-0000.....	120	4.7244	260	10.2362	86	3.3858	.098
264-13030-0000.....	130	5.1181	200	7.8740	52	2.0472	.079
264-13031-0000.....	130	5.1181	210	8.2677	64	2.5197	.079
264-13022-0000.....	130	5.1181	230	9.0551	64	2.5197	.098
264-13042-0000.....	130	5.1181	230	9.0551	80	3.1496	.098
264-13023-0000.....	130	5.1181	280	11.0236	93	3.6614	.118
264-14030-0000.....	140	5.5118	210	8.2677	53	2.0866	.079
264-14031-0000.....	140	5.5118	225	8.8583	68	2.6772	.079
264-14022-0000.....	140	5.5118	250	9.8425	68	2.6772	.098
264-14042-0000.....	140	5.5118	250	9.8425	88	3.4646	.098
264-14023-0000.....	140	5.5118	300	11.8110	102	4.0157	.118
264-15030-0000.....	150	5.9055	225	8.8583	56	2.2047	.079
264-15031-0000.....	150	5.9055	250	9.8425	80	3.1496	.079
264-15022-0000.....	150	5.9055	270	10.6299	73	2.8740	.098
264-15042-0000.....	150	5.9055	270	10.6299	96	3.7795	.098
264-15023-0000.....	150	5.9055	320	12.5984	108	4.2520	.118
264-16030-0000.....	160	6.2992	240	9.4488	60	2.3622	.079
264-16031-0000.....	160	6.2992	270	10.6299	86	3.3858	.079
264-16022-0000.....	160	6.2992	290	11.4173	80	3.1496	.098
264-16042-0000.....	160	6.2992	290	11.4173	104	4.0945	.098
264-16023-0000.....	160	6.2992	340	13.3858	114	4.4882	.118
264-17030-0000.....	170	6.6929	260	10.2362	67	2.6378	.079
264-17031-0000.....	170	6.6929	280	11.0236	88	3.4646	.079
264-17022-0000.....	170	6.6929	310	12.2047	86	3.3858	.118
264-17042-0000.....	170	6.6929	310	12.2047	110	4.3307	.118
264-17023-0000.....	170	6.6929	360	14.1732	120	4.7244	.118
264-18030-0000.....	180	7.0866	280	11.0236	74	2.9134	.079
264-18031-0000.....	180	7.0866	300	11.8110	96	3.7795	.098
264-18022-0000.....	180	7.0866	320	12.5984	86	3.3858	.118
264-18042-0000.....	180	7.0866	320	12.5984	112	4.4094	.118
264-18023-0000.....	180	7.0866	380	14.9696	126	4.9606	.118
264-19030-0000.....	190	7.4803	290	11.4173	75	2.9528	.079
264-19031-0000.....	190	7.4803	320	12.5984	104	4.0945	.098
264-19022-0000.....	190	7.4803	340	13.3858	92	3.6220	.118
264-19042-0000.....	190	7.4803	340	13.3858	120	4.7244	.118
264-19023-0000.....	190	7.4803	400	15.7480	132	5.1968	.157

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TABLE XVI.--Class 6, type 264, self-aligning, double row spherical, self contained, outer and inner raceways, concave (metric bore and o.d., inch or metric width).--(Continued)

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
264-20030-0000.....	200	7.8740	310	12.2047	82	3.2283	0.079
264-20031-0000.....	200	7.8740	340	13.3858	112	4.4094	.098
264-20022-0000.....	200	7.8740	360	14.1732	98	3.8583	.118
264-20042-0000.....	200	7.8740	360	14.1732	128	5.0394	.118
264-20023-0000.....	200	7.8740	420	16.5354	138	5.4331	.157
264-22030-0000.....	220	8.6614	340	13.3858	90	3.5433	.098
264-22031-0000.....	220	8.6614	370	14.5669	120	4.7244	.118
264-22022-0000.....	220	8.6614	400	15.7480	108	4.2520	.118
264-22042-0000.....	220	8.6614	400	15.7480	144	5.6693	.118
264-22023-0000.....	220	8.6614	460	18.1102	145	5.7087	.157
264-24030-0000.....	240	9.4488	360	14.1732	92	3.6220	.098
264-24031-0000.....	240	9.4488	400	15.7480	128	5.0394	.118
264-24042-0000.....	240	9.4488	440	17.3228	160	6.2992	.118
264-26030-0000.....	260	10.2362	400	15.7480	104	4.0945	.118
264-26031-0000.....	260	10.2362	440	17.3228	144	5.6693	.118
264-26042-0000.....	260	10.2362	480	18.8976	174	6.8504	.157
264-28030-0000.....	280	11.0236	420	16.5354	106	4.1732	.118
264-28031-0000.....	280	11.0236	460	18.1102	146	5.7480	.157
264-28042-0000.....	280	11.0236	500	19.6850	176	6.9291	.157
264-30030-0000.....	300	11.8110	460	18.1102	118	4.6457	.118
264-30031-0000.....	300	11.8110	500	19.6850	160	6.2992	.157
264-30042-0000.....	300	11.8110	540	21.2598	192	7.5591	.157
264-32030-0000.....	320	12.5984	480	18.8976	121	4.7638	.118
264-32031-0000.....	320	12.5984	540	21.2598	176	6.9291	.157
264-32042-0000.....	320	12.5984	580	22.8346	208	8.1890	.157

[1] See 3.10.

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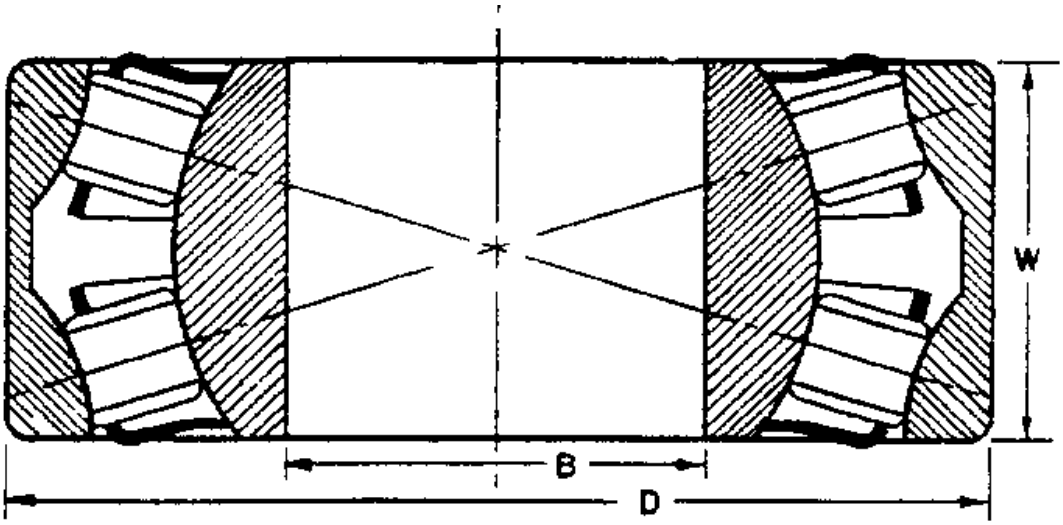

FIGURE 16.—Class 6, type 265, self-aligning, concave, self contained, outer and inner raceways convex, non-separable assembly, double row, all metric dimensions.

Contained, Outer and Inner Raceways Convex, Non-Separable Assembly, Double Row, All Metric Dimensions.]

TABLE XVII.--Class 6, type 265, self-aligning, concave, self contained, outer and inner raceways convex, non-separable assembly, double row, all metric dimensions

Military standard code	Bore (B)		Outside diameter (D)		Width (W)		Shaft and housing fillet radius[1]
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Inch
265-04523-0000.....	45	1.7717	100	3.9370	36	1.4173	0.059
265-05023-0000.....	50	1.9685	110	4.3307	40	1.5748	.079
265-05523-0000.....	55	2.1654	120	4.7244	43	1.6929	.079
265-06023-0000.....	60	2.3622	130	5.1181	46	1.8110	.079
265-06523-0000.....	65	2.5591	140	5.5118	48	1.8898	.079
265-07023-0000.....	70	2.7559	150	5.9055	51	2.0079	.079
265-07523-0000.....	75	2.9528	160	6.2992	55	2.1654	.079
265-08022-0000.....	80	3.1496	140	5.5118	33	1.2992	.079
265-08023-0000.....	80	3.1496	170	6.6929	58	2.2835	.079
265-08522-0000.....	85	3.3465	150	5.9055	36	1.4173	.079
265-08523-0000.....	85	3.3465	180	7.0866	60	2.3622	.098
265-09022-0000.....	90	3.5433	160	6.2992	40	1.5748	.079
265-09023-0000.....	90	3.5433	190	7.4803	64	2.5197	.098
265-09522-0000.....	95	3.7402	170	6.6929	43	1.6929	.079
265-09523-0000.....	95	3.7402	200	7.8740	67	2.6378	.098
265-10022-0000.....	100	3.9370	180	7.0866	46	1.8110	.079
265-10023-0000.....	100	3.9370	215	8.4646	73	2.8740	.098
265-11022-0000.....	110	4.3307	200	7.8740	53	2.0866	.079
265-11023-0000.....	110	4.3307	240	9.4488	80	3.1496	.098
265-12022-0000.....	120	4.7244	215	8.4646	58	2.2835	.079
265-12023-0000.....	120	4.7244	260	10.2362	86	3.3858	.098
265-13022-0000.....	130	5.1181	230	9.0551	64	2.5197	.098
265-13023-0000.....	130	5.1181	280	11.0236	93	3.6614	.118
265-14022-0000.....	140	5.5118	250	9.8425	68	2.6772	.098

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265-14023-0000.....	140	5.5118	300	11.8110	102	4.0157	.118
265-15022-0000.....	150	5.9055	270	10.6299	73	2.8740	.098
265-15023-0000.....	150	5.9055	320	12.5984	108	1.2520	.118
265-16022-0000.....	160	6.2992	290	11.4173	80	3.1496	.098
265-16023-0000.....	160	6.2992	340	13.3858	114	4.4882	.118
265-17022-0000.....	170	6.6929	310	12.2047	86	3.3858	.118
265-18022-0000.....	180	7.0866	320	12.5984	86	3.3858	.118
265-19022-0000.....	190	7.4803	340	13.3858	92	3.6220	.118

[1] See 3.10.

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TABLE XVIII.--Sampling for visual and dimensional inspection of assembled bearings

Number of bearings in lot	Number of bearing in sample
1 to 4	All
5 to 8	5
9 to 15	7
16 to 40	10
41 to 65	15
66 to 110	20
111 to 180	25
181 to 300	30
301 to 800	50
801 to 1300	75
13001 and over	100

TABLE XIX.--Sampling for inspection and test of disassembled bearings

Number of bearings in lot	Number of bearing in sample
1 to 4	None
5 to 8	None
9 to 15	2
16 to 40	3
41 to 110	4
111 to 180	5
181 to 300	6
301 to 800	8
801 to 1300	10
13001 to 2000	12

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APPENDIX

10. SCOPE

10.1 This appendix covers the application requirements of roller bearings conforming to this specification to be used in the construction of machinery. When purchasing machinery in which roller bearings are used, this appendix shall govern unless otherwise approved by the procuring agency.

20. APPLICABLE SPECIFICATIONS AND DRAWINGS

20.1 The following specification and drawing, of the issue in effect on date of invitation for bids, form a part of this appendix:

Military Specification:

MIL-G-1870 - Grease, Ball and Roller Bearing.

Bureau of Ships Drawing:

S9200-465839--Pulling Tool for Pulling Ball Bearings and Gears and for Similar Applications.

(Copies of specifications, standard, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

30. Requirements

30.1 Unless otherwise specified in the contract or order, or specifically approved by the procuring agency, all cylindrical and self-aligning roller bearings used for Naval work shall comply as to the classes, types and sizes to the requirements of this specification.

30.2 Interchangeability.

30.2.1 Particular attention shall be given to interchangeability of roller bearings in any application to a given design, to minimize the number of classes, types, and sizes used and stocked for maintenance purposes. Where practicable, roller bearings used for both ends of a motor, pump, generator, or turbine, shall be of the same class, type, and size. Likewise, the roller bearings used for each system of control, communication, or transmission shafting shall be of the same class, type, and size.

30.3 Corrosion-resisting bearings.--Unless specifically approved by the procuring agency, corrosion-resisting roller bearings shall not be used. Corrosion-resisting bearings are intended for use under very low loads and speeds where the corrosion-resisting feature is of prime importance. The limiting maximum loads for corrosion-resisting roller bearings shall not exceed one-tenth the loads shown in the applicable table (see tables XX through XXIII).

30.4 Selection for use.

30.4.1 In general, where a nonlocating separable bearing is required, type 212 has the most universal application.

30.4.2 In general where a one direction locating separable bearing is required, 231 has the most universal application.

30.4.3 In general where a two direction locating nonseparable bearing is

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required, type 237 has the most universal application.

30.5 Types and their applications.

30.5.1 Class 1--radial, cylindrical, non-locating, single row) of rollers (metric bore and o.d., inch or metric width).

30.5.1.1 Type 211, two-lip inner ring, cylindrical outer ring with two roller retainment rings.--Type 211 bearings as shown in table II and as specified in 3.13.1 are of the two-lip inner ring, cylindrical outer ring with two roller retainment rings type. These bearings are of nonlocating, nonseparable type.

30.5.1.1.1 Type 211 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XX when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof.

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30.5.1.1.2 Type 211 bearings will permit endwise "float" of the shaft relative to the housing.

30.5.1.1.3 Type 211 bearings, shall be used in applications where it is advantageous to have a self-contained bearing and where low speeds and high radial loads exist.

30.5.1.2 Type 212, two-lip inner ring, cylindrical outer ring.--Type 212 bearings as shown in table III and as specified in 3.13.2 are of the two-lip inner ring, cylindrical outer ring type. These bearings are of the nonlocating, separable outer ring type.

30.5.1.2.1 Type 212 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XX when proper consideration is given to speed, life and safety factors as set forth in section 3 hereof.

30.5.1.2.2 Type 212 bearings shall be used in applications where it is desirable to have the inner ring and roller assembly float in the outer ring. With this design, there is no possibility of cramping the roller endwise and it permits endwise movement of the shaft due to expansion and contraction. Type 212 bearings operate equally well in vertical or horizontal applications and are easy to assemble.

30.5.1.3 Type 214, cylindrical inner ring, and outer ring with two roller retainment rings on outer ring.--Type 214 bearings as shown in table IV and as specified in 3.13.3 are of the cylindrical inner and outer ring with roller retainment rings on the outer ring type. These bearings are of the nonlocating, separable inner ring type.

30.5.1.3.1 Type 214 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XX when proper consideration in given to speed, life and safety factors in their size selection as set forth in section 3 hereof.

30.5.1.3.2 Type 214 bearings shall be used in applications where it is desirable to hold the rollers in place during the installation of the inner ring on the shaft.

30.5.1.4 Type 215, cylindrical inner ring two-lip outer ring.--Type 215 bearings as shown in table V and as specified in 3.13.4 are of the cylindrical inner ring, two-lip outer ring type. These bearings are of the nonlocating, separable inner ring type.

30.5.1.4.1 Type 215 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XX when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof.

30.5.1.4.2 Type 215 bearings shall be listed in applications where the shaft must be removed frequently, leaving the outer ring and the roller assembly in the housing. These bearings shall also be used in applications where the shaft must have endwise float.

30.5.1.5 Type 216, cylindrical inner one-lip outer ring.--Type 216 bearings as shown in table VI and as specified in 3.13.5 are of the cylindrical inner ring, one-lip outer ring type. These bearings are of the nonlocating, separable inner ring type.

30.5.1.5.1 Type 216 bearings are capable of supporting pure radial loads

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not exceeding the permissible radial loads specified in table XX when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof.

30.5.1.5.2 Type 216 bearings shall be used in applications where it is desirable to hold the outer ring and roller assembly in place when inner ring is removed.

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30.5.2 Class 2--radial, cylindrical, one direction locating single row of rollers (metric bore and o.d., inch or metric width).

30.5.2.1 Type 231, two-lip inner ring--one-lip outer ring.--Type 231 bearings as shown in table VII and as specified in 3.14.1 are of the two-lip inner ring, one-lip outer ring type. These bearings are of the one direction locating, separable outer ring type.

30.5.2.1.1 Type 231 bearings are capable of supporting radial loads not exceeding the permissible radial loads specified in table XX, when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial load, these bearings can support light shaft location loads in one direction.

30.5.2.1.2 Type 231 bearings shall be used in applications where it is desirable to keep the roller assembly with the inner ring during assembly. These bearings shall not be used in applications where both rotating and oscillating movements are involved.

30.5.2.1.3 Type 231 bearings, when used at opposite ends of a shaft (with outer ring lips opposed) will take light shaft location loads in either direction.

30.5.2.2 Type 232, two-lip inner ring--one-lip outer ring with one roller retainment ring on outer ring.--Type 232 bearings as shown in table VIII and as specified in 3.14.2 are of the two-lip inner ring--one-lip outer ring with one roller retainment ring on the outer ring type. These bearings are of the one direction locating, separable inner ring type.

30.5.2.2.1 Type 232 bearings are capable of supporting radial loads not exceeding the permissible radial loads specified in table XX, when proper consideration is given to speed, life, and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can support light shaft location loads in one direction.

30.5.2.2.2 Type 232 bearings shall be used in applications where it is desirable to have a self-contained bearing and where high loads and low speeds are involved.

30.5.2.3 Type 234, one-lip inner ring--one-lip outer ring.--Type 234 bearings as shown in table IX and as specified in 3.14.3 are of the one-lip inner ring and one-lip outer ring type. These bearings are of the one direction locating, separable inner and outer ring type.

30.5.2.3.1 Type 234 bearings are capable of supporting radial loads not exceeding the permissible radial loads specified in table XX, when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can support light shaft location loads in one direction.

30.5.2.3.2 Type 234 bearing due to its design shall be used in applications where it is desirable to either remove the shaft complete with the inner ring without disturbing the inner ring fit on the shaft and retaining the outer ring and roller assembly in the housing or to remove the housing complete with the outer ring without disturbing the outer ring fit in its housing and retaining the inner ring and roller assembly on the shaft.

30.5.2.4 Type 236, one-lip inner ring--two-lip outer ring with one roller retainment ring on inner ring.--Type 236 bearings as shown in table X and as specified in 3.14.4 are of the one-lip inner ring and two-lip outer ring type

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with one roller retainment ring on inner ring. These bearings are of the one direction locating, separable inner ring type.

30.5.2.4.1 Type 236 bearings are capable of supporting radial loads not exceeding the permissible loads specified in table XX, when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can support light shaft location loads in one direction.

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30.5.2.4.2 Type 236 bearings shall be used in applications where it is desirable to have a self-contained bearing and where high loads and low speeds are involved.

30.5.3 Class 3--radial, cylinder two direction locating single row of rollers, (metric bore and o.d., inch or metric width).

30.5.3.1 Type 237, two-lip inner ring--two-lip outer ring.--Type 237 bearings as shown in table XI and as specified in 3.15.1 are of the two-lip inner ring, two-lip outer ring type. These bearings are of the two direction locating, nonseparable type.

30.5.3.1.1 Type 237 bearings are capable of supporting radial loads not exceeding the permissible radial loads specified in table XX, when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can support light shaft location loads in either direction.

30.5.3.1.2 Type 237 bearings shall be used in applications where there exists light shaft location loads in either direction.

30.5.3.2 Type 238, two-lip inner ring (one-lip of inner ring separable and extended)--two-lip outer ring.--Type 238 bearings as shown in table XII and as specified in 3.15.2 are of the two-lip inner ring (one lip of inner ring separable and extended), two-lip outer ring type. These bearings are of the two direction locating, separable inner ring type.

30.5.3.2.1 Type 238 bearings are capable of supporting radial loads not exceeding the permissible radial loads specified in table XX when proper consideration is given to speed, life and safety factors in the size selection as set forth in section 3 hereof. In addition to the radial load, these bearings can support light shaft location loads in either direction.

30.5.3.2.2 Type 238 bearings shall be used in applications where there exists light shaft location loads in either direction and where it is desirable to have a separable bearing.

30.5.4 Class 4, radial, cylindrical, nonlocating, double row of rollers (metric bore and o.d., inch or metric width).

30.5.4.1 Type 244, cylindrical inner and outer ring, two roller retaining rings on outer rings.--Type 244 bearings as shown in table XIII and as specified in 3.16.1 are of the cylindrical inner and outer ring with two roller retainment rings on outer ring type. These bearings are of the nonlocating separable inner ring type.

30.5.4.1.1 Type 244 bearings are capable of supporting pure radial loads specified in table XXI when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof.

30.5.4.1.2 Type 244 bearings shall be used in applications where the shaft must be removed frequently, leaving the outer ring and the roller assembly in the housing. These bearings shall also be used in applications where the shaft must have endwise float.

30.5.5 Class 5, radial, cylindrical, nonlocating, single row of rollers (all dimensions).

30.5.5.1 Type 251, two-lip inner ring, cylindrical outer ring.--Type 251 bearings as shown in table XIV and as specified in 3.17.1 are of the two-lip

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inner ring, cylindrical outer ring, nonlocating, separable outer ring type.

30.5.5.1.1 Type 261 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XXII when proper consideration is given to speed, life and safety factors as set forth in section 3 hereof.

30.5.5.1.2 Type 251 bearings shall be used in applications where it is desirable to have the inner ring and roller assembly float in the outer ring. With this design, there is no possibility of cramping the roller endwise, and

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it permits endwise movement of the shaft due to expansion and contraction. Type 251 bearings operate equally well in vertical or horizontal applications and are easy to assemble.

30.5.5.2 Type 252, cylindrical inner--two-lip outer ring.--Type 252 bearings as shown in table XV and as specified in 3.17.2 are of the cylindrical inner ring--two-lip outer ring, separable inner ring type.

30.5.5.2.1 Type 252 bearings are capable of supporting pure radial loads not exceeding the permissible radial loads specified in table XXII when proper consideration is given to speed, life, and safety factors in their size selection as set forth in section 3 hereof.

30.5.5.2.2 Type 252 bearings shall be used in applications where the shaft must be removed frequently, leaving the outer ring and the roller assembly in the housing. These bearings shall also be used in applications where the shaft must have endwise float.

30.5.6 Class 6--self-aligning.

30.5.6.1 Type 264, double row, spherical, self-contained, outer and inner raceways concave (metric bore and o.d., inch or metric width).--Type 264 bearings as shown in table XVI and as specified in 3.18.1 are of the double row, spherical, self-contained, outer and inner raceways, concave, nonseparable, two direction locating type.

30.5.6.1.1 Type 264 bearings are capable of supporting radial loads specified in table XXIII when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can take heavy thrust loads in either direction.

30.5.6.1.2 Type 264 bearings shall be used in applications where it is desirable to carry heavy thrust loads in either direction. Due to its self-aligning feature, these bearings shall be used where there is a possibility of angular misalignment between the shaft and housing.

30.5.6.2 Type 265--concave, self-contained, outer and inner raceways convex, nonseparable assembly, double row (all metric dimensions).

30.5.6.2.1 Type 265 bearings as shown in table XVII and as specified in 3.18.2 are of the concave self-contained, outer and inner raceways convex, double row, nonseparable type

30.5.6.2.2 Type 265 bearings are capable of supporting radial loads specified in table XXIII in either direction when proper consideration is given to speed, life and safety factors in their size selection as set forth in section 3 hereof. In addition to the radial loads, these bearings can take thrust loads in either direction, or any combination of radial and thrust loads.

30.5.6.2.3 Type 265 bearings shall be used in applications where it is desirable to carry heavy thrust loads in either direction. Due to its self-aligning feature, these bearings shall be used where there is a possibility of angular misalignment between the shaft and the housing.

30.6 Load, speed and life computations.

30.6.1 The primary operation in selection of a bearing for a given application shall be a complete and careful evaluation of the loads the

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bearing shall be called upon to support and the speeds at which it will be required to operate. Shaft location loads, radial loads or the combination of radial and thrust loads, shall be evaluated completely. Also, the service conditions, continuous or intermittent operation, extent of shock loading and the expected life of the assembly, shall be taken into consideration.

30.6.1.1 When the radial load has been determined it shall be altered by adequate speed and life factors to give satisfactory operation. Formula I takes these factors into consideration:

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Formula I:

$$L = D \times C \times L_{re}$$

Where:

L = Load to be supported
D = Life factor shown in table XIV
C = Speed factor shown in table XXV
L_{re} = Equivalent radial load (computed from application data)

30.6.1.1.1 The proper size bearing can now be selected from the applicable table (see tables XX through XXIII) to support the load, since this load takes into consideration the life and speed conditions of the application.

30.6.1.2 Where type 264 and 265 bearings are applicable; and where shaft location loads are to be supported, the combinations of radial and shaft location loads shall be evaluated completely. Bearing loads shall first be converted to a single equivalent radial load before applying speed and life factors. The following formula shall be used for this conversion:

Formula II (for bearings designed primarily for radial loads):

$$R_{re} = R + 2T$$

Where:

R_{re} = equivalent radial load
R = actual maximum radial load
T = actual maximum shaft location load

30.6.1.3 When the equivalent radial load has been determined it shall be altered by adequate speed and life factors to give satisfactory operation. The value R_{re} determined in formula II should then be substituted for L_{re} in formula I and the bearing selection load determined by applying the proper life and speed factors from tables XXIV and XXV and as specified in 30.6.1.1. The proper size bearing can now be selected from the applicable table (see tables XX through XXIII) to support the load.

30.6.1.4 In most applications, the inner ring of the bearing rotates with the shaft and the outer ring is stationary in the housing. In those rare cases where the outer ring rotates, it is necessary to compensate for the higher equivalent shaft speed. This equivalent shaft speed is one-third greater than the outer ring speed, in accordance with table XXV.

30.7 Mounting, shaft and housing.

30.7.1 Mounting.

30.7.1.1 In general, the use of a roller bearing and a sleeve bearing on the same shaft or two rigidly connected shafts will not be permitted. Where two units are coupled together, flexible couplings shall be interposed to prevent overloading of the bearings in one unit by radial displacement or misalignment of the other.

30.7.1.2 In general, not more than two roller bearings will be permitted on shafts rigidly assembled and required to run in line. The use of three or more bearings on rigidly assembled shafts will be acceptable only when perfect original alignment and maintenance of this alignment in service can be assured. The use of three or more bearings in this case will require

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specific approval of the procuring agency.

30.7.1.3 The assembly drawing shall show all details of mounting, including the loads and speed to which the bearings are subjected, lubrication, the ambient temperature, operating temperature, disassembly requirements, provision for adjustment, location and limits of clearances, and the method used to check these clearances after assembly.

30.8 Shaft and housing.

30.8.1 Shafts.

30.8.1.1 The shaft shall be manufactured in accordance with the tolerances shown in table XXVI to provide for the proper fit of the inner ring of the bearing.

30.8.1.2 Shaft fillets shall not exceed the radius shown in dimensional

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tables of this specification for the various bearing sizes. The diameters of shaft shoulders shall be not less than the limits shown in table XXVII for the various bearing sizes. Where it is necessary, provisions shall be made for removal of the bearing without damaging the bearing, the shoulder, or the shaft, such as slots, knock-out holes, offset or relieved shoulders which allow removal pressure to be applied to the bearing inner ring.

30.8.1.3 Unless otherwise specified in the contract or order, the inner ring of the bearing shall be secured against the shaft shoulder by a locknut and an interposed pronged lockwasher in accordance with tables XXVIII and XXIX as to dimensions, and application, or other method approved by the procuring agency. Applications in which the bearings are not secured against shoulders shall be specifically approved by the procuring agency concerned. The dimensions of the locknut and lockwasher shall be within the limits shown in tables XXVIII and XXIX and figures 17 and 18 for the various bearing sizes. The prong on the inner circumference of the washer shall be fitted into a keyway machined into the shaft and one of the prongs on the outer circumference of the washer shall be bent into one of the slots of the lock-nut. The dimensions of the related shaft parts shall be within the limits shown in table XXX and figure 19 for the various bearing sizes.

30.8.1.4 Unless specifically approved by the procuring agency, sleeves shall not be permitted between the bearing inner ring and the shaft, on shaft rotation applications.

30.8.2 Housing.

30.8.2.1 The housing bore and shoulder shall be ground wherever practicable or fine machined finished to the tolerances shown in table XXXI.

30.8.2.2 Where the housing material is of aluminum alloy or other material which is so soft that it may be peened out of shape by the hard outer ring, a steel sleeve shrunk into place and finished in accordance with 30.8.2.1 shall be used between the bearing housing and the outer ring.

30.8.2.3 Housing fillets shall not exceed the radius shown in the dimensional tables of this specification for the various bearing sizes. The diameters of bearing restraining housing shoulders shall not exceed the maximum limits shown in table XXXII for the various bearing sizes. Where it is necessary, provision shall be made for the removal of the bearing without damaging the bearing, the housing shoulder, or the housing, such as slots, knockout holes, offset or relieved shoulders which allow removal pressure to be applied to the bearing outer ring.

30.8.2.4 The housing shall provide an effective seal for the two-fold purpose of retaining the lubricant and excluding foreign matter from the bearing. A reservoir shall be provided for an adequate supply of lubricant together with means for renewing and draining same, and where oil lubrication is used, means shall be provided for showing the oil level in the reservoir (see 30.10 and 30.12).

30.8.2.5 The housing shall be designed to provide means for renewing wearing parts of seals.

30.8.2.6 The housing shall be designed to provide means of convenient determination of the bearing temperature and shaft speed.

30.8.2.7 In general, one bearing of an assembly on the same shaft of a machinery unit shall be definitely fixed axially by the housing. The fixed bearing will take only those shaft location loads due to the location of the

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shaft (except types 264 and 265). All other bearings of the nonseparable type on this same shaft shall be mounted so as to permit them to float axially in the housing to compensate for linear shaft expansion. In the case of types 264 and 265, one bearing of an assembly on the same shaft of a machinery unit shall be definitely fixed axially by the housing. The fixed bearing shall take the thrust load in addition to the radial load. All other

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bearings on the same shaft shall be mounted so as to permit them to float axially in the housing to compensate for linear shaft expansion. In all cases, a total axial clearance between the outer ring and the housing shoulders shall not exceed 0.010 inch (0.005 inch on each side of the outer ring), except that no axial clearance shall be allowed where end play should be so controlled.

30.8.2.8 The housing shall be designed to provide rigidity, and strength shall be incorporated where necessary. Housing rib shall be designed so as not to restrict the flow of lubricant to or from the bearing. In the case of types 264 and 265 bearings, the housing shall be designed to provide rigidity for shaft location loads in addition to radial loads.

30.9 Application approval.

30.9.1 If directed by the procuring agency, the assembly drawing of the apparatus shall bear a certificate signed by a responsible official of the bearing manufacturing company showing that the bearing application proposed is approved by his company as to all details of mounting, the load and speed to which the bearing will be subjected and the lubrication of the bearing, after having given full consideration to the intended service requirements.

30.9.1.1 The assembly drawing shall show all details of mounting, including dimensions showing the location and extent of maximum and minimum end play and notes describing the method by which the end play and other fits will be checked after assembly of the apparatus.

30.10 Lubrication.

30.10.1 All roller bearings shall be lubricated with grease or oil. Unless otherwise specified in the contract or order, the grease used shall be in compliance with Military Specification 18709 and the lubricating oil used shall be in conformance with the specification suitable for the equipment.

30.10.2 Oil lubrication.

30.10.2.1 In general, oil lubrication is preferred for applications in which it is practicable to satisfactorily seal the housing against leakage.

30.10.2.2 When oil is used as a lubricant, the bearing housing shall be designed to serve as an oil reservoir with filling tube, visual oil level tube, provision to prevent over-filling, and drain of a design satisfactory to the procuring agency. Filling and level tubes shall have screwcap covers. Arrangement shall be such that the oil level will be carried at about the center of the lowest roller for horizontal installations, except that, where a wick feed or an oil flinger design in used, the oil level need not be maintained above the bottom of the lowest roller; the visible length of the level tube shall be approximately 1 inch above the correct operating oil level, and this fact shall be shown by proper marking. For vertical Installations, continuous lubrication shall be assured by centrifugal oil flinger or attached centrifugal oil pump.

30.10.2.3 When oil is used as a lubricant, care shall be exercised to provide protective fluid film on the bearing parts and to limit full fluid lubrication to such quantity as will not cause churning and consequent excessive overheating of the bearing. In general, in horizontal applications, this limit will be reached when the oil level is maintained at a level not over the bottom of the inner ring of the bearing.

30.10.3 Grease lubrication.

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30.10.3.1 In general, grease lubrication shall be used for applications in which it would be impracticable to retain oil or where it is impracticable to provide sufficient reservoir space for oil lubrication. Grease shall also be used in applications where the equipment is not stationary, making it impracticable to maintain a supply of all in the reservoir.

30.10.3.2 When grease is used as a lubricant, the housing or housing cover shall be designed to serve as a reservoir. Provision shall be made for renewal of the lubricant. Drain openings shall be provided.

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30.10.3.3 When grease is used as a lubricant, care shall be exercised to provide protective fluid films on the bearing parts and to limit full fluid lubrication to such quantity as will not cause churning and consequent overheating of the bearings. In general, in horizontal applications, this limit will be reached when the grease level is maintained at a level not over the center line of the shaft.

30.11 Cooling.--In general, the maximum ambient temperature in service shall be taken as 122 deg. F, (50 deg. C.). Where it is evident that the ambient temperature in a service application will exceed 122 deg. F. (50 deg. C.), or where any other condition of installation onboard ship will result in a total maximum operating temperature of a bearing exceeding 194 deg. F. (90 deg. C.), some provision shall be made to cool the application. The application and the method of cooling shall be approved by the procuring agency.

30.11.1 Where provision for cooling the application cannot be incorporated into the design of the application, consideration shall be given to utilizing heat stabilized bearings. Heat stabilized bearings are subjected to a special heat treating process to stabilize them so that their dimensions will not increase more than 0.0001 inch per inch of shaft during 2500 hours at 300 deg. F.

30.12 Seals.

30.12.1 Each bearing shall be provided with an effective seal in the housing to prevent escape of the lubricant along the shaft and to prevent the entrance of foreign matter or moisture to the bearing.

30.12.2 Particular attention shall be given to interchangeability of seals in any application to a given design to minimize the number of types and sizes used and stocked for maintenance purposes. Where practicable, seals used for both ends of a motor, pump, gear transmission or winch, shall be of the same class, type and size.

30.12.3 The type of seal and the material used shall be suitable for the type of bearing and the service intended and shall be approved by the procuring agency. The seal shall consist of felt or cork washers or other material such as plastics, when specifically approved by the procuring agency, combined with housing grooves or labyrinths and flingers or any combination of the foregoing features.

30.12.4 Each design shall incorporate convenient means for renewing sealing members. Where practicable, each seal ring shall be without joints.

30.13 Bearing care, assembly and removal.

30.13.1 Roller bearings shall be removed from their original containers ONLY after every preparation has been made to install them. The bearings shall be applied to the machinery without removal of the original coating used in packaging. Every effort shall be made to prevent a bearing from picking up foreign matter or becoming injured or corroded before or after it is installed.

30.13.2 The roller bearings themselves may not always bear the Military standard code number. The cross reference data between the bearing manufacturer’s number or the machinery component manufacturer’s part number and the Military standard code number shall be noted on the drawings and in the machinery history of the unit.

30.13.3 A thorough study of the application shall be made so that the

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bearing assembly or disassembly can be made correctly in one series of operations.

30.13.4 All burrs, slivers and foreign matter shall be removed before mounting roller bearings. No filing or machining of the assembly shall be attempted after the bearing has been mounted.

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30.13.5 A few drops of oil or grease shall be applied to the bearing seats before mounting to prevent shaft scoring.

30.13.6 For mounting roller bearings, the following methods are approved:

30.13.6.1 Oil bath method.--Roller bearings, except those with seals or shields may be expanded to slip easily over the shaft by heating for not over 10 minutes in an oil bath at a maximum temperature of 250 deg. F. On cooling, the inner ring is locked in proper position on the shaft. When this method is employed, only a clean container and absolutely clean oil shall be used.

30.13.6.2 Arbor press method.--Arbor press method of mounting employs an arbor press to apply the pressure directly to the inner ring to slide the bearing into proper position on a shaft. Before applying pressure to the bearing, it may be tapped lightly with a rawhide, plastic, or lightweight soft metal hammer to assist in starting the roller bearing squarely on the shaft. Sleeves or other suitable tools used to insure uniform pressure on the inner ring shall be free of burrs and have square pressure faces. Driving, by hammering roller bearings to position on the shaft, shall not be permitted.

30.13.6.3 Electric oven method.--Tapered roller bearings may be expanded to slip easily over the shaft by heating in an oven to a maximum temperature of 250 deg. F. The bearings shall not be left in the oven beyond the time necessary to expand the inner ring the desired amount.

30.13.6.4 Infrared oven method.--The infrared oven method employs the same principle of mounting as does the electric oven method namely, heating the bearings to a maximum temperature of 250 deg. F. to expand the inner rings. Instead of heating the bearings by means of electric coils, this method employs infrared lamps.

30.13.6.5 In both the electric oven and infrared oven methods, the packaged bearings shall be placed into the ovens. The bearings shall be taken out of their wraps only after they have been heated and just prior to their installation.

30.13.6.6 Where it is necessary to use interference fits on the outer ring, pressure shall be applied to the outer ring to force the bearing into the housing; for example, outer ring rotation applications.

30.14 Repair parts and tools.

30.14.1 Repair parts.

30.14.1.1 Roller bearings.--Spare roller bearing requirements are specified under the spares of the apparatus of which they form a part. Where not definitely specified in the equipment specification or in the contract of order, one set of spares for each four units or fraction thereof (one set comprises 100 percent of the bearing for one unit) shall be furnished for all shipboard installations.

30.14.1.2 Housings.--In general, repair parts for roller bearing housings shall consist of 50 percent of all springs and 100 percent of renewable wearing parts such as seals, felt, or cork, for each vessel.

30.14.2 Tools.--For all roller bearings, unless otherwise specified in the equipment specification or in the contract or order, a suitable tool for removal of the bearing from the shaft or housing shall be included with each apparatus of which they form a part, except in those cases where the Navy

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standard set of pullers (USNC 100938) shown on Drawing S9200-465839 is considered suitable.

30.15 Inspection and tests.

30.15.1 Roller bearings and housings.

30.15.2 Careful inspection of dimensions and details of mountings shall be made during shop assembly of any machinery unit using roller bearings.

30.15.3 Performance tests of roller bearings and housings shall be included in the general performance tests of the apparatus of which they are a part.

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TABLE XX.--Radical load capacity at 1000 r.p.m. for types 211, 212, 214, 215, 216, 231, 232, 234, 236, 237 and 238

Military standard code	Load capacity	Military standard code	Load capacity	Military standard code	Load capacity
	Pounds		Pounds		Pounds
211-01002-0000	97	211-05502-0000	1,485	211-11002-0000	6,050
211-01003-0000	176	211-05503-0000	2,700	211-11003-0000	11,000
211-01202-0000	133	211-06002-0000	1,730	211-12002-0000	8,250
211-01203-0000	242	211-06003-0000	3,150	211-12003-0000	15,000
211-01502-0000	197	211-06502-0000	1,950	211-13002-0000	9,800
211-01503-0000	358	211-06503-0000	3,550	211-13003-0000	17,800
211-01702-0000	244	211-07002-0000	2,310	211-14002-0000	10,700
211-01703-0000	444	211-07003-0000	4,200	211-14003-0000	19,500
211-02002-0000	330	211-07502-0000	2,680	211-15002-0000	11,500
211-02003-0000	600	211-07503-0000	4,880	211-15003-0000	21,000
211-02502-0000	425	211-08002-0000	3,000	211-16002-0000	12,100
211-02503-0000	775	211-08003-0000	5,450	211-16003-0000	21,200
211-03002-0000	525	211-08502-0000	3,400	211-17002-0000	13,400
211-03003-0000	950	211-08503-0000	6,200	211-17003-0000	24,000
211-04002-0000	825	211-09502-0000	4,330	211-19002-0000	16,400
211-04003-0000	1,500	211-09503-0000	7,880	211-19003-0000	28,000
211-04502-0000	1,030	211-10002-0000	4,850	211-20002-0000	17,500
211-04503-0000	1,870	211-10003-0000	8,500	211-20003-0000	30,000
211-05002-0000	1,240	211-10502-0000			
211-05003-0000	2,250	211-10503-0000			

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TABLE XXI.--Load capacity at 1000 r.p.m. for type 233

Military standard code	Load capacity
244-02582-0000	1,900
244-03062-0000	3,000
244-03582-0000	4,000
244-05082-0000	6,500
244-06082-0000	9,500
244-07082-0000	11,800
244-08082-0000	14,900
244-09582-0000	23,600
244-10082-0000	26,700
244-12082-0000	31,000
244-15082-0000	50,000
244-16082-0000	55,500
244-18082-0000	69,000

TABLE XXII.--Load capacity at 1000 r.p.m. for types 251 and 252

Military standard code	Load capacity	Military standard code	Load capacity	Military standard code	Load capacity
	Pounds		Pounds		Pounds
251-01603-0000	1,000	211-05201-0000	1,430	251-07203-0000	13,000
251-02003-0000	1,750	211-05203-0000	8,000	251-07603-0000	13,500
251-02203-0000	2,000	211-05403-0000	8,000	251-08002-0000	7,250
251-03003-0000	2,800	211-05602-0000	4,200	251-08003-0000	13,500
251-03201-0000	880	211-05801-0000	1,550	251-08601-0000	2,910
251-03203-0000	3,000	211-06001-0000	1,640	251-08801-0000	2,910
251-03601-0000	950	211-06002-0000	4,050	251-08802-0000	7,400
251-03801-0000	1,200	211-06201-0000	2,030	251-09601-0000	3,050
251-04201-0000	1,200	211-06401-0000	2,030	251-09602-0000	10,000
251-04401-0000	1,200	211-06402-0000	5,400	251-10402-0000	10,000
251-04402-0000	2,810	211-06403-0000	10,100	251-12802-0000	12,500
251-04601-0000	1,430	211-06601-0000	2,130	251-13201-0000	5,800
251-04801-0000	1,430	211-06801-0000	2,150	251-15201-0000	8,350
251-04802-0000	3,000	211-06802-0000	5,200	251-16001-0000	8,350
251-04803-0000	8,000	211-06803-0000	10,300	251-16801-0000	9,700
251-05001-0000	1,430	211-07202-0000	6,100	251-19201-0000	12,500

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TABLE XXIII.--Load capacity[1] at 1000 r.p.m for types 264 and 265

Military standard code	Load capacity	Military standard code	Load capacity	Military standard code	Load capacity
	Pounds		Pounds		Pounds
264-04023-0000	2,030	264-13030-0000	9,500	264-19030-0000	19,200
264-04523-0000	2,460	264-13031-0000	10,000	264-19031-0000	29,600
264-05023-0000	3,600	264-13042-0000	16,700	264-19042-0000	37,400
264-05523-0000	4,350	264-14022-0000	15,200	264-20022-0000	30,200
264-06023-0000	5,200	264-14023-0000	28,500	264-20023-0000	51,000
264-06523-0000	5,550	264-14030-0000	10,000	264-20030-0000	20,000
264-07023-0000	7,600	264-14031-0000	13,500	264-20031-0000	32,400
264-07523-0000	8,000	264-14042-0000	19,600	264-20042-0000	42,000
264-08022-0000	3,000	264-15022-0000	16,200	264-22022-0000	43,000
264-08023-0000	9,600	264-15023-0000	30,500	264-22023-0000	61,000
264-08522-0000	4,360	264-15030-0000	10,000	264-22030-0000	22,400
264-08523-0000	10,200	264-15031-0000	16,200	264-22031-0000	40,000
264-09022-0000	5,200	264-15042-0000	23,600	264-22042-0000	51,000
264-09023-0000	12,400	264-16022-0000	20,000	264-24030-0000	28,000
264-09522-0000	6,200	264-16023-0000	34,500	264-24031-0000	42,620
264-09523-0000	13,600	264-16030-0000	10,850	264-24042-0000	62,000
264-10022-0000	7,000	264-16031-0000	19,800	264-26030-0000	38,500
264-10023-0000	16,000	264-16042-0000	27,000	264-26031-0000	53,500
264-10042-0000	10,900	264-17022-0000	22,500	264-26042-0000	73,500
264-11022-0000	9,500	264-17023-0000	41,000	264-28030-0000	39,500
264-11023-0000	19,200	264-17030-0000	13,600	264-28031-0000	59,000
264-11031-0000	9,100	264-17031-0000	20,000	264-28042-0000	79,000
264-11042-0000	13,500	264-17042-0000	30,600	264-30030-0000	50,000
264-12022-0000	11,700	264-18022-0000	22,000	264-30031-0000	72,500
264-12023-0000	21,000	264-18023-0000	41,000	264-30042-0000	96,500
264-12030-0000	7,300	264-18030-0000	12,900	264-32030-0000	51,500
264-12031-0000	11,500	264-18031-0000	22,600	264-32031-0000	85,500
264-12042-0000	16,600	264-18042-0000	32,400	264-32042-0000	100,000
264-13022-0000	14,600	264-19022-0000	28,900		
264-13023-0000	26,500	264-19023-0000	48,700		

[1] The maximum shaft location load shall not exceed 30 percent of the rated radial load capacities without specific approval of the procuring agency

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TABLE XXIV.--Life factor

Less than standard life		Greater than standard life	
Life hours	Factor	Life hours	Factor
365.....	0.450	4,000.....	1.00
430.....	.476	5,300.....	1.10
500.....	.500	6,900.....	1.20
665.....	.551	8,800.....	1.30
865.....	.600	11,000.....	1.40
1,100.....	.650	13,500.....	1.50
1,370.....	.700	16,400.....	1.60
1,680.....	.750	19,700.....	1.70
2,050.....	.800	23,300.....	1.80
2,400.....	.850	27,500.....	1.90
2,920.....	.900	32,000.....	2.00
4,000.....	1.000	37,000.....	2.10

TABLE XXV.--Speed factor

Shaft r.p.m.	Factor	Shaft r.p.m.	Factor	Shaft r.p.m.	Factor
0.....	0.100	1,400...	1.10	3,250....	1.49
100.....	.465	1,500...	1.11	3,500....	1.52
200.....	.585	1,600...	1.14	3,600....	1.54
300.....	.667	1,700...	1.16	3,750....	1.56
400.....	.740	1,800...	1.22	4,000....	1.59
500.....	.794	1,900...	1.23	4,250....	1.61
600.....	.847	2,000...	1.25	4,500....	1.64
700.....	.893	2,100...	1.28	4,750....	1.67
800.....	.926	2,200...	1.30	5,000....	1.70
900.....	.961	2,300...	1.32	5,500....	1.75
1,000.....	1.00	2,400...	1.33	6,000....	1.82
1,100.....	1.02	2,500...	1.35	7,000....	1.92
1,200.....	1.06	2,750...	1.41	7,500....	1.96
1,300.....	1.09	3,000...	1.45		

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TABLE XXVI.--Recommended shaft fits for general use

Bearing bore			Rotating shaft				Stationary shaft			
			Shaft diameter		Resulting fit		Shaft diameter		Resulting fit	
Metric, mm.	Inches	Tolerance +0.0000	Nominal		Theoretical shaft-fit		Nominal		Theoretical shaft-fit	
		Minus	Plus		Max. loose	Max. tight	Minus		Max. loose	Max. tight
		Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch
4	0.1575	0.0003	0.0002	-0.0001	0.0000	0.0005	0.0002	0.0005	0.0005	0.0001
5	.1969	.0003	.0002	-.0001	.0000	.0005	.0002	.0005	.0005	.0001
6	.2362	.0003	.0002	-.0001	.0000	.0005	.0002	.0005	.0005	.0001
7	.2756	.0003	.0002	-.0001	.0000	.0005	.0002	.0006	.0006	.0001
8	.3150	.0003	.0002	-.0001	.0000	.0005	.0002	.0006	.0006	.0001
9	.3543	.0003	.0002	-.0001	.0000	.0005	.0002	.0006	.0006	.0001
10	.3937	.0003	.0002	-.0001	.0000	.0005	.0002	.0006	.0006	.0001
12	.4724	.0003	.0002	-.0001	.0001	.0005	.0002	.0007	.0007	.0001
15	.5906	.0003	.0002	-.0001	.0001	.0005	.0002	.0007	.0007	.0001
17	.6693	.0003	.0002	-.0001	.0001	.0005	.0002	.0007	.0007	.0001
20	.7874	.0004	.0004	+.0001	.0001	.0008	.0003	.0008	.0008	.0001
25	.9843	.0004	.0004	+.0001	.0001	.0008	.0003	.0008	.0008	.0001
30	1.1811	.0004	.0004	+.0001	.0001	.0008	.0003	.0008	.0008	.0001
35	1,3780	.0005	.0005	+.0001	.0001	.0010	.0004	.0010	.0010	.0001
40	1,5748	.0005	.0005	+.0001	.0001	.0010	.0004	.0010	.0010	.0001
45	1,7717	.0005	.0005	+.0001	.0001	.0010	.0004	.0010	.0010	.0001
50	1,9685	.0005	.0005	+.0001	.0001	.0010	.0004	.0010	.0010	.0001
55	2,1654	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
60	2,3622	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
65	2,5591	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
70	2,7559	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
75	2,9528	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
80	3,1496	.0006	.0006	+.0001	.0001	.0012	.0005	.0011	.0011	.0002
85	3,3465	.0008	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
90	3,5433	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
95	3,7402	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
100	3,9370	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
105	4,1339	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
110	4,3307	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
120	4,7244	.0005	.0007	+.0001	.0001	.0015	.0005	.0013	.0013	.0003
130	5,1181	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
140	5,5118	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
150	5,9055	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
160	6,2992	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
170	6,6929	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
180	7,0866	.0010	.0008	+.0001	.0001	.0018	.0006	.0015	.0015	.0004
190	7,4803	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
200	7,8740	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
210	8,2677	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
220	8,6614	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
230	9,0551	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
240	9,4488	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
260	10,2362	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006

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280	11,0236	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006
300	11,8110	.0012	.0010	+.0002	.0002	.0022	.0006	.0017	.0017	.0006

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TABLE XXVII.--Minimum shall shoulder limits[1]

Bearing bore		Shaft fillet radius (inches)											
		0.024	0.039	0.047	0.059	0.063	0.079	0.094	0.098	0.109	0.118	0.125	0.158
Mm.	Inch	Minimum shoulder diameter (inches)											
10		0.55											
12		.62	0.66										
15		.74	.80										
17			.87										
20			1.02										
25		1.18	1.22										
	1.000			1.25									
30			1.42										
	1.250			1.50									
	1.375				1.69	1.73							
35			1.62		1.73								
40			1.81		1.94								
45			2.08		2.13								
	1.875					2.25	0						
50			2.21		2.28		2.36						
	2.000			2.38			2.44						
55			2.40		2.52		2.56						
	2.2500			2.44									
60			2.60		2.73		2.76						
	2.3750			2.56									
65			2.80		2.91		3.03						
	2.6250			2.81									
	2.7500			0		3.11							
70			3.03		3.19		3.23						
	2.8750			3.38									
75			3.23		3.31		3.43						
	3.0000			3.19		3.50	3.56						
	3.1250			3.31									
80			3.43				3.62						
	3.2500			3.44						3.81			
85			3.62				3.85		3.90				
	3.3750									3.94			
	3.5000							3.94					
90					3.90		4.05		4.09				
	3.6250					3.88							
95					4.10		4.21		4.29				
	3.7500					4.00		4.25					
	3.8750					4.25							
100					4.29		4.41		4.49				
	4.0000					4.38		4.50		4.56			
	4.1250					4.50							
105							4.61		4.69				
	4.2500					4.63		4.75		4.88			
110							4.80		4.81				
	4.5000							5.00		5.13			
120							5.20		5.28				
	4.7500									5.38			
	5.0000							5.56				5.75	

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TABLE XXVII.--Minimum shaft shoulder limits[1]--(Continued)

Bearing bore		Shaft fillet radius (inches)											
		0.024	0.039	0.047	0.059	0.063	0.079	0.094	0.098	0.109	0.118	0.125	0.158
Mm.	Inch	Minimum shoulder diameter (inches)											
130							5.51		5.67		5.83		
	5.3750							5.75					
	5.5000							5.88					
140							5.91		6.06		6.22		
150							6.25		6.46		6.61		
	6.0000							6.38					
160							6.77		6.85		7.01		
	6.5000											7.25	
170							7.17			5.38	7.40		
180							7.56		7.64		7.80	8.00	
190							7.95		8.03		8.19		8.35
200							8.35		8.43		8.58		8.75
	8.0000											8.69	
	8.2500											8.69	
220							9.21		9.37		9.37		9.53
240									9.88		10.00		
	9.5000											10.00	
	10.0000											10.50	
260											10.95		11.10
	10.5000											11.00	
280											11.73		11.89
300											12.52		12.68
	12.0000											12.63	
320											13.31		13.47

[1] The maximum shaft shoulder shall not interfere with the removal of the bearing by applying pressure against the bearing inner ring.

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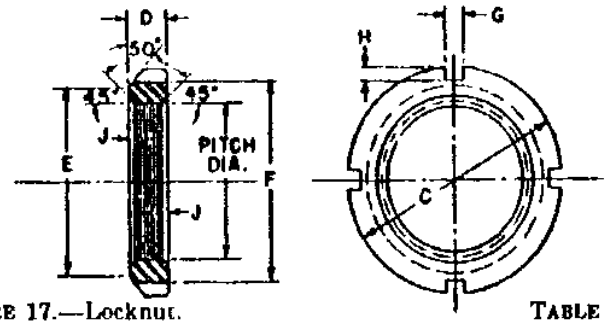

FIGURE 17.—Locknut.

TABLE XXVIII.—*Locknut*

	Bearing bore	Threads per inch	C +0.005 −0.015	D	E	F +0.010 −0.005	G	H +0.010 −0.010	J	Lock nut dimensions (inches): Minor diameter, Minimum	Minor diameter, Maximum	Thread pitch diameter, Minimum	Thread pitch diameter, Maximum	Major diameter
999-50000-0000	0.3937	32	5/8	1/16	5/8	5/8	+0.005 −0.005 3/16	1/16	1/8	0.3572	0.3606	0.3707	0.3733	0.391
999-50001-0000	.4721	32	3/4	1/16	3/4	3/4	3/16	1/16	1/8	.4352	.4386	.4487	.4513	.469
999-50002-0000	.5906	32	1	1/16	1 1/16	1 1/16	3/16	1/16	1/8	.5522	.5556	.5657	.5687	.588
999-50003-0000	.6693	32	1 1/8	1/16	1 1/16	1 1/16	3/16	1/16	1/8	.6302	.6336	.6437	.6467	.684
999-50004-0000	.7874	32	1 5/8	3/16	1 3/8	1 5/8	3/16	3/16	1/8	.7472	.7506	.7607	.7641	.781
999-50005-0000	.9843	32	1 7/8	3/16	1 5/8	1 7/8	3/16	3/16	1/8	.9352	.9386	.9487	.9521	.969
999-50006-0000	1.1811	18	1 3/4	3/16	+0.000 −0.020 1 3/4	1 7/8	3/16	3/16	1/8	1.1129	1.1189	1.1309	1.1409	1.173
999-50007-0000	1.3780	18	2 1/8	1/8	1 15/16	1 3/8	3/16	1/8	1/8	1.3158	1.3219	1.3339	1.3439	1.378
999-50008-0000	1.5748	18	2 1/4	1/8	2	2 1/8	1/4	1/8	1/8	1.5029	1.5089	1.5269	1.5314	1.563
999-50009-0000	1.7717	18	2 1/2	1/8	2 1/8	2 1/8	+0.010 −0.010 1/4	1/8	1/8	1.7068	1.7128	1.7308	1.7354	1.767
999-50010-0000	1.9685	18	2 1/2	+0.010 −0.010 1/4	2 1/4	2 1/4	1/4	1/8	1/8	1.9068	1.9129	1.9309	1.9354	1.967
999-50011-0000	2.1654	18	2 3/4	1/4	2 1/2	2 1/2	1/4	1/8	1/8	2.0999	2.1059	2.1209	2.1260	2.157
999-50012-0000	2.3622	18	3 1/8	1/4	2 3/4	2 3/4	1/4	1/8	1/8	2.2999	2.3059	2.3239	2.3290	2.360
999-50013-0000	2.5591	18	3 3/8	1/4	3 1/8	3 1/8	1/4	1/8	1/8	2.4879	2.4939	2.5119	2.5170	2.548
999-50014-0000	2.7559	18	3 1/2	1/4	3 1/8	3 1/8	1/4	1/8	1/8	2.6906	2.6960	2.7140	2.7200	2.751
999-50015-0000	2.9528	12	3 3/4	5/16	3 1/8	3 1/8	1/4	1/8	1/8	2.8428	2.8518	2.8789	2.8843	2.933
999-50016-0000	3.1496	12	4 1/8	5/16	3 1/4	3 1/4	1/4	1/8	1/8	3.0468	3.0558	3.0829	3.0885	3.137
999-50017-0000	3.3465	12	4 3/8	5/16	4 1/8	4 1/8	1/4	1/8	1/8	3.2498	3.2588	3.2859	3.2933	3.340
999-50018-0000	3.5433	12	4 5/8	5/16	4 1/8	4 1/8	1/4	1/8	1/8	3.4368	3.4458	3.4729	3.4803	3.527
999-50019-0000	3.7402	12	4 7/8	5/16	4 1/8	4 1/8	1/4	1/8	1/8	3.6398	3.6488	3.6759	3.6833	3.730
999-50020-0000	3.9370	12	5 1/8	3/8	+0.000 −0.030 4 3/8	4 3/8	1/4	1/8	1/8	3.8278	3.8368	3.8639	3.8713	3.918
999-50021-0000	4.1339	12	5 3/8	3/8	5	5 1/8	1/4	1/8	1/8	4.0318	4.0408	4.0679	4.0762	4.122
999-50022-0000	4.3307	12	5 5/8	3/8	5 1/8	5 1/8	1/4	1/8	1/8	4.2348	4.2438	4.2709	4.2792	4.325
999-50024-0000	4.7244	12	6 1/8	3/8	5 1/8	5 1/8	1/4	1/8	1/8	4.6258	4.6348	4.6619	4.6702	4.716
999-50026-0000	5.1181	12	6 3/4	3/8	6 1/8	6 1/8	1/4	1/8	1/8	5.0158	5.0248	5.0519	5.0602	5.106
999-50028-0000 999-50128-0000	5.5118	12	7 1/8	5/16 1/4	6 1/8	6 1/8	3/16	1/8	1/8	5.4068	5.4158	5.4429	5.4512	5.497
999-50030-0000 999-50130-0000	5.9055	12	7 1/8	11/16 1/2	7 1/8	7 1/8	+0.010 −0.015 3/16	1/8	1/8	5.7978	5.8068	5.8339	5.8422	5.888
999-50032-0000 999-50132-0000	6.2992	8	8 1/8	+0.010 −0.015 11/16 1 1/2	7 1/8	7 1/8	1/8	1/8	1/8	6.1487	6.1622	6.2028	6.2119 6.2142	6.284
999-50034-0000 999-50134-0000	6.6929	8	8 1/8	11/16 1 1/16	8 1/8	8 1/8	1/8	1/8	1/8	6.5237	6.5372	6.5778	6.5869 6.5892	6.659
999-50036-0000 999-50136-0000	7.0866	8	9 1/8	11/16 1 1/16	+0.000 −0.040 8 1/8	8 1/8	1/4	1/8	1/8	6.9307	6.9442	6.9848	6.9939 6.9962	7.066
999-50038-0000 999-50138-0000	7.4803	8	9 1/8	11/16 1 1/16	8 1/8	8 1/8	1/4	1/8	1/8	7.3367	7.3502	7.3908	7.3999 7.4022	7.472
999-50040-0000 999-50140-0000	7.8740	8	9 1/8	11/16 1 1/16	9 1/8	9 1/8	1/4	1/8	1/8	7.7117	7.7252	7.7658	7.7772	7.847

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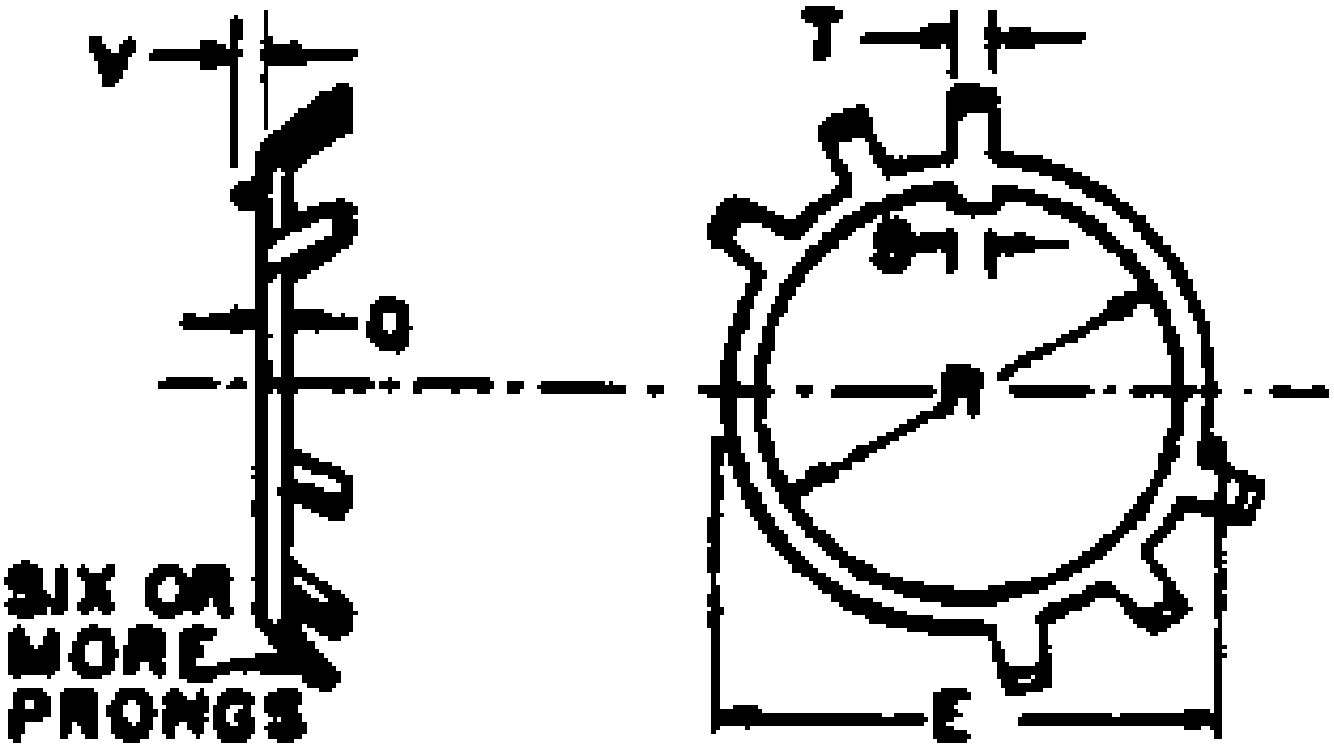

FIGURE 18.—Lock washer.

TABLE XXIX.—*Lock washer*

TABLE XXIX.--Lock washer

Military standard code	Washer bore, R (minimum)	E	Locker washer dimensions (inches)			
			Washer key		Tangent width T(min.)	Thick-ness, Q
			Width S(min.)	Projection V(min.)		
999-51000-0000.....	0.406	0.625	0.110	1/16	0.108	0.042
999-51001-0000.....	.484	.718	.110	1/16	.108	.042
999-51002-0000.....	.601	.813	.110	1/16	.108	.042
999-51003-0000.....	.679	.938	.110	1/16	.108	.042
999-51004-0000.....	.801	1.125	.156	1/16	.146	.042
999-51005-0000.....	.989	1.281	.156	3/22	.146	.050
999-51006-0000.....	1.193	1.500	.156	3/22	.146	.050
999-51007-0000.....	1.396	1.813	.156	3/22	.146	.050
999-51008-0000.....	1.583	2.000	.250	3/22	.204	.058
999-51009-0000.....	1.792	2.281	.250	1/8	.204	.058
999-51010-0000.....	1.992	2.438	.250	1/8	.204	.058
999-51011-0000.....	2.182	2.656	.250	1/8	.204	.063
999-51012-0000.....	2.400	2.844	.250	1/8	.204	.063
999-51013-0000.....	2.588	3.063	.250	1/8	.204	.063

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999-51014-0000.....	2.791	3.313	.250	3/16	.204	.063
999-51015-0000.....	2.973	3.563	.250	3/16	.298	.072
999-51016-0000.....	3.177	3.844	.313	3/16	.298	.072
999-51017-0000.....	3.395	4.032	.313	3/16	.298	.072
999-51018-0000.....	3.582	4.283	.313	3/16	.298	.094
999-51019-0000.....	3.800	4.563	.313	3/16	.298	.094
999-51020-0000.....	3.988	4.813	.313	1/4	.298	.094
999-51021-0000.....	4.194	5.000	.313	1/4	.360	.094
999-51022-0000.....	4.395	5.283	.313	1/4	.360	.125
999-51024-0000.....	4.801	5.688	.313	1/4	.360	.125
999-51026-0000.....	5.191	6.188	.375	1/4	.480	.125
999-51028-0000.....	5.582	6.531	.500	1/4	.480	.125
999-51128-0000.....						
999-51030-0000.....	5.983	7.063	.500	5/16	.480	.156
999-51130-0000.....						
999-51032-0000.....	6.389	7.438	.500	5/16	.480	.156
999-51132-0000.....						
999-51034-0000.....	6.764	8.031	.625	5/16	.605	.156
999-51134-0000.....						
999-51036-0000.....	7.171	8.376	.625	5/16	.605	.156
999-51136-0000.....						
999-51038-0000.....	7.577	8.781	.625	5/16	.605	.156
999-51138-0000.....						
999-51040-0000.....	7.577	8.781	.625	5/16	.605	.156
999-51140-0000.....						

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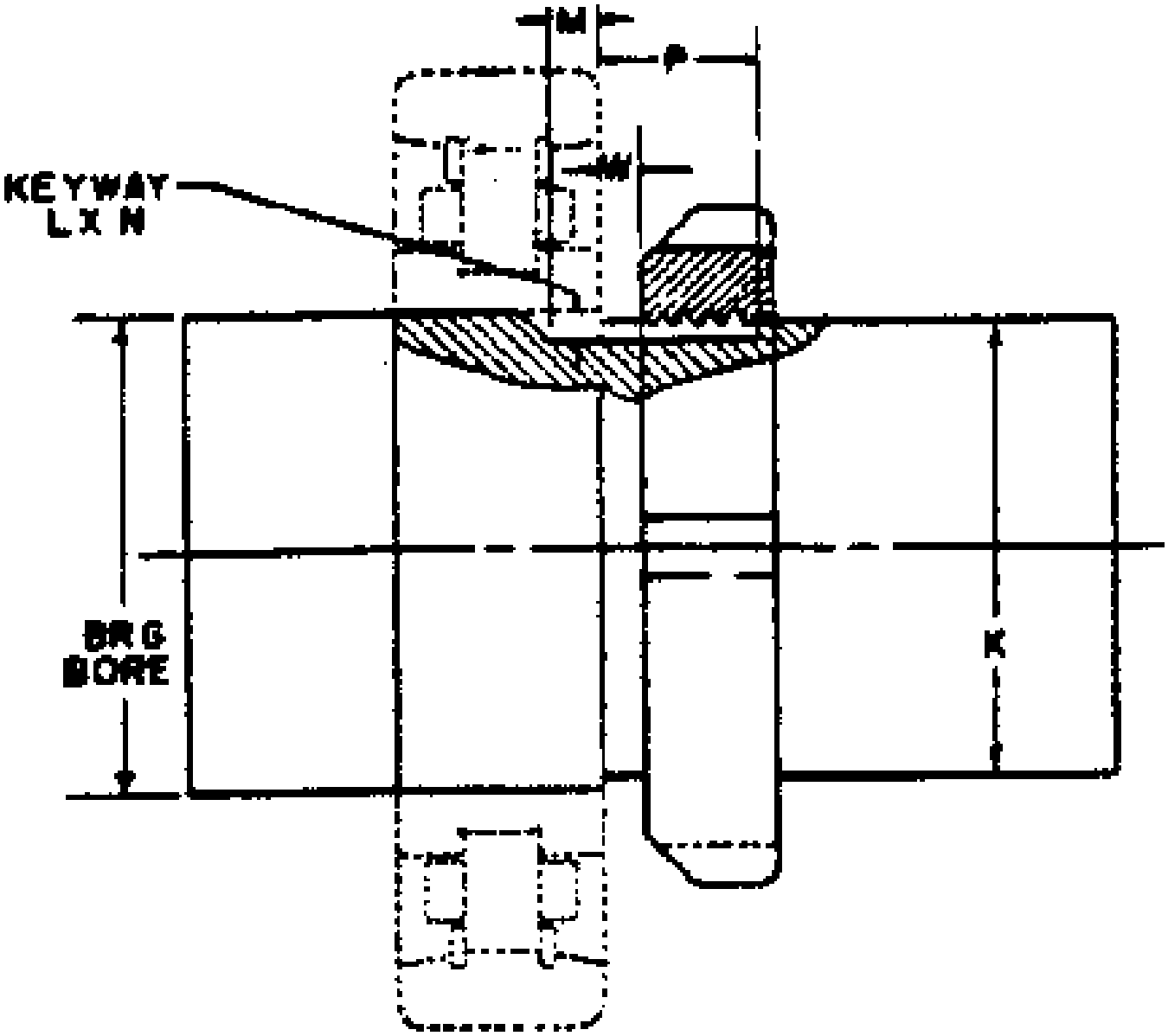

FIGURE 19.—Assembly.

TABLE XXX.—*Assembly*

TABLE XXX.--Assembly

Shaft dimensions (inches)						
K	Keyway	Thread relief W	Thread relief P	Major diameter	Thread pitch diameter	Minor diameter

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(maximum)	Depth L	Width N	Length M			Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	(max.)
5/14.....	1/16	1/8	3/22	1/16	2/32	0.391	0.3856	0.3707	0.3681	0.3527
15/32....	1/16	1/8	3/22	1/16	3/8	.469	.4636	.4487	.4461	.4307
1/2.....	5/64	1/8	3/22	1/16	3/8	.586	.5806	.5657	.5627	.5477
2/14.....	5/64	1/8	3/22	1/16	15/32	.664	.6586	.6437	.6407	.6257
22/32....	5/64	3/16	3/22	1/16	7/14	.781	.7756	.7607	.7573	.7427
7/8.....	3/32	3/16	1/8	1/16	15/32	.969	.9636	.9487	.9453	.9307
1 1/16...	3/32	3/16	1/8	1/8	15/32	1.173	1.1648	1.1369	1.1329	1.1048
1 1/4....	3/32	3/16	1/8	1/8	1/2	1.376	1.3678	1.3399	1.3359	1.3078
1 15/32..	3/32	5/16	1/8	1/8	17/32	1.563	1.5548	1.5269	1.5224	1.4948
1 11/32..	3/32	5/16	5/32	1/8	17/32	1.767	1.7588	1.7309	1.7264	1.6988
1 7/8....	3/32	5/16	5/32	1/8	19/32	1.967	1.9588	1.9309	1.9264	1.8998
2 1/16...	1/8	5/16	5/32	1/8	19/32	2.157	2.1488	2.1209	2.1158	2.0888
2 1/4....	1/8	5/16	5/32	1/8	5/8	2.360	2.3518	2.3239	2.3188	2.2918
2 7/16...	1/8	5/16	5/32	1/8	21/32	2.548	2.5398	2.5119	2.5068	2.4798
2 5/8....	1/8	5/16	1/4	1/8	21/32	2.751	2.7428	2.7149	2.7098	2.6828
2 25/32..	1/8	5/16	1/4	5/32	11/16	2.933	2.9218	2.8789	2.8735	2.8308
3.....	1/8	3/8	1/4	5/32	11/16	3.137	3.1258	3.0829	3.0770	3.0348
3 3/16...	1/8	3/8	1/4	5/32	23/32	3.340	3.3288	3.2859	3.2785	3.2378
3 3/8....	5/32	3/8	1/4	5/32	13/16	3.527	3.5158	3.4729	3.4655	3.4248
3 9/16...	5/32	3/8	1/4	5/32	27/32	3.730	3.7188	3.6759	3.6685	3.6278
3 25/32..	5/32	3/8	5/16	5/32	7/8	3.918	3.9068	3.8639	3.8565	3.8158
3 15/16..	5/32	3/8	5/16	5/32	7/8	4.122	4.1108	4.0679	4.0596	4.0198
4 1/16...	3/16	3/8	5/16	5/32	29/32	4.325	4.3138	4.2709	4.2626	4.2228
4 9/16...	3/16	3/8	5/16	5/32	15/16	4.716	4.7048	4.6619	4.6536	4.6138
4 15/16..	3/16	1/2	5/16	5/32	1	5.106	5.0948	5.0519	5.0436	5.0038

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TABLE XXX.--Assembly.--Continued)

Shaft dimensions (inches)										
K (maximum)	Keyway			Thread relief W	Thread relief P	Major diameter		Thread pitch diameter		Minor diameter (max.)
	Depth L	Width N	Length M			Maximum	Minimum	Maximum	Minimum	
5 5/16...	3/16	3/8	3/16	5/32	1 1/16 1 15/16	5.497	5.4858	5.4429	5.4346	5.3948
5 23/32..	7/32	5/8	3/8	5/32	1 1/8 1 13/32	5.888	5.8768	5.8339	5.8256	5.7858
6 1/8....	7/32	5/8	3/8	1/4	1 13/16 1 17/16	6.284	6.2688	6.2028	6.1937 6.1914	6.1306
6 1/2....	7/32	3/4	3/8	1/4	1 7/32 1 1/2	6.659	6.6438	6.5778	6.5687 6.5664	6.5056
6 29/32..	7/32	3/4	3/8	1/4	1 1/4 1 2/16	7.066	7.0508	6.9848	6.9757 6.9734	6.9126
7 5/16...	7/32	3/4	3/8	1/4	1 9/32 1 9/16	7.472	7.4568	7.3908	7.3817 7.3794	7.3186
7 1/16...	1/32	7/8	3/8	1/4	1 11/32 1 21/32	7.847	7.8318	7.7638	7.7544	7.6936

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TABLE XXXI.--Recommended housing fits for general use

Bearing o. d.			Stationary shaft				Revolving housing			
			Housing bore		Resulting fit		Housing bore		Resulting fit	
Metric, mm.	Inches	Tolerance +0.0000	Nominal		Theoretical housing-fit		Nominal		Theoretical housing-fit	
		Minus	Plus	Minus	Max. loose	Max. tight	Plus	Minus	Max. tight	Max. loose
		Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch
16	0.6299	0.0004	0.0004	0.0000	0.0008	0.0000	0.0000	0.0007	0.0007	0.0004
19	.7480	.0005	.0005	.0000	.0009	.0000	.0000	.0008	.0008	.0004
22	.8661	.0005	.0005	.0000	.0009	.0000	.0000	.0008	.0008	.0004
24	.9449	.0005	.0005	.0000	.0009	.0000	.0000	.0008	.0008	.0004
26	1.0236	.0005	.0005	.0000	.0009	.0000	.0000	.0008	.0008	.0004
30	1.1811	.0005	.0005	.0000	.0009	.0000	.0000	.0008	.0008	.0004
32	1.2598	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
35	1.3780	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
37	1.4567	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
40	1.5748	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
42	1.6535	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
47	1.8504	.0005	.0006	.0000	.0011	.0000	.0000	.0010	.0010	.0005
52	2.0472	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
55	2.1654	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
62	2.4409	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
68	2.6772	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
72	2.8346	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
75	2.9528	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
80	3.1496	.0005	.0007	.0000	.0012	.0000	.0000	.0012	.0012	.0005
85	3.3465	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
90	3.5433	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
95	3.7402	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
100	3.9370	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
110	4.3307	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
115	4.5276	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
120	4.7244	.0006	.0009	.0000	.0015	.0000	.0000	.0014	.0014	.0006
125	4.9213	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
130	5.1181	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
140	5.5118	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
145	5.7087	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
150	5.9055	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
160	6.2992	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
150	5.9055	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
160	6.2992	.0008	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0008
170	6.6929	.0010	.0010	.0000	.0018	.0000	.0000	.0016	.0016	.0010
180	7.0866	.0010	.0010	.0000	.0020	.0000	.0000	.0016	.0016	.0010
190	7.4803	.0012	.0011	.0000	.0020	.0000	.0000	.0018	.0018	.0012
200	7.8740	.0012	.0011	.0000	.0023	.0000	.0000	.0018	.0018	.0012
210	8.2677	.0012	.0011	.0000	.0023	.0000	.0000	.0018	.0018	.0012
220	8.6614	.0012	.0011	.0000	.0023	.0000	.0000	.0018	.0018	.0012
230	9.0551	.0012	.0011	.0000	.0023	.0000	.0000	.0018	.0018	.0012
240	9.4488	.0012	.0011	.0000	.0023	.0000	.0000	.0018	.0018	.0012

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TABLE XXXI.--Recommended housing fits for general use--(Continued)

Bearing o. d.			Stationary shaft				Revolving housing			
			Housing bore		Resulting fit		Housing bore		Resulting fit	
Metric, mm.	Inches	Tolerance +0.0000	Nominal		Theoretical housing-fit		Nominal		Theoretical housing-fit	
		Minus	Plus	Minus	Max. loose	Max. tight	Plus	Minus	Max. tight	Max. loose
		Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch
260	10.2362	0.0014	0.0013	0.0000	0.0027	0.0000	0.0000	0.0020	0.0020	0.0014
265	10.4331	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
270	10.6299	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
280	11.0236	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
290	11.4173	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
300	11.8110	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
310	12.2047	.0014	.0013	.0000	.0027	.0000	.0000	.0020	.0020	.0014
320	12.5984	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
330	12.9921	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
340	12.3858	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
350	13.7795	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
360	14.1732	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
370	14.5669	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
380	14.9606	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
390	15.3543	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
400	15.7480	.0016	.0014	.0000	.0030	.0000	.0000	.0022	.0022	.0016
410	16.1417	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
420	16.5354	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
430	16.9291	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
440	17.3228	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
450	17.7165	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
460	18.1102	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
465	18.3071	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
480	18.8958	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
490	19.2895	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
500	99.6850	.0018	.0016	.0000	.0034	.0000	.0000	.0025	.0025	.0018
520	20.4704	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
530	20.8641	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
540	21.2598	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
560	22.0472	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
580	22.8326	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
590	23.2283	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
600	23.6220	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020
620	24.4074	.0020	.0018	.0000	.0038	.0000	.0000	.0027	.0027	.0020

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TABLE XXXII.--Housing shoulder limits

Outside diameter		Housing fillet radius (inches)											
		0.024	0.039	0.047	0.059	0.063	0.079	0.094	0.098	0.109	0.118	0.125	0.158
Mm.	Inch	Maximum shoulder diameter [1] (inches)											
30		1.08											
32		1.15											
35		1.24											
37		1.26	1.31										
40		1.38	1.44										
42		1.46	1.49										
47		1.65	1.67										
52			1.82		1.75								
55			1.93		1.88								
62			2.20		2.00								
	2.4995			2.25									
68			2.44		2.38								
72			2.59		2.47								
75			2.72										
	3.1243			2.56									
80			2.91		2.80								
	3.3118			3.125									
85			3.10		2.99								
	3.4993					3.18							
90			3.38		3.19		3.13						
	3.5618			3.38									
95			3.50		3.39		3.33						
	3.7493			3.58									
100			3.70		3.58		3.50						
	4.1250			3.94									
110			4.06		3.98		3.94		3.90				
	4.4993			4.31			4.13						
115			4.25		4.17		4.13						
120			4.45		4.37		4.33						
	4.7493			4.56									
125			4.65		4.57		4.53					4.50	
130			4.84		4.76		4.72						
	5.2490			4.94		4.92							
140					5.16	5.10	5.05						5.00
	5.6240					5.25							
145					5.35		5.24						
	5.7490					5.38							
150					5.55		5.43		5.38				
	5.9990					5.63							
160							5.83		5.75				
	6.4990							6.06					
170							6.22		6.13				
	6.7490							6.25					
	6.9990						6.50						
180							6.61		6.54				
	7.2490							6.75					
190							7.00		6.93				
	7.4990							7.00		6.94			
200							7.40		7.32				
	7.9990							7.50					

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TABLE XXXII.--Housing shoulder limits--(Continued)

Outside diameter		Housing fillet radius (inches)											
		0.024	0.039	0.047	0.059	0.063	0.079	0.094	0.098	0.109	0.118	0.125	0.158
Mm.	Inch	Maximum shoulder diameter [1] (inches)											
210							7.80	7.72					
215							8.00		7.91				
	8.4990									7.94			
	8.7490									8.13			
225							8.39		8.31				
	8.9990							8.44					
230							8.65		8.50		8.35		
	9.3740												
240							9.00		8.98		8.70		
	9.4990							8.94					
250							9.37		9.29		9.13		
	9.9990											9.25	
260							9.76		9.69		9.53		
	10.4990							9.88					
270							10.16		10.08		9.92		
	10.9990											10.38	
280							10.55	10.47	10.38		10.31		
290							10.95	10.87	10.71		10.71		
300								11.26	11.10		11.10		
310							11.73	11.65	11.50		11.50		
320								12.05	12.00		11.89	11.75	
	12.7490											12.98	
	12.9990											12.25	
	13.2490											12.75	
340								12.84	12.68		12.67		12.52
	13.9990											13.50	
360									13.50		13.47		13.31
370											14.00		
380											14.25		14.00
400											14.94		14.88
	15.9990											15.38	
420											15.67		15.60
440											16.46		16.38
460											17.24		17.19
480											18.03		18.00
500											18.87		18.82
540											20.39		20.00
580											21.00		21.97

[1] The minimum housing shoulder shall not interfere with the rotating elements of the bearing.

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FF-B-185
AMENDMENT--4
December 26, 1953
SUPERSEDING
Amendment--3
January 14, 1963

FEDERAL SPECIFICATION

BEARINGS, ROLLER, CYLINDRICAL; AND BEARINGS, ROLLER, SELF-ALIGNING

This amendment, which forms a part of Federal Specification FF-B-185, dated September 10, 1956, was approved by the Commissioner, Federal Supply Services, General Services Administration, for the use of all Federal agencies.

Page 3, paragraph 3.3, last sentence: Delete and substitute: "The surfaces shall be free from tool marks, chatter waves, grinding scratches, pits, rust, discoloration, soft spots, cracks, surface fractures, and other surface imperfections visible to the unaided eye, which would be detrimental to the satisfactory performance of the bearing.

Page 3, paragraph 3.4: Delete and substitute:

3.4 The rolls used in the same bearing shall be selected and graded so that the difference in maximum diameter between the largest and the smallest roller in an assembled bearing shall not exceed 0.0001 inch for roller diameters up to and including 3/8 inch; 0.00015 inch for roller diameters above 3/9 inch up to and including 1 inch; 0.0002 inch for roller diameters above 1 inch and up to and including 2 inches; and 0.00025 inch for roller diameters above 2 inches. No cylindrical roll shall show a Variation of diameter greater than 0.0001 inch when measured at different positions axially. The variation in length of rolls used in the same bearing shall not exceed 0.005 inch.

Page 6, paragraph 4.1, lines 5 and 6: Delete "4.5, 4.7" and "4.5, 4.7 and 4.8" substitute "4.5. 4.7 and 4.8".

Page 7, paragraph 4.4.2.2: Delete and substitute:

4.4.2.2 Radial runout. Radial runout shall be checked for conformance to the limits specified in table I. Radial runout shall be determined by mounting bearings on an arbor having a very slight taper (0.0001 to 0.0002 inch on the diameter per inch of length). For measuring outer ring radial runout, a calibrated (dial) indicator shall be set up against the center of the outer ring in a manner to register the runout, the arbor shall be stationary and the outer ring shall be rotated one revolution, and the difference between the minimum and maximum reading on the indicator is the outer ring radial runout. For measuring inner ring radial runout, the procedure shall be reversed, that is, the dial indicator shall be set up against the arbor, the outer ring shall be stationary, and the arbor shall be rotated one revolution to determine the inner ring radial runout. Neither the inner race runout nor the outer race runout shall exceed the maximum radial runout in table I.

Page 7, Add as paragraph 4.4.2.2.1:

4.4.2.2.1 The manufacturer shall not be required to measure radial runout as specified in 4.4..2.2, but shall be held to the tolerances of table I as measured by this method at a Government laboratory.

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Page 7, paragraph 4.5.1.1: Delete last sentence.

Page 8, paragraph 4.5.4: Delete and substitute new paragraph 4.5.4:

4.5.4 Surface finish. The sample bearing taken in accordance with 4.2.4 shall be examined to verify conformance to 3.3.

Page 8, paragraph 4.5.5.1, line 2: Delete "57 to 65" and substitute "58 to 66".

Page 8, paragraph 4.5.5.2: Delete and substitute:

4.5.5.2 Ring hardness test. The hardness of steel rings shall be determined in Rockwell testing machine with a 120 degree cone and 150-Kilogram load. Rings made of alloy steel shall show hardness values of 58 to 66 Rockwell C. The hardness of all the rings representing one lot shall not vary more than 4 points on the Rockwell C scale. Rings made of corrosion-resisting steel shall have a hardness value of not less than 55 Rockwell C.

Page 8, paragraph 4.5.6: Delete.

Page 8, paragraph 4.5.7, line 4: Delete ,"Government".

Page 9, paragraph 4.7: Delete and substitute:

"4.7 Tests at a Government laboratory."

Page 9, paragraph 4.8: Delete and substitute:

4.8 Life test. The bearings shall be subjected to a life test to determine conformance to 3.19 and to insure that bearing life, under accelerated conditions with speed and load correction applied, shall be as specified in the appendix. The test machines shall utilize a four-bearing mounted system in which all four bearings an mounted an a single arbor. The two outboard bearing shall act as pedestal bearings to oppose the load applied to the two central bearings, housed in a loading head. Lubrication shall be accomplished by supplying Military symbol 2190 TEP oil under pressure to the inner parts of the bearings. Sufficient oil shall be supplied to maintain the general outer race temperature at 150 deg. F. The test shall be continuous in nature and test machine cutoff shall be controlled by vibra-switches. Criteria for rejection shall be failure to meet the fatigue life.

Page 9: Add as paragraph 4.10:

4.10 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such Inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

Page 53, column 5, opposite "264-18023-0000": Delete "14.9696" and substitute "14.9606".

Page 57, paragraph 10.1, lines 6 and 7: Delete and substitute: "this appendix shall govern where applicable".

Page 71, Table XXVI: Delete and substitute new Table XXVI:

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Page 74, table XXVIII, column "G": Delete "--0.005" and substitute "--0.020".

Page 74, table XXVIII: Under "Minor diameter", column "Minimum": Delete "2.0999" and substitute "2.0969".

Page 75, table XXIX: In column 2, line 22, delete "4.194" and substitute "4.192", and in column 6, delete "Tangent" and substitute "'Tang".

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TABLE XXVI.—*Recommended shaft fits for general use*

Bearing bore			Rotating shaft				Stationary shaft			
			Shaft diameter		Resulting fit		Shaft diameter		Resulting fit	
Metric mm.	Inches	Tolerance +0.0000	Nominal		Theoretical shaft-fit		Nominal		Theoretical shaft-fit	
		Minus	Plus		Maximum loose	Maximum tight	Minus		Maximum loose	Maximum tight
		Inch	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
4	0.1575	0.0003	0.0002	0.0000	0.0000	0.0005	0.0002	0.0003	0.0005	0.0001
5	.1969	.0003	.0002	.0000	.0000	.0005	.0002	.0005	.0005	.0001
6	.2362	.0003	.0002	.0000	.0000	.0005	.0002	.0005	.0005	.0001
7	.2756	.0003	.0002	−.0001	−.0001	.0005	.0002	.0006	.0006	.0001
8	.3150	.0003	.0002	−.0001	−.0001	.0005	.0002	.0006	.0005	.0001
9	.3543	.0003	.0002	−.0001	−.0001	.0005	.0002	.0006	.0006	.0001
10	.3937	.0003	.0002	−.0001	−.0001	.0005	.0002	.0006	.0006	.0001
12	.4724	.0003	.0002	−.0001	−.0001	.0005	.0002	.0007	.0007	.0001
15	.5906	.0003	.0002	−.0001	−.0001	.0005	.0002	.0007	.0007	.0001
17	.6693	.0003	.0002	−.0001	−.0001	.0005	.0002	.0007	.0007	.0001
20	.7874	.0004	.0004	+.0001	+.0001	.0008	.0003	.0008	.0003	.0001
25	.9843	.0004	.0004	+.0001	+.0001	.0008	.0003	.0008	.0008	.0001
30	1.1811	.0004	.0004	+.0001	+.0001	.0008	.0003	.0008	.0008	.0001
35	1.3780	.0005	.0005	+.0001	+.0001	.0010	.0004	.0010	.0010	.0001
40	1.5748	.0005	.0005	+.0001	+.0001	.0010	.0004	.0010	.0010	.0001
45	1.7717	.0005	.0005	+.0001	+.0001	.0010	.0004	.0010	.0010	.0001
50	1.9685	.0005	.0005	+.0001	+.0001	.0010	.0004	.0010	.0010	.0001
55	2.1654	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
60	2.3622	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
65	2.5591	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
70	2.7559	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
75	2.9528	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
80	3.1496	.0006	.0006	+.0001	+.0001	.0012	.0004	.0011	.0011	.0002
85	3.3465	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003
90	3.5433	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003

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TABLE XXVI.—*Recommended shaft fits for general use* (Cont'd)

Bearing bore			Rotating shaft				Stationary shaft			
			Shaft diameter		Resulting fit		Shaft diameter		Resulting fit	
Metric mm.	Inches	Tolerance +0.0000	Nominal		Theoretical shaft-fit		Nominal		Theoretical shaft-fit	
		Minus	Plus		Maximum loose	Maximum tight	Minus		Maximum loose	Maximum tight
		Inch	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
95	3.7402	0.0008	0.0007	+0.0001	+0.0001	0.0015	0.0005	0.0013	0.0013	0.0003
100	3.9370	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003
105	4.1339	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003
110	4.3307	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003
120	4.7244	.0008	.0007	+.0001	+.0001	.0015	.0005	.0013	.0013	.0003
130	5.1181	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
140	5.5118	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
150	5.9055	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
160	6.2992	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
170	6.6929	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
180	7.0866	.0010	.0008	+.0001	+.0001	.0018	.0006	.0015	.0015	.0001
190	7.4803	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
200	7.8740	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
210	8.2677	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
220	8.6614	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
230	9.0551	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
240	9.4488	.0012	.0010	+.0002	+.0002	.0022	.0006	.0017	.0017	.0006
260	10.2362	.0014	.0011	+.0002	+.0002	.0025	.0007	.0019	.0019	.0007
280	11.0236	.0014	.0011	+.0002	+.0002	.0025	.0007	.0019	.0019	.0007
300	11.8110	.0014	.0011	+.0002	+.0002	.0025	.0007	.0019	.0019	.0007

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Page 78, table XXXI: In column 3, line 2 through 6, delete ".0005" and substitute ".0004", and opposite metric "160" in column 3, delete ".0008" and substitute ".0010"; in column 6, delete ".0018" and substitute ".0020"; and in column 11, delete ".0008" and substitute ".0010".

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