

INCH-POUND

MIL-DTL-39000C  
8 January 2013  
SUPERSEDING  
MIL-DTL-39000B  
3 October 2003

## DETAIL SPECIFICATION

FLANGES, WAVEGUIDE, RIDGE,  
GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

This specification is inactive for new design after 8 May 1998.

## 1. SCOPE

1.1 Scope. This specification covers the general requirements for ridge-waveguide flanges that are used to couple mechanically and electrically two sections of ridge-waveguides or ridge-waveguide units ([see 6.1](#)).

1.2 Part or identifying number (PIN). This specification requires a PIN that is as described in the appropriate reference to specification sheets ([see 3.1](#)).

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## FEDERAL SPECIFICATIONS

- [FF-N-836](#) - Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding and Single Ball Seat.
- [FF-S-85](#) - Screw, Cap, Slotted and Hexagon Head.
- [FF-S-86](#) - Screw, Cap, Socket-Head.
- [FF-W-84](#) - Washers, Lock (Spring).

## FEDERAL STANDARDS

- [FED-STD-H28](#) - Screw Thread Standards for Federal Services.

Comments, suggestions or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, or emailed to [Tubesamps@dla.mil](mailto:Tubesamps@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

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## COMMERCIAL ITEM DESCRIPTIONS

[A-A-59588](#) - Rubber, Silicone.

## DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-DTL-39000/3](#) - Flanges, Waveguide, Double Ridge, Socket Mount (Bandwidth Ratio 2.4:1)

## DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-202](#) - Electronic and Electrical Component Parts.  
[MIL-STD-1285](#) - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <https://assist.dla.mil/quicksearch> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

[ASTM-B16/B16M](#) - Rod, Brass, Free-Cutting, Bar and Shapes for use in Screw Machines.  
[ASTM-B21/B21M](#) - Rod, Bar, and Shapes, Naval Brass.  
[ASTM-B26/B26M](#) - Aluminum-Alloy Sand Castings.  
[ASTM-B85/B85M](#) - Aluminum-Alloy Die Castings.  
[ASTM-B108/B108M](#) - Aluminum-Alloy Permanent Mold Castings.  
[ASTM-B124/B124M](#) - Copper and Copper Alloy Forging Rod, Bar, And Shapes.  
[ASTM-B140/B140M](#) - Copper- Zinc-Lead (Red Brass or Hardware Bronze) Rod, Bars, and Shapes  
[ASTM-B143](#) - Tin Bronze and Leaded Tin Bronze Sand Castings.  
[ASTM-B221](#) - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

(Copies are available online at <http://www.astm.org> or from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) INTERNATIONAL

[ASME-B46.1](#) - Surface Texture (Surface Roughness, Waviness and Lay).  
[ASME-Y14.5.1M](#) - Principles, Dimensioning And Tolerancing, Mathematical Definition Of.

(Copies are available online at <http://www.asme.org> or from ASME International, Three Park Avenue, New York, NY 10016-5990.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.2 Material. The material shall be as specified ([see 3.1](#)). Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

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3.2.1 Copper alloys.

3.2.1.1 Bar stock. When fabricated from bar stock, flanges shall be of leaded red brass, naval brass, or free-cutting brass.

3.2.1.1.1 Leaded red brass. Composition of material for leaded red brass shall conform to the requirements for alloy B, half-hard, of [ASTM-B140/B140M](#).

3.2.1.1.2 Naval brass. Naval brass shall be of the composition for alloy A or C, half-hard, of [ASTM-B21/B21M](#).

3.2.1.1.3 Free-cutting brass. Free-cutting brass shall conform to the chemical composition requirements of [ASTM-B16/B16M](#), half-hard.

3.2.1.2 Casting. When fabricated by casting, flanges shall be of tin bronze conforming to the composition for alloy 1A or 1B of [ASTM-B143](#).

3.2.1.3 Forging. When fabricated by forging, flanges shall be of leaded brass conforming to composition for alloy 2 of [ASTM-B124/B124M](#), or naval brass conforming to composition for alloy A, half-hard, of [ASTM-B21/B21M](#), or free-cutting brass conforming to composition of [ASTM-B16/B16M](#), half-hard.

3.2.2 Aluminum alloys.

3.2.2.1 Bar stock and forging. When fabricated from bar stock or by forging, flanges shall be of an aluminum alloy conforming to alloy 6061 of [ASTM-B221](#). Bar stock shall be temper T6.

3.2.2.2 Sand casting. When fabricated by sand casting, flanges shall be of an aluminum alloy conforming to alloy C4A, condition T4; alloy CS43A, condition F; alloy SG70A, condition T6; or alloy ZG6LA, condition T5, of [ASTM-B26/B26M](#).

3.2.2.3 Die casting. When fabricated by die casting, flanges shall be of an aluminum alloy conforming to the composition for alloy G8A or SG100A of [ASTM-B85/B85M](#).

3.2.2.4 Permanent mold casting. When fabricated by permanent mold casting, flanges shall be of an aluminum alloy conforming to alloy ZC60A, condition T5; alloy SG70A, condition T6; or alloy SC51A, condition T6, of Publication [ASTM-B108/B108M](#).

3.2.3 Silicone rubber. When gaskets are required for use with individual types of flanges ([see 3.1](#)), the material shall be silicone rubber conforming to [A-A-59588](#), class 2b.

3.2.4 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of flange components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass ([see 6.5](#)).

3.3 Design and construction. Waveguide flanges shall be of the design, construction, and physical dimensions specified ([see 3.1](#)). Dimensions and tolerances shall be interpreted in accordance with [ASME-Y14.5.1M](#).

3.3.1 Condition. Flanges shall be annealed before finish machining, when specified ([see 6.2](#)).

3.3.2 Threaded parts. All threaded parts shall be in accordance with [FED-STD-H28](#).

3.3.3 Cap screws. Cap screws shall be type II, style 10P, grade 8, alloy steel, cadmium plated, in accordance with [FF-S-85](#) or type VI, alloy steel, cadmium plated, in accordance with [FF-S-86](#), whichever is applicable ([see 3.1](#)).

3.3.4 Hexagon nuts. Hexagon nuts shall be type II, style 4, carbon steel, cadmium plated in accordance with [FF-N-836](#).

3.3.5 Lock washers. Lock washers shall be class A, style 2, cadmium plated in accordance with [FF-W-84](#).

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3.4 Surface roughness. When measured as specified in 4.6.2, flange surface roughness (in root mean square microinches) shall not exceed the value specified (see 3.1).

3.5 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.6 Marking. Waveguide flanges shall be marked in accordance with MIL-STD-1285, with the PIN and the manufacturer's source code. The numbers shall be marked in depressed or raised characters in proportion to the size of the flange and at least .031 inch high, in the place specified (see 3.1).

3.7 Workmanship. Waveguide flanges shall be produced in such a manner as to be uniform in quality and all surfaces shall be free from burrs, die marks, chatter marks, scratches, dirt, grease, scale, splinters and other defects that will affect life, serviceability, or appearance.

## 4. VERIFICATION

4.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the contractor.

4.2 Classification of inspections. The inspections specified herein are classified as follows:

- a. Materials inspection (see 4.3).
- b. Conformance inspections (see 4.5).

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials listed in table I, used in fabricating the waveguide flanges, are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

4.4 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.5 Conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of all waveguide flanges of the same PIN produced under essentially the same conditions, and offered for inspection at one time.

TABLE I. Materials inspection.

Material	Requirement paragraph	Applicable specification
Copper alloys:	3.2.1	
Bar stock:	3.2.1.1	
Leaded red brass	3.2.1.1.1	ASTM-B140/B140M
Naval brass	3.2.1.1.2	ASTM-B21/B21M
Free-cutting brass	3.2.1.1.3	ASTM-B16/B16M
Casting (tin bronze)	3.2.1.2	ASTM-B143
Forging:		
Leaded brass	3.2.1.3	ASTM-B124/B124M
Naval brass	3.2.1.3	ASTM-B21/B21M
Free-cutting brass	3.2.1.3	ASTM-B16/B16M
Aluminum alloys:	3.2.2	
Bar stock and forging	3.2.2.1	ASTM-B221
Sand casting	3.2.2.2	ASTM-B26/B26M
Die casting	3.2.2.3	ASTM-B85/B85M
Permanent mold casting	3.2.2.4	ASTM-B108/B108M
Silicone rubber	3.2.3	A-A-59588

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4.5.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in [table II](#), in the order shown.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph
Visual and mechanical inspection	<a href="#">3.1</a> , <a href="#">3.3</a> thru <a href="#">3.3.5</a> , <a href="#">3.5</a> and <a href="#">3.6</a>	<a href="#">4.6.1</a>
Surface roughness	<a href="#">3.4</a>	<a href="#">4.6.2</a>

4.5.1.2.1 Sampling plan. Statistical sampling and inspection shall be performed on an inspection lot basis with a random sample of waveguide flanges selected in accordance with [table III](#). No failures shall be allowed.

TABLE III. Group A Sampling Plan.

Lot size	Sample size
1- 13	100 percent
14- 150	13
151- 280	20
281- 500	29
501- 1,200	34
1,201- 3,200	42
3,201-10,000	50
10,001-75,000	60

4.5.1.2.2 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for re-inspection. Such lots shall be separate from new lots, and shall be clearly identified as re-inspected lots.

#### 4.6 Methods of inspection.

4.6.1 Visual and mechanical inspection. Waveguide flanges and associated components shall be examined to verify that the design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see [3.1](#), [3.3](#) through [3.3.5](#), [3.6](#) and [3.7](#)).

4.6.2 Surface roughness. Surface roughness shall be determined in accordance with [ASME-B46.1](#) (see [3.4](#)).

### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see [6.2](#)). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

### 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Waveguide flanges covered by this specification are intended for use as coupling devices for waveguides and waveguide components used in military electronic equipment and systems.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. The specific issue of individual documents referenced ([see 2.2](#)).
- c. Whether flanges are to be annealed before finish machining ([see 3.3.1](#)).
- d. Packaging requirements ([see 5.1](#)).

6.3 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website at <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the list of 31 priority chemicals are cadmium, lead, and mercury. Use of the materials on the list should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

6.4 Subject term (keyword) listing.

alloys  
casting  
coupling  
forging

6.5 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers ([see 3.2.4](#)). For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.6 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Army - CR  
Navy - EC  
Air Force - 85  
DLA - CC

Preparing activity:  
DLA - CC

(Project 5985-2013-005)

Review activities:  
Army - AR, AV, MI  
Navy - AS, MC, OS, SH  
Air Force - 19

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.