INCH-POUND
MIL-F-24704A(SH)
23 March 1992
SUPERSEDING
MIL-F-24704(SH)
30 November 1988
(See 6.5)

MILITARY SPECIFICATION

FLANGES, FOUR BOLT SQUARE, HYDRAULIC GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirement for a 4-bolt, square flange for use in 3000 pounds per square inch (lb/in^2) hydraulic systems.

1.2 Classification. Flanges are designated by part identification number, as specified on the applicable specification sheet (see 6.2).

1.2.1 Material requirement. The material requirement is designated by a letter. The material is designated in the applicable specification sheet.

1.2.2 Vent requirement. The vent requirement is designated by a letter. The letter designation and location for the vent port on a given flange should be in accordance with the applicable specification sheet.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4810

SPECIFICATIONS

FEDERAL

PPP-F-320 - Fiberboard: Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

MIL-V-3 - Valves, Fittings and Flanges (Except for Systems Indicated Herein); Packaging of.
MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.
MIL-F-24704/1 - Flanges, Four Bolt Square, Socket Weld for Hydraulic Systems.
MIL-F-24704/2 - Flanges, Four Bolt Square, Butt Weld for Hydraulic Systems.
MIL-F-24704/4 - Flanges, Four Bolt Square, Blind for Hydraulic Systems.
MIL-F-24704/5 - Flanges, Four Bolt, Insert Rings for Hydraulic Systems.

STANDARDS

FEDERAL

FED-STD-151 - Metals: Test Methods.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B46.1 - Surface Texture (Surface Roughness, Waviness and Lay).

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for 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 sheet. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.2 Materials. Flanges shall be manufactured from materials designated in the applicable specification sheet.

3.2.1 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.2.2 Material composition. When specified (see 6.2), a chemical analysis shall be performed in accordance with method 111.2 of FED-STD-151 for verification of material composition. Materials not in accordance with this specification or the applicable specification sheets shall be cause for rejection.

3.3 Machining. The flange shall be machined to configuration and dimensions as specified herein and on the applicable specification sheet (see appendix).

3.4 Surface finish. Unless otherwise specified (see 6.2), surface roughness shall not exceed 125 microinches. Surface finish for sealing surface shall be in accordance with the applicable specification sheet. Machined surfaces shall have no burrs. Sharp edges and corners shall be rounded to a radius of 0.005 inch minimum. Non-machined surfaces such as forged surfaces and bar stock flats shall have no fins, cracks, or spongy areas. Surface roughness shall be identified in accordance with ANSI B46.1. The determination of surface finishes shall be made with a profilometer, comparator brush analyzer or other comparison equipment with an accuracy of plus or minus 15 percent at the level being measured. Surface finishes on sealing finish not in accordance with this specification or the applicable specification sheet shall be cause for rejection.

3.5 Identification marking. Each flange shall be clearly and permanently marked with the following information:

(a) Part identification number (see 1.2).
(b) Manufacturer's name, trademark, or logo.
(c) Manufacturer's part number (optional).
(d) Pressure rating.

3.6 Workmanship. Flanges shall be free from detrimental grooving, indentations, flaws, cracks, lamination, surface pitting, inclusion and slivers which would interfere in their use and shall be free from dirt, corrosion and other extraneous material.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Quality conformance inspection. Quality conformance inspection shall consist of the examination as specified in 4.2.2.

4.2.1 Quality conformance sampling. Sampling for quality conformance inspection shall be as specified in 4.2.1.1 through 4.2.1.3 unless otherwise specified (see 6.2).

4.2.1.1 Lot. A lot shall consist of finished flanges which are of the same material, type, size, fabricated by the same process, and produced as one continuous run or order, or part thereof, and submitted for acceptance inspection at the same time.

4.2.1.2 Sampling for examination. A random sample of flanges shall be selected from each lot and inspected in accordance with table I. The sampling plans in table II shall be utilized in accordance with the classification of defects in table I.

TABLE I. Classification of defects.

Categories	Defects	Inspection method
Major		
101	Surface finish not as specified on sealing face (see 3.4)	ANSI B46.1
102	Flange size not as specified (see 3.3)	SIE 1/
103	Sealing face not machined as specified (see 3.3)	SIE
104	Bore dimensions not as specified (see 3.3)	SIE
105	Bolt holes not located or drilled properly (see 3.3)	SIE
106	Vent location not as specified (see 3.3)	SIE
107	Material composition not as specified (see 3.2.2)	FED-STD-151 method 111.2
108	Flange style not as specified (see 3.3)	SIE
109	Indication of flaws, slivers grooving, laminations, cracks, surface pitting, or inclusions (see 3.6)	Visual
Minor		
201	Surface finish not as specified (not including sealing face) (see 3.4)	ANSI B46.1
202	Flange not properly marked (see 3.5)	Visual

1/ Standard inspection equipment (SIE).

TABLE II. Sampling plan for major and minor defects. 1/, 2/

Lot size	Sample size	Accept	Reject
1 to 13	Entire lot	0	1
14 to 150	13	0	1
151 to 280	20	0	1
281 to 500	29	0	1
501 to 1200	34	0	1
1201 to 3200	42	0	1

1/ All defective items shall be replaced with acceptable items prior to lot acceptance.
2/ Stop inspecting samples when reject criteria is reached.

4.2.1.3 Rejection. Any flange in the sample which contains 1 or more defects shall be rejected. If the number of defective flanges in any sample exceeds the acceptance number for that sample, the entire lot shall be rejected.

4.2.2 Examination. Each flange taken as specified (see 4.2.1.2) shall be examined as specified in table I to verify conformance to this specification.

4.3 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.3.)

5.1 Packaging requirements. The packaging (preservation, packing and marking) requirements of flanges shall be in accordance with MIL-V-3 for the level (A, C, or commercial) of preservation; level of packing (A, B, C, or commercial), marking, including bar coding and other packaging acquisitioning options therein as specified (see 6.2). In addition, for Navy acquisitions, the following Navy fire retardant requirements apply:

(a) Treated lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Level A and B - Type II - weather resistant.
Category 1 - general use.
Level C - Type I - non-weather resistant.
Category 1 - general use.

(b) Fiberboard. Fiberboard used in the construction of interior (unit and intermediate) and exterior fiberboard boxes including interior packaging forms shall conform to the class-domestic/fire retardant or class-weather resistant/fire retardant materials requirements, as specified (see 6.2), of PPP-F-320 and amendments thereto.

6. NOTES

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

6.1 Intended use. Flanges covered by this specification are intended for use in 3000 lb/in^2 hydraulic systems.

6.2 Acquisition requirements. Acquisition documents must specify the following:

(a) Title, number, and date of this specification.
(b) Title, number, and date of applicable specification sheet.
(c) Specification sheet part number required (see 1.2).
(d) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
(e) If material verification by analysis is required (see 3.2.2).

(f) If surface roughness measurements are other than specified (see 3.4).
(g) If quality conformance sampling is other than specified (see 4.2.1).
(h) Level of preservation, level of packing and other packaging acquisitioning options required (see 5.1).
(i) When fire retardant treated materials are required (see 5.1 (a) and (b)).

6.3 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 Subject term (key word) listing.

Flange, right angle
Flange, straight
Flange style, pipe
Flange style, tube

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 4810-N082)

APPENDIX

FLANGE INTERFACE AND ASSEMBLY INSTRUCTIONS

10. SCOPE

10.1 Scope. This appendix details the interface machining configuration for the 4-bolt flange and the assembly instructions. This appendix is not a mandatory part of the specification. The information contained herein is intended for guidance only.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-B-7838	- Bolt, Internal Wrenching, 160 KSI, FTU.
MIL-I-8846	- Inserts, Screw Thread, Helical Coil.
MIL-I-45932	- Inserts, Screw Thread Thin Wall, Locked In.
MIL-R-83248	- Rubber, Fluorocarbon Elastomer, High Temperature, Fluid, and Compression Set Resistant.
MIL-R-83248/1	- Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant (O-Rings, Class 1, 75 Hardness).

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

20.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC. (AIA)

NAS 1351 - Screw, Cap, Socket Head - Undrilled and Drilled, Plain and Self-Locking, Alloy Steel and Corrosion-Resisting Steel, UNRF-3A. (DoD adopted)

(Application for copies should be addressed to the Aerospace Industries Association of America, Inc., 1250 Eye Street, NW, Washington, DC 20005.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

30. INTERFACE CONNECTION

30.1 Interface connection. The interface configurations or cavities for the flanges covered by this specification are identified on figure 1.

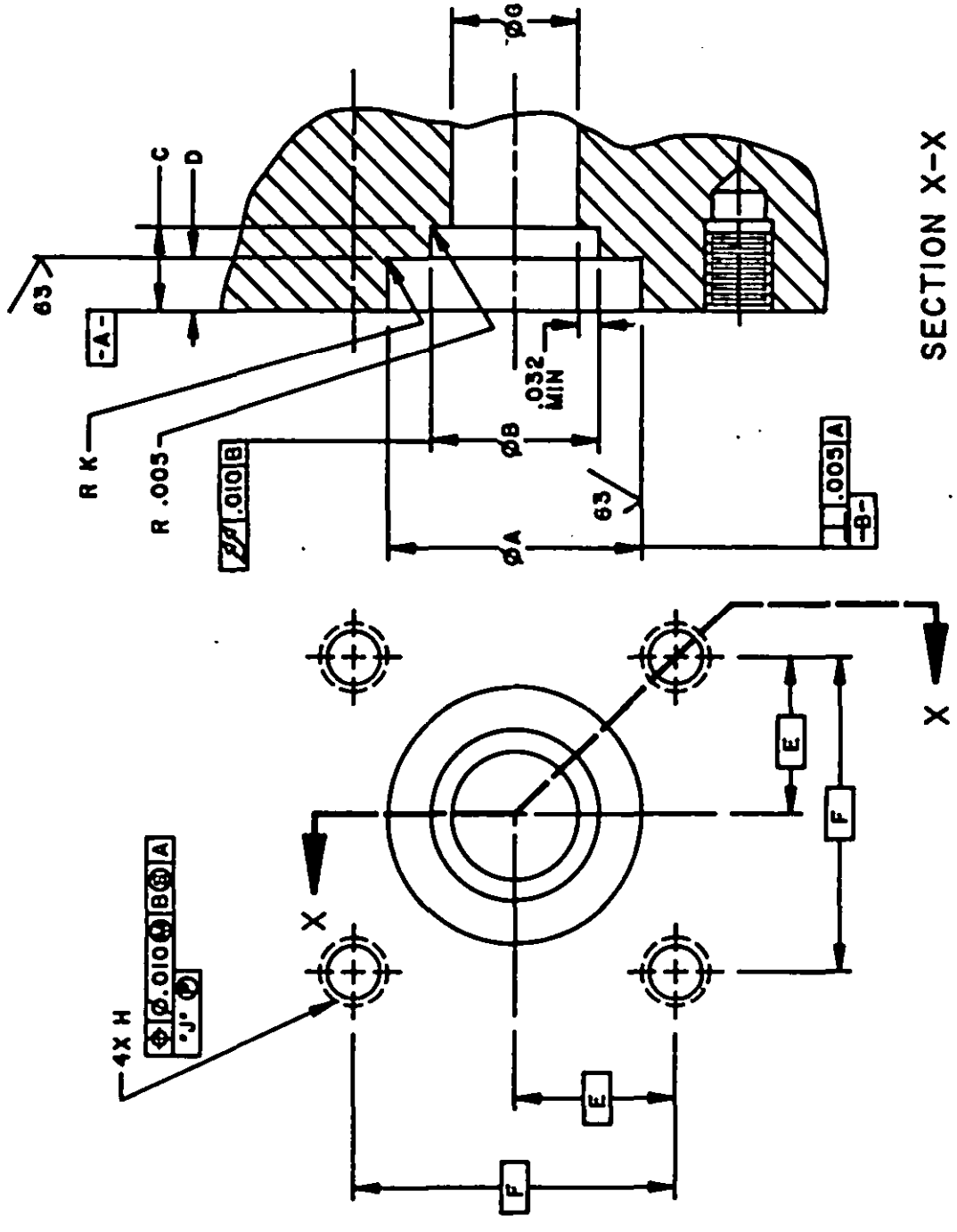


FIGURE 1. Machining dimensions.

UNLESS OTHERWISE SPECIFIED

- Surface roughness should not exceed 125 microinches.
- Tolerances should be:
  .XXX +/-.015
  .XX +/-.03
- Break edges and corners to .005 Radius Max.
- Threaded hole ("H" diameter) should have a 90-degree lead-in chamfer countersunk to "H" thread root diameter.

FLANGE CODE	FLANGE SIZE (SQ)	A +.002 -.000	B +.001 -.001	C +.010 -.000	D +.003 -.003	E	F	G MAX	H THREAD SIZE	J MIN	K +.005 -.005
A	1.50	0.488	0.279	0.251	0.118	0.469	0.938	0.215	0.250-28UNF	0.500	0.010
B	1.75	0.688	0.439	0.251	0.153	0.562	1.125	0.375	0.312-24UNF	0.500	0.010
C	2.00	1.000	0.689	0.314	0.184	0.656	1.312	0.625	0.375-24UNF	0.500	0.010
D	2.25	1.188	0.876	0.314	0.184	0.750	1.500	0.812	0.438-20UNF	0.750	0.010
E	2.75	1.438	1.064	0.377	0.247	0.938	1.875	1.000	0.438-20UNF	0.750	0.010
F	3.50	2.125	1.564	0.502	0.311	1.250	2.500	1.500	0.500-20UNF	1.250	0.010
G	4.25	2.375	1.814	0.502	0.311	1.531	3.062	1.688	0.625-18UNF	1.625	0.010

FIGURE 1. Machining dimensions - Continued.

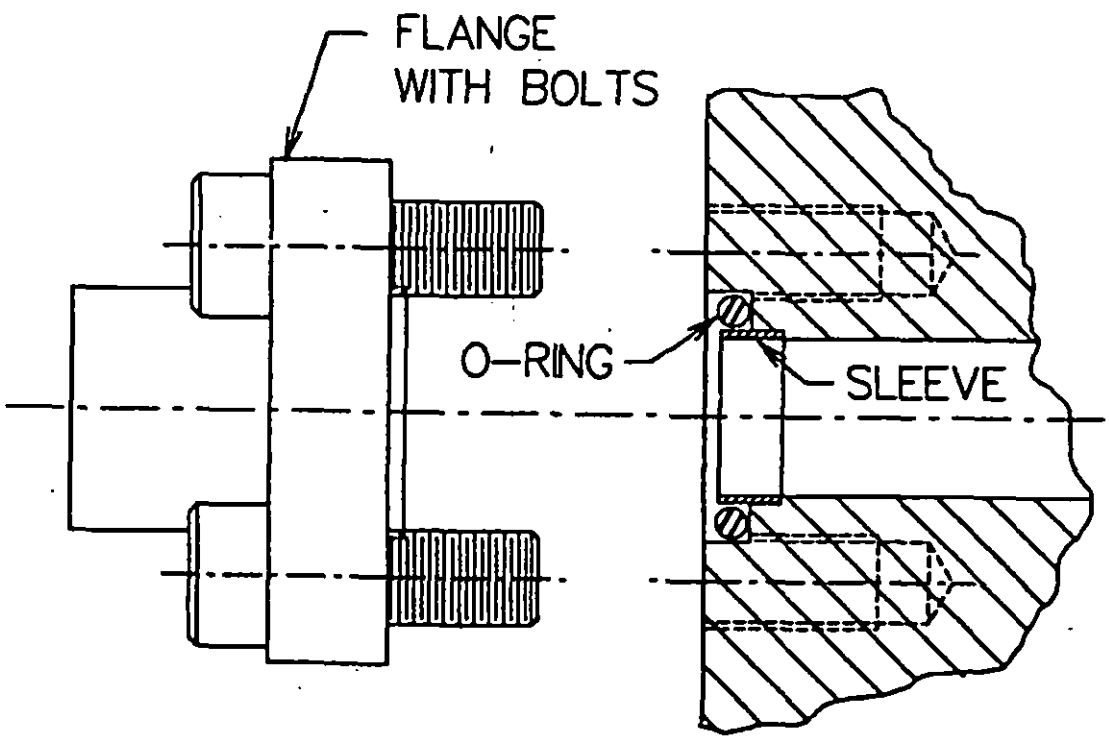
30.1.1 Bolt thread engagement for steel. The recommended bolt thread engagement for steel based materials that do not require threaded inserts is approximately 1.5 times the bolt diameter unless otherwise required by engineering analysis or applicable specification.

30.1.2 Bolt thread engagement for aluminum.. Guidance for determining bolt thread engagement for aluminum alloy base materials that require threaded inserts is provided by MIL-I-8846 for standard inserts or MIL-I-45932 for thin-wall inserts. However, if lower torque values can be utilized because the full tensile strength of the fastener is not required for a specific application, it is not necessary to use the longer length threaded inserts that would be required for use with the higher tensile strength and higher torque values.

40. ASSEMBLY INSTRUCTIONS

40.1 Assembly instructions. Assembly shall be as shown on figure 2. The selection of the O-ring and sleeve shall be made from figure 2.

40.2 Fasteners. The recommended fasteners are socket head cap screws in accordance with AIA NAS 1351 or internal wrenching bolts in accordance with a MIL-B-7838 specification sheet or military part standard. The length of the cap screw is determined by adding the thickness of the flange and washer (if required) to the minimum thread engagement as determined in 30.1.1 or 30.1.2 then select the nearest standard cap screw size.



FLANGE CODE 1/	FLANGE SIZE	O-RING MIL-R-83248/1	SLEEVE CODE 2/
A	1.50	M83248/1-012	A
B	1.75	M83248/1-112	B
C	2.00	M83248/1-210	C
D	2.25	M83248/1-213	D
E	2.75	M83248/1-217	E
F	3.50	M83248/1-327	F
G	4.25	M83248/1-329	G

1/ From MIL-F-24704
2/ From MIL-F-24704/5.

FIGURE 2. O-ring and sleeve selection guide.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-F-24704	23 March 1992

3. DOCUMENT TITLE
FLANGES, FOUR BOLT SQUARE, HYDRAULIC GENERAL SPECIFICATION FOR

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
Technical point of contact: (TPOC) Mr. Avery, NAVSEA Code 56W16	(1) Commercial (703) 6021596	(2) AUTOVON 332-1596
c. ADDRESS (Include Zip Code) COMMANDER NAVAL SEA SYSTEMS COMMAND WASHINGTON, D.C. 20360-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	