

INCH-POUND

MIL-F-24787/5(SH)
3 September 1993

MILITARY SPECIFICATION

FITTINGS, END, TYPE D, HOSE TO HOSE 90° ELBOW, REUSABLE
FOR FLEXIBLE HOSE ASSEMBLIES

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 reusable hose to hose 90° elbow fittings for use with wire or synthetic fiber reinforced rubber hose.

1.2 Classification. The 90° elbow fittings shall be type D. See MIL-F-24787, table III for identification of corresponding hose type (MIL-H-24135 and MIL-H-24136 specification sheet number) for each group number specified herein.

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, SEA 03Q42, Naval Sea Systems Command, 2531 Jefferson Davis Hwy, Arlington, VA 22242-5160 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 4730

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

SPECIFICATIONS

FEDERAL

- QQ-C-390 - Copper Alloy Castings, (Including Cast Bar).
- QQ-N-281 - Nickel-Copper Alloy Bar, Rod, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections.
- QQ-N-286 - Nickel-Copper-Aluminum Alloy, Wrought (UNS N05500).
- QQ-N-288 - Nickel-Copper Alloy and Nickel-Copper-Silicon Alloy Castings.

MILITARY

- MIL-F-24787 - Fittings, End, Reusable for Flexible Hose Assemblies, General Specification For.
- MIL-T-1368 - Tube and Pipe, Nickel-Copper Alloy, Seamless and Welded.
- MIL-T-16420 - Tube, Copper-Nickel Alloy, Seamless and Welded (Copper Alloy Numbers 715 and 706).
- MIL-H-24135 - Hose Synthetic Rubber, Wire Reinforced, for Flexible Hose Assemblies, General Specification for.
- MIL-H-24136 - Hose, Synthetic Rubber, Synthetic Fiber Reinforced, for Flexible Hose Assemblies, General Specification for.
- MIL-B-24480 - Bronze, Nickel-Aluminum (UNS No. C95800) Castings for Sea Water Service.

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

2.2 Non-Government publications. The following documents 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 DoDISS cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- AMS 6381 - Steel Tubing, Mechanical 0.95Cr - 0.20Mo. (0.38 - 0.43C (SEA 4140). (DoD adopted)

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

(Non-Government standards and other publications are normally available from the organizations which 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 related associated detail specifications, specification sheets, or MS standards), 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 Ninety degree elbow fittings furnished under this specification shall conform to the requirements of MIL-F-24787 and as specified herein.

3.1.1 Dimensions. Dimensions of the 90° elbow shall conform to figure 1 and the tables thereon.

TABLE I. 90° elbow by group.

Fitting size (hose dash no.)	Fitting group										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
6	X	X						X			X
8	X	X				X		X			X
10						X					
12	X	X				X		X			X
16	X	X	X			X		X			X
20	X		X			X		X			X
24	X		X			X		X			X
32	X		X			X		X			X
40				X				X		X	
48				X						X	
64				X						X	
80							X		X		
96							X		X		
128									X		
160									X		
192									X		

NOTE: X's denote where 90° elbow fittings are available by group and size.

3.2 Dimensions. Dimensions of the 90° elbow fittings shall be in accordance with figure 1 and the tables thereto.

3.3 Materials. Materials shall be in accordance with figure 1 and the tables thereto.

4. QUALITY ASSURANCE PROVISIONS

4.1 Quality assurance provisions shall be in accordance with MIL-F-24787 and as specified herein.

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 Qualification. Ninety degree, hose to hose, elbow fittings are not normally subjected to qualification testing since they do not attach to piping. They are qualified for a particular subgroup whenever a fitting of that subgroup is submitted to and passes the requisite qualification testing.

5. PACKAGING

5.1 Packaging requirements shall be in accordance with MIL-F-24787.

6. NOTES

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

6.1 Intended use. End fittings to this specification are intended for use in shipboard or shore to ship piping systems where pressures do not exceed the flange rated working pressure, and temperatures do not exceed that of the applicable hose.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Fitting size (hose dash no.).
- (c) Fitting group number.
- (d) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.1.1).
- (e) Quantity of fittings.

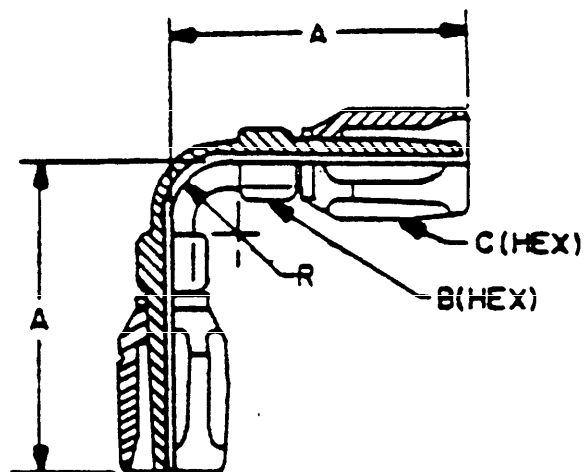
Wire

Synthetic fiber

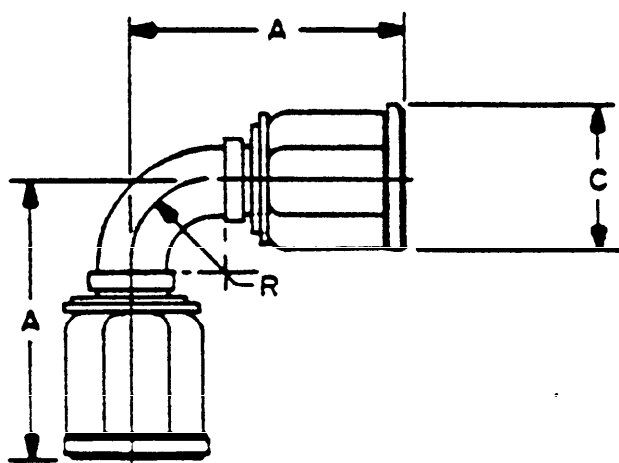
Preparing activity

Navy - SH

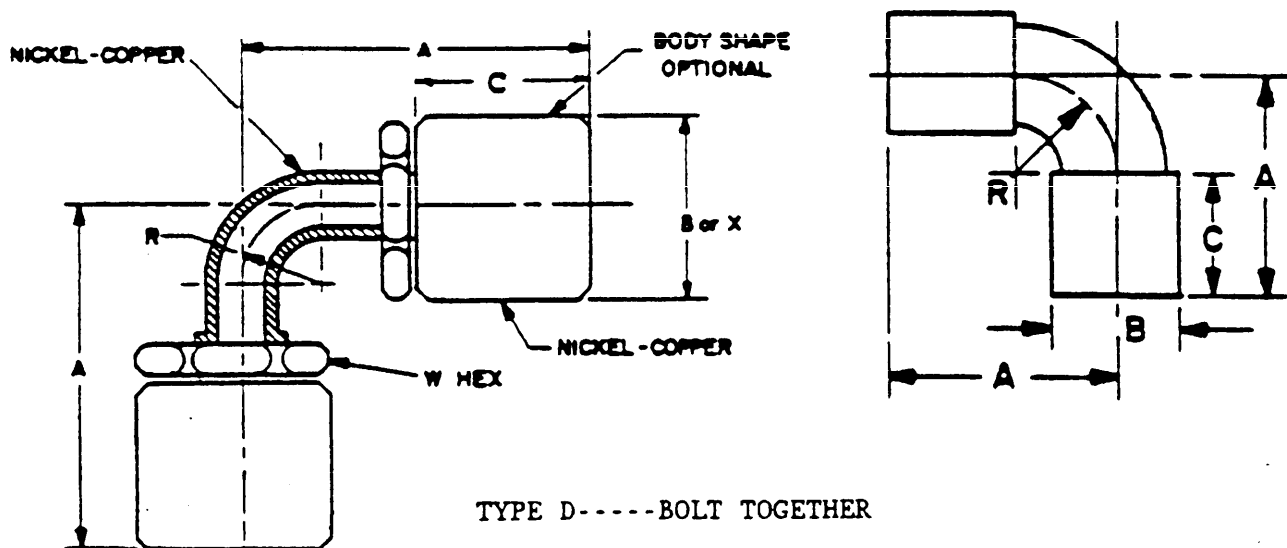
(Project 4730-N086-5)



TYPE D-----SOLID SOCKET



TYPE D-----RING AND BAND



TYPE D-----BOLT TOGETHER

FIGURE 1. Type D end fittings.

TABLE II. Dimensions for groups I and II solid socket 90° elbow fittings.

Hose (dash no.)	A max	B nom	C max	R min
-6	3.55	0.69	1.25	0.50
-8	3.81	0.81	1.50	0.75
-12	4.75	1.06	1.75	1.25
-16	5.75	1.38	2.00	1.50
-20	6.75	1.62	2.75	1.75
-24	7.00	1.88	3.00	2.00
-32	8.00	2.50	3.50	2.50

TABLE III. Dimensions for group III solid socket 90° elbow fitting.

Hose (dash no.)	A max	B nom	C max	R min
-16	6.50	1.38	2.00	1.50

TABLE IV. Dimensions for group VIII solid socket 90° elbow fittings.

Hose (dash no.)	A max	B nom	C max	R min
-6	2.45	0.56	0.81	0.50
-8	3.05	0.75	0.94	0.75
-10	3.57	0.81	1.12	1.00
-12	4.15	1.00	1.25	1.25
-16	3.93	1.38	1.44	1.50
-20	2.98	1/	1.75	1.22
-24	3.24		1.94	1.38
-32	3.89		2.44	1.62
-40	4.39		3.25	1.88

Notes for tables II, III and IV:

1. Sizes -20 and larger do not have this hex.
2. Dimensions are in inches.
3. The fitting assembly materials shall conform to QQ-N-281 or QQ-N-286.
4. Socket alternative material shall conform to QQ-N-288.
5. The 90° tube elbow for sizes -6 through -12 shall conform to MIL-T-1368 and for sizes -16 and larger to MIL-T-16420.

TABLE V. Dimensions for group IV ring and band 90° elbow fittings.

Hose (dash no.)	A max	C max	R min
-20	7.00	4.00	1.75
-24	7.75	4.25	2.00
-32	9.00	5.25	2.50

NOTES:

1. Dimensions are in inches.
2. Fitting assembly material for the hose nipple shall conform to QQ-N-281 or QQ-N-286.
3. Socket may be one-piece or multiple segment design not exceeding the envelope dimensions.
4. Material for the fitting assembly socket shall conform to QQ-N-281, QQ-N-286 or QQ-N-288.
5. Alternative material for the fitting assembly socket shall be steel conforming to AISI 1035 (segment) or AISI-SAE 4140 (ring and band) in accordance with AMS 6381 as applicable.
6. The material for the 90° tube elbow shall conform to MIL-T-16420.

TABLE VI. Dimensions for group IV ring and band 90° elbow fitting.

Hose (dash no.)	A max	C nom	R min
-40	5.70	3.90	1.88
-48	5.96	4.50	2.09
-64	6.75	5.44	2.81

NOTES:

1. Dimensions are in inches.
2. Hose nipple material shall conform to MIL-B-24480.
3. Socket assembly may be multiple segment bolt or ring retained so long as envelope dimensions are not exceeded. Material may be bronze conforming to MIL-B-24480 or NiCu conforming to QQ-N-281, QQ-N-286 or QQ-N-288.

TABLE VII. Dimensions for group VI ring and band 90° elbow fitting.

Hose (dash no.)	A max	C max	R min
-8	4.45	1.60	0.75
-12	5.90	1.80	1.25
-16	6.40	2.16	1.50
-20	6.44	2.83	1.97
-24	7.25	3.16	2.00
-32	8.95	3.75	3.00

NOTES:

1. Dimensions are in inches.
2. Fitting assembly materials for the hose nipple shall conform to QQ-N-281 or QQ-N-286.
3. Socket for fitting assemblies for -20 and larger may be one-piece or multiple segment design, not exceeding the envelope dimensions. Socket for sizes -8, -12 and -16 shall be one-piece design.
4. Fitting assembly materials for the socket shall conform to QQ-N-281, QQ-N-286 or QQ-N-288.
5. Alternative material for the fitting assembly socket for hoses sizes -20 and larger shall be steel conforming to AISI-SAE 4140 in accordance with AMS 6381, as applicable.
6. Tubing shall conform to MIL-T-16420.

TABLE VIII. Dimensions for groups IV and VII bolt together 90° elbow fitting.

Hose (dash no.)	A max	B nom	C nom	R min
-40	5.70	6.75	3.35	1.88
-48	5.96	7.75	3.35	2.09
-64	6.75	9.00	3.35	2.81
-80	10.78	8.45	5.90	4.50
-96	11.08	9.41	5.89	4.75

NOTES:

1. Dimensions are in inches.
2. Materials for nipple and elbow shall be bronze in accordance with MIL-B-24480.

TABLE IX. Dimensions for group IX bolt together 90° elbow fittings.

Hose (dash no.)	A max	B nom	C nom	R min
-80	8.75	11.50	5.00	3.50
-96	9.25	12.00	5.00	4.00
-128	10.50	14.00	5.00	5.00
-160	12.00	16.50	5.00	6.38
-192	15.00	20.00	6.50	7.38

NOTES:

1. Dimensions are in inches.
2. Material for segments and elbow shall be bronze in accordance with MIL-B-24480.
3. Materials for fasteners shall be in accordance with QQ-N-281 or QQ-N-286.

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TABLE X. Dimensions for group X bolt together 90° elbow fittings.

Hose (dash no.)	A max	B nom	C nom	R min
-40	6.25	6.75	5.00	2.13
-48	6.88	7.75	5.00	2.50
-64	7.00	9.00	5.00	3.00

NOTES:

1. Dimensions are in inches.
2. Materials for elbow and segments shall be bronze in accordance with MIL-B-24480.
3. Material for fasteners shall be NiCu in accordance with QQ-N-281 or QQ-N-286.

TABLE XI. Dimensions for group XI bolt together 90° elbow fittings.

Hose (dash no.)	A max	B nom	C nom	R min	W nom	X max
-6	3.25	1.50	2.00	0.50	0.94	2.47
-8	3.75	1.50	2.10	0.75	1.00	3.00
-12	4.75	2.25	2.42	1.25	1.31	3.50
-16	5.75	2.25	2.42	1.50	1.62	4.31
-20	6.75	2.75	2.80	1.75	2.00	4.81
-24	7.00	3.00	3.01	2.00	2.25	5.88
-32	8.00	3.50	3.88	2.50	2.75	5.81

NOTES:

1. Dimensions are in inches.
2. Fitting assembly materials shall conform to QQ-N-281 or QQ-N-286.
3. Material for elbow shall conform to MIL-T-1368 or MIL-T-16420.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the comment 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 this 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

MIL-F-24787/5(SH)

2. DOCUMENT DATE (YYMMDD)

930903

3. DOCUMENT TITLE

FITTINGS, END, TYPE D, HOSE TO HOSE 90° ELBOW, REUSABLE FLEXIBLE HOSE ASSEMBLIES

4. NATURE OF CHANGE (identity 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) DSN

(if applicable)

7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Technical Point of Contact (TPOC)

MR. CARL BANKS, SEA 03Y23

ADDRESS ALL CORRESPONDENCE AS FOLLOWS:

b. TELEPHONE (Include Area Code)

(1) Commercial:

DSN:

TPOC: 703-602-0367

8-332-0367

c. ADDRESS (Include Zip Code)

COMMANDER, NAVAL SEA SYSTEMS COMMAND

ATTN: SEA 03Q42

2531 JEFFERSON DAVIS HIGHWAY

ARLINGTON, VA 22242-5160

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 DSN 289-2340