

INCH-POUND

MIL-F-24787/4(SH)
3 September 1993

MILITARY SPECIFICATION

FITTINGS, END, TYPES E AND EL, SPLIT CLAMP, REUSABLE, WITH TYPES SC (SPLIT CLAMP), TF TAILPIECE FEMALE AND TM TAILPIECE MALE 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 split clamp end fittings, and adapters for use with wire or synthetic fiber reinforced rubber hose.

1.2 Classification. The split clamp fittings shall be type E (straight nipple) and EL (90° elbow nipple). The adapters shall be type SC (split clamp assembly), type TF (tailpiece female) and type TM (tailpiece male). 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.

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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).

MILITARY

- MIL-F-24787 - Fittings, End, Reusable for Flexible Hose Assemblies, General Specification for.
- 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.
- MIL-R-83248 - Rubber Fluorocarbon Elastomer, High Temperature, Fluid, and Compression, Set Resistant.

(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.)

2.3 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 Split clamp end fittings and adapters furnished under this associated detail specification shall conform to the requirements of MIL-F-24787 and as specified herein.

3.1.1 Fitting availability. Types E and EL end fittings and adapters are available in the classes and sizes indicated in table I.

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TABLE I. Split clamp fitting by Group.

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

NOTE: X's denote where split clamp end fittings are available by group and size.

3.2 Dimensions. Fitting and adapter dimensions shall be in accordance with figures 1 and 2 and the tables thereto.

3.3 Materials. Fitting and adapter materials shall be in accordance with figures 1 and 2 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 materials, either indicated or actual, nor does it commit the Government to accept defective material.

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4.2 Sampling for qualification testing.

4.2.1 End fittings. Qualification testing of end fittings shall consist of end fitting samples as specified in table II. For qualification testing, end fittings shall be attached to the appropriate hose indicated in table II.

4.2.1.1 Use on multiple hoses. Where end fittings are indicated for use on multiple hose associated detail specifications, the basic qualification shall be to the associated detail specification having the highest pressure rating. At least one hose sample shall be selected from each additional associated detail specification for the hydraulic impulse test.

TABLE II. End fitting samples required.

Group no.	Size hose (dash no.)	No. of end fitting samples required	Appropriate hose military specification
IV	-40	8	MIL-H-24135/4 and /10 (-40 and -48 only)
	-64	10	
VII	-80	8	MIL-H-24135/11
	-96	10	
VIII	-8	8	MIL-H-24135/10 (-4 TO -32) /12 and MIL-H-24136/3
	-32	10	
IX	-96	8	MIL-H-24136/1
	-128	10 ^{1/}	
X	-40	6	MIL-H-24136/4
	-64	8	

^{1/} If a size larger than -128 is to be offered than that size shall be represented by 6 sample end fittings.

4.2.3 Hose qualification. Hose samples used for the qualification of fittings to this specification shall be qualified to the appropriate associated detail specification shall be not less than 15 inches long. Where there are no previously qualified hose, the prospective fitting supplier shall work together with a prospective hose supplier to qualify their respective products. (The hose supplier and fitting supplier may be a single source).

4.2.3.1 The quantity of hose samples (15 inch minimum length) required shall be in accordance with table III.

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TABLE III. Hose samples required.

Hose size (table II)	No. of hose samples to be provided
Smallest	4
Largest	5

4.2.4 Hose and end fitting mix. Where there are two or more qualified suppliers of hose to the associated detail specification required for hose samples for the group being qualified, the hose mix shall be in accordance with table IV. Where there is only one previously qualified supplier, the "previously qualified" samples shall come from that supplier.

TABLE IV. Hose and fitting mix when there is one or more qualified suppliers for combined qualification test.

One approved source				
Sample size (dash no.) 4/	No. of hose samples to be provided 1/		No. of end fittings to be provided	
	Qualifier 2/	Appvd 3/ source	Qualifier 2/	Appvd 3/ source
Smallest	2	2	4	4
Largest	3	2	5	5

Two or more approved sources			
Sample size (dash no.)	No. of fittings to be provided by		
	Qualifier 2/	Approved 3/ source #1	Approved 3/ source #2
Smallest	4	2	2
Largest	5	3	2
Sample size (dash no.)	Number of hoses to be provided by		
	Qualifier 2/	Approved 3/ source #1	Approved 3/ source #2
Smallest	2	1	1
Largest	3	1	1

See notes at top of next page.

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(Hose samples shall be not less than 15 inches in length and shall be coupled on one end with the fitting being submitted for qualification and on the other end with a previously qualified end fitting.)

NOTES:

1. See table II for appropriate hose sample.
2. Offeror of hose and fittings or fittings to be qualified.
3. Approved source - Previously qualified fitting and hose, or fitting or hose.
4. Satisfactory completion of qualification testing of the samples selected in accordance with tables II, III and IV will qualify the manufacturer for all sizes in this associated detail specification for the group qualified. Qualification will be extended to all fittings under the same group no. under different associated detail specifications.

4.2.5 No previously qualified source. Where there is no previously qualified source, all samples for qualification shall come from the prospective qualifier(s).

4.2.6 Sequence of tests on sample hose assemblies shall be as specified in table V. If hoses are being qualified at the same time, the sequence of tests shall be in accordance with the applicable associated detail specification for the hose being qualified. Whichever sequence is used, only those tests in table V below shall apply to end fittings.

TABLE V. Sequence of qualification tests on sample assemblies.

Test sequence (see MIL-F-XX216)	Assembly sample numbers								
	Smallest size				Largest size				
	1	2	3	4	5	6	7	8	9
Proof pressure (see 4.6.1)	X	X	X	X	X	X	X	X	X
Hydraulic fluid circulation (see 4.6.2)		X					X		
Impulse test (see 4.6.3) <u>1/</u>				X	X		X		
Burst test (see 4.6.4)	X		X			X		X	

1/ Where the end fitting group being qualified is used on multiple hoses (see table II), qualification will be extended to the use of the fitting on additional hoses provided at least one sample hose assembly from each of the other group(s) is made up and submitted to the hydraulic impulse test.

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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:

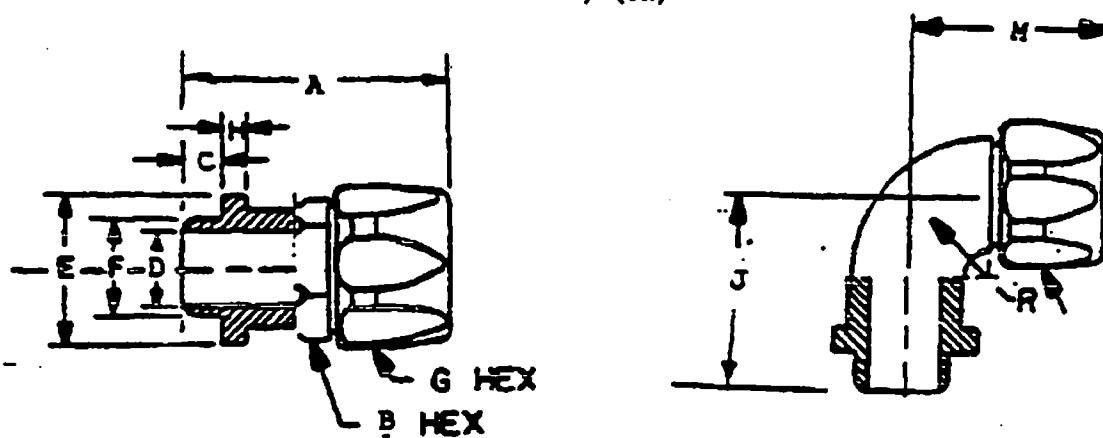
- (a) Title number and date of this specification sheet.
- (b) Fitting type designation.
- (c) Fitting group designation, see table I.
- (d) Fitting size, hose X pipe or tube.
- (e) Adapter type designation.
- (f) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.1.1).
- (g) Quantity of fittings or adapters.

6.3 Subject term (key word) listing.

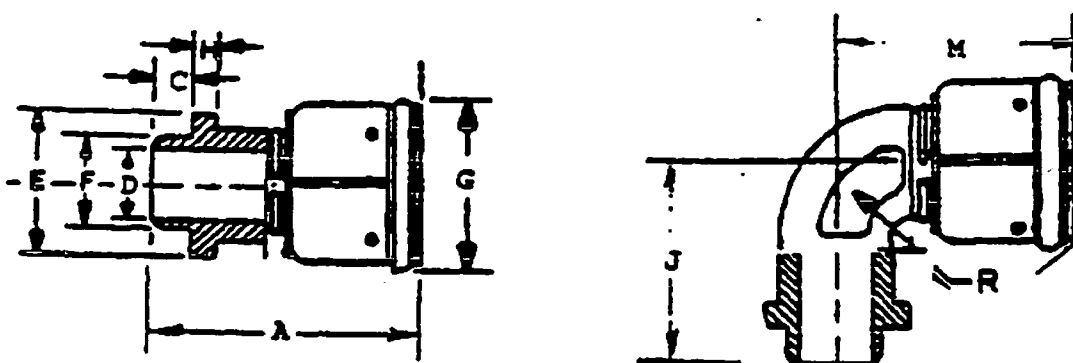
Wire
Synthetic fiber
Straight
Elbow

Preparing activity:
Navy - SH
(Project 4730-N086-4)

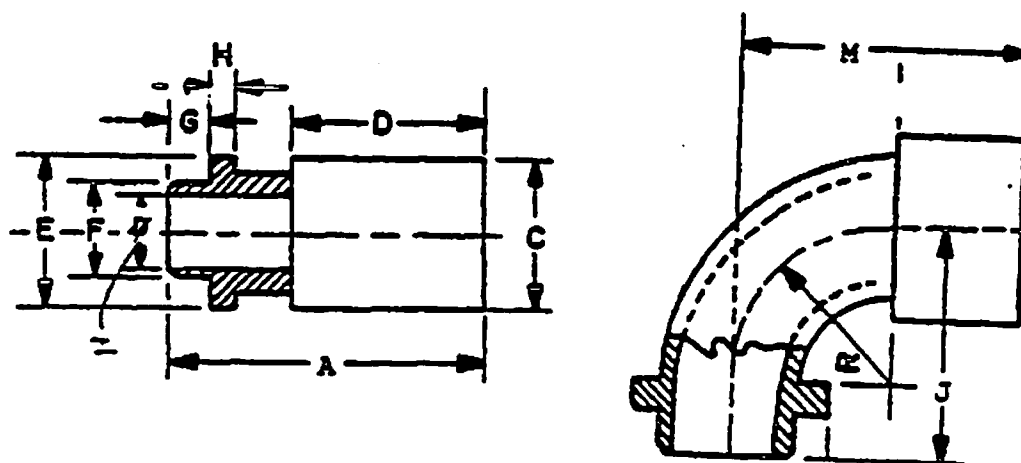
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TYPES E AND EL-----SOLID SOCKET



TYPES E AND EL-----RING AND BAND



TYPES E AND EL-----BOLT TOGETHER

FIGURE 1. Types E and EL end fittings.

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TABLE VI. Dimensions for group VIII solid socket types E and EL.

Hose (dash no.)	NPS size	A max	B nom	C max	D nom	E ref	F ref	G nom	H min	J max	M max
-32	1-1/4		2.12					2.44			3.89
-32	1-1/2		2.12					2.44			3.89

NOTES:

1. Dimensions are in inches
2. Material for nipple shall conform to QQ-C-390.
3. Material for socket shall conform to QQ-N-281 or QQ-N-286.

TABLE VII. Dimensions for group IV ring and band types E and EL.

Hose (dash no.)	NPS size	A max	C max	D nom	E ref	F ref	G nom	H min	J max	M max	R min
-40	2						3.90			5.70	1.88
-48	2-1/2						4.50			5.88	2.09
-48	3						4.50			6.46	2.09
-64	3-1/2						5.44			6.75	2.81
-64	4						5.44			6.75	2.81

NOTES:

1. Dimensions are in inches.
2. Material for nipple shall be bronze in accordance with MIL-B-24480.
3. Material for sockets shall conform to QQ-N-281, QQ-N-286 or MIL-B-24480.
4. Socket assembly may be either ring and band attached or bolt attached.

TABLE VII. Dimensions for group VII bolt together types E and EL.

Hose (dash no.)	A max	B max	C nom	D nom	E +/- 0.006	F +0.006 -0.000	G +0.005 -0.000	H +0.005 -0.000	J max	M max	R ref	I ref
-80	7.31	8.42	8.45	5.90	6.63	5.64	0.42	0.36	6.81	10.78	4.50	4.40
-96	7.30	8.67	9.41	5.89	7.57	6.76	0.47	0.43	7.31	11.08	4.75	5.40

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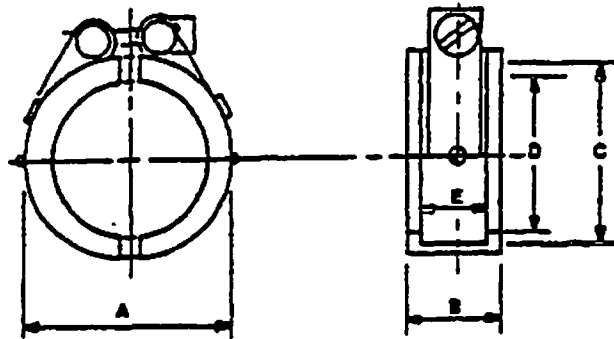
TABLE VIII. Dimensions for groups IX and X bolt together types E and EL.

Hose (dash no.)	A max	C nom	D nom	E +/- 0.006	F +0.006 -0.000	G +0.005 -0.000	H +0.005 -0.000	J max	M max	R ref	I ref
-40	6.188	6.75	2	3.245	2.495	0.332	0.317	3.50	6.25	2.13	2.51
-48	6.188	7.75	2-1/2	3.745	2.995	0.322	0.317	3.75	6.88	2.50	2.51
-48	6.188	7.75	3	4.370	3.620	0.322	0.317	3.75	6.88	2.50	2.51
-64	6.313	9.00	3-1/2	4.928	4.120	0.322	0.317	4.50	7.00	3.00	3.50
-64	6.313	9.00	4	5.428	4.620	0.404	0.360	4.50	7.00	3.00	3.50
-80	6.250	11.50	5	6.630	5.620	0.400	0.360	7.00	8.75	3.50	4.40
-96	6.750	12.00	6	7.570	6.750	0.450	0.430	7.50	9.25	4.00	5.40
-128	7.000	14.00	7	9.970	9.000	0.820	0.400	9.00	10.50	5.00	7.40
-160	7.000	16.50	7	12.060	11.000	0.860	0.400	10.00	12.00	6.38	9.40
-192	9.000	20.00	9	13.380	12.000	0.880	0.440	11.00	15.00	7.38	11.40

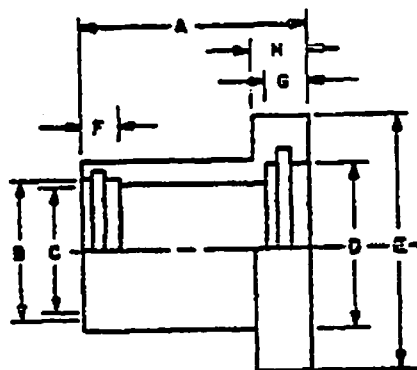
Notes for tables VII and VIII.

1. Dimensions are in inches.
2. Material for nipple and segments shall conform to MIL-B-24480.
3. Material for fasteners shall conform to QQ-N-281 or QQ-N-286.

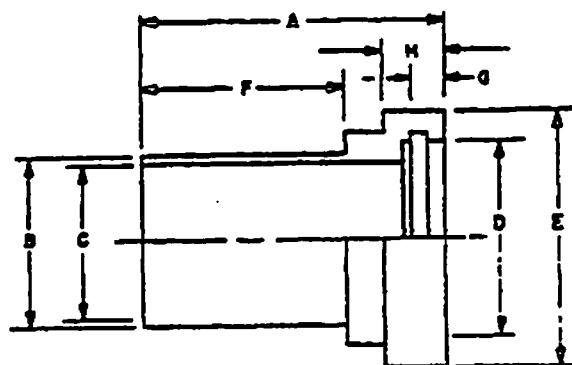
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TYPE SC-----SPLIT CLAMP ASSEMBLY



TYPE TF-----TAILPIECE, FEMALE



TYPE TM-----TAILPIECE, MALE

FIGURE 2. Split clamp adapters.

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TABLE IX. Dimensions for type SC split clamp, all applicable groups.

IPS size	A max	B max	C +0.006 -0.000	D nom	E +0.006 -0.000
2	4.00	1.38			
2-1/2	4.42	1.44	3.750	3.25	0.674
3	5.19	1.50	4.360	3.86	0.624
3-1/2	5.56	1.50			
4	6.12	1.62	5.430	4.93	0.720
5	7.31	1.62	6.630	6.13	0.720
6	8.25	1.94	7.570	7.07	0.960
8	10.78	2.38	9.970	9.47	0.800
10	12.88	2.38	12.060	11.56	0.800
12	14.98	2.38	13.380	12.88	0.800

NOTES:

1. Dimensions are in inches.
2. Materials, -clamp halves, QQ-C-390.
-band, QQ-N-281.
-fastener, QQ-N-281 or QQ-N-286.

TABLE X. Type TF, tailpiece, female, all groups.

NPS	A max	B +0.006 -0.000	C nom	D +0.006 -0.000	E +0.006 -0.000	F +0.006 -0.000	G +0.005 -0.000	H +0.005 -0.000
2	1.64	2.38	2.12	2.51	3.25	0.66	0.35	0.317
2-1/2	1.86	2.88	2.59	3.01	3.75	0.78	0.35	0.317
3	1.94	3.50	3.17	3.64	4.36	0.83	0.35	0.317
3-1/2	1.98	4.00	3.63	4.14	4.93	0.88	0.35	0.317
4	2.10	4.50	4.11	4.64	5.43	0.91	0.42	0.300
5	1.80	6.25	5.30	5.64	6.63	1.00	0.42	0.360
6	1.95	5.57	6.38	6.76	7.57	1.11	0.47	0.430
8	2.50	6.63	8.40	9.01	9.97	1.31	0.84	0.400
10	2.75	8.81	10.53	11.01	12.06	1.49	0.88	0.400
12	3.00	10.75	12.58	12.01	13.38	3.10	0.90	0.400

NOTES:

1. Dimensions are in inches.
2. Material shall be bronze in accordance with QQ-C-390 or MIL-B-24480.
3. Braze socket and groove shall be designed for ultrasonic inspection.
4. Back-up ring shall be commercial grade leather.
5. O-ring shall be in accordance with MIL-R-83248.

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TABLE XI. Type TM. tailpiece, male, all groups.

NPS	A max	B +0.006 -0.000	C nom	D +0.006 -0.000	E +0.006 -0.000	F +0.006 -0.000	G +0.005 -0.000	H +0.005 -0.000
2	2.17	2.38	2.04	2.51	3.25	1.31	0.35	0.317
2-1/2	2.04	2.88	2.59	3.01	3.75	1.12	0.35	0.317
3	3.45	3.50	3.00	3.64	4.36	2.50	0.35	0.317
3-1/2	3.45	4.00	3.50	4.14	4.93	2.50	0.35	0.317
4	3.67	4.50	3.88	4.64	5.43	2.64	0.42	0.300
5	3.80	5.56	4.94	5.64	6.63	2.77	0.42	0.360
6	3.97	6.62	5.96	6.67	7.57	2.67	0.47	0.430
8	4.37	8.62	7.88	9.01	9.97	2.82	0.84	0.400
10	4.55	10.47	9.52	11.01	12.06	3.00	0.88	0.400
12	4.75	12.25	11.76	12.01	13.38	3.10	0.90	0.400

NOTES:

1. Dimensions are in inches.
2. Material shall be bronze in accordance with QQ-C-390 or MIL-B-24480.
3. Back-up ring shall be commercial grade leather.
4. O-ring shall be in accordance with MIL-R-83248.

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-24787/4(SH)

2. DOCUMENT DATE (YYMMDD)

930903

3. DOCUMENT TITLE

FITTINGS, END, TYPES E AND EL, SPLIT CLAMP, REUSABLE, WITH TYPES SC (SPLIT CLAMP), TF TAILPIECE FEMALE AND TM TAILPIECE MALE FOR FLEXIBLE HOSE ASSEMBLIES

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)

7. DATE SUBMITTED (YYMMDD)

(1) Commercial
(2) DSN
(if applicable)

8. PREPARING ACTIVITY

a. NAME Technical Point of Contact (TPOC)

MR. CARL BANKS, SEA 03Y23

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TPOC: 703-602-0367

8-332-0367

c. ADDRESS (Include Zip Code)

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