MILITARY SPECIFICATION

FITTINGS, FLARELESS TUBE, FLUID CONNECTION

This amendment forms a part of Military Specification MIL-F-18280E, dated 31 August 1983 and is approved for use by all Departments and Agencies of the Department of Defense.

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Paragraph 2.1.1 Under Federal Specifications, add: "TT-P-1757 Primer, Coating, Zinc Chromate, Low-Moisture-Sensitivity."

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Paragraph 2.1.1 Under Military Specifications, add: "MIL-T-9046 Titanium and Titanium Alloy Sheet, Strip and Plate".

Paragraph 2.1.1 Under Military Specifications, delete: "MIL-B-13239 Barrier Material, Waterproof, Flexible All Temperature".

Paragraph 2.1.1 Under Federal Standards, add: "FED-STD-595 Colors."

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Paragraph 2.2 Under Society of Automotive Engineers, add: "AMS 4911 Titanium Alloy Sheet and Plate 6Al-4V Annealed".

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Add: Paragraph 3.1.1 Qualification by Association. Manufacturers who are listed in QPL-18280 are qualified by the association to manufacture and furnish the AS fittings which are listed in the latest revision of MIL-F-18280E Supplement A.

*Paragraph 3.2.2.2.2.a Line 1, delete: "0.0014" and substitute: "0.0013".

Paragraph 3.2.2.2.2.C delete: "Core hardness of 208-245 KHN" and substitute "Core hardness of 208-256 Knoop hardness number (KHN)."

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Delete Table I, and substitute Table I attached.

AMSC N/A FSC 4730

TABLE I. Materials.

MATERIAL	TYPE OF PART	FORM 2/	SPECIFICATION	MATERIAL CODE
ALUMINUM ALLOY	STRAIGHT FITTINGS AND NUTS	BARS AND ROD	QQ-A-225/6 (2024) TEMPER T6, OR T851	D
			QQ-A-225/9 (7075) TEMPER T73	W
	SHAPE FITTINGS AND NUTS	1/ FORGINGS	QQ-A-367 (2014) TEMPER T6	D
			QQ-A-367 (7075) TEMPER T73	W
	SHAPE FITTINGS	BARS	QQ-A-225/6 (2024) TEMPER T6 OR T851	D
			QQ-A-225/9 (7075) TEMPER T73	W
TITANIUM ALLOY	STRAIGHT FITTINS AND NUTS	BARS	3/AMS4928 (6A1-4V ANNEALED)	T
	SHAPE FITTINGS	BARS, PLATE AND FORGINGS	AMS4928 AMS4911 (6A1-4V ANNEALED) MIL-T-9046 CONDITION AB-1	T
CARBON STEEL	STRAIGHT FITTINGS AND NUTS	BARS AND RODS	ASTM A108 (1137) ASTM A108 (1141) ASTM A576 (1137) ASTM A576 (1141) MIL-S-6758 (4130)	NONE
	SHAPE FITTINGS	BARS	MIL-S-6758 (4130)	NONE
		FORGINGS	MIL-S 6758 (4130)	F
	SLEEVES	BARS	ASTM A108 (1213), (12L14) & (1215) ASTM A576 (1213)	NONE
CORROSION RESISTANT STEEL	STRAIGHT FITTINGS AND NUTS	BARS	QQ-S-763, CLASS 304	J
			QQ-S-763, CLASS 316	K
			4/QQ-S-763, CLASS 321	R
	SHAPE FITTINGS	BARS AND FORGINGS	QQ-S-763, CLASS 304	J
			QQ-S-763, CLASS 316	K
			4/QQ-S-763, CLASS 321	R

1/ USE OF FORGINGS FOR NUTS IN SIZES SMALLER THAN -24 IS PROHIBITED.

2/ SUBSTITUTION OF PLATE MATERIAL FOR BARS, RODS AND FORGINGS FOR A SPECIFIC APPLICATION SHALL BE SUBJECT TO THE APPROVAL OF THE INDIVIDUAL PROCURING ACTIVITY, WITH THE EXCEPTION THAT SEPARATE APPROVAL IS NOT REQUIRED FOR TITANIUM PLATE WHEN EITHER BAR OR PLATE WAS USED FOR QUALIFICATION TEST. MACHINED SHAPES SHALL CONFORM WITH AS1376, IF APPLICABLE.

3/ TITANIUM HEX BAR SHALL BE COLD FINISHED WITH TOLERANCES PER AMS2241.

4/ 347 CODE "S" MATERIAL MAY BE USED UNTIL EXISTING STOCK IS DEPLETED. 321 CODE "R" MATERIAL MAY BE SUBSTITUTED WHEREVER 347 CODE "S" MATERIAL IS SPECIFIED.

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Delete paragraph 3.4.1 and add: "3.4.1 Aluminum alloy fittings and nuts. Aluminum alloy fittings and nuts shall be anodized in accordance with MIL-A-8625, Type II, Class 2. Type 2014 and 2024 alloys shall be dyed green similar to color 14187 of FED-STD-595 and type 7075 alloy shall be dyed brown similar to color 10080 of FED-STD-595 (see 3.5.5).

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Paragraph 3.5.2: Change to read "3.5.2 Material identification. Corrosion resistant steel fittings and nuts shall be marked with the letter "J" if made from Class 304, the letter "K" if made from Class 316, the letter "R" if made from Class 321 corrosion resistant steel. All 7075-T73 aluminum alloy parts shall be marked with the letter "W". All 2014 and 2024 aluminum alloy parts shall be marked with the letter "D". Code "D" aluminum alloy parts already anodized yellow in color due to the dichromate seal shall also be marked with green paint in accordance with 3.5.5. Titanium alloy parts shall be marked with the letter "T" (see Table I material code). Carbon steel forgings made from 4130 shall be marked with the letter "F".

Paragraph 3.5.5: change to read for aluminum alloy: "Aluminum alloy 2014 and 2024 fittings and nuts shall be dyed green (see 3.4.1). Parts from stock colored yellow as a result of the dichromate sealer, may be furnished for a period of two years from the date of the revision of this specification that changes from no dye to the color green, providing all straight fittings and nuts are identified by coating two opposite hex flats with green primer paint and all shape fittings are identified with a 0.250 minimum diameter spot of green primer paint on one side. The paint shall be resistant to both hydrocarbon and phosphate ester based hydraulic fluids and shall be applied uniformly, using good workmanship practices. The letter "D" required in 3.5.2, if not aready marked on the part, shall be permanently ink stamped on top of a green paint spot. Aluminum alloy 7075 fittings and nuts shall be dyed brown (see 3.4.1).

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TABLE III. Fittings, Tube Material, Pressures and Stresses. For dash size 24, under column 6, working pressure for aluminum alloy; delete: "1500" and substitute "1000."

For dash size 32 under column 6, working pressure for aluminum alloy; delete "1500" and substitute "600."

Note 1/, underneath the table: Delete: "347" and substitute "321".

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Note 2/ Change to read: "In each size and material for which qualification is desired. For qualification of each material, MS21908 and MS21912 parts shall be supplied in full unmixed sets of either forgings or bar/plate stock. Both forms of the material may be qualified, if desired. Bar and plate will be considered as interchangeable for qualification.

Note 4/ Change to read: "All materials as applicable (2014, 2024 and 7075 aluminum alloys) (class 316, 304, 321 corrosion-resistant steel (CRES)) (any allowable carbon steel) (MIL-T-9046, AMS 4911, AMS 4928 6Al-4V annealed titanium). Qualification test reports must identify the material used and the form used.

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TABLE VIII. Torque Values. For dash size 2, delete "75" and "85" under minimum and maximum columns and substitute "50" and "60" minimum and maximum respectively.

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Paragraph 4.7.5.1.b: At the end of last sentence, add: "At least three of the four readings shall be within the required range."

Paragraph 4.7.5.1.c: Change to read: "Core hardness shall be measured at a minimum of the three places on the same samples used for case hardness and with the same equipment, except that the load shall be 500 grams. Five readings may be taken and the highest and lowest readings or the two highest readings or the two lowest readings may be disgarded."

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Delete Table XIV and substitute Table below:

TABLE XIV. Pressure and Temperature Rating for Fittings.

Tube OD (NOM) Size	Aluminum Alloy		Carbon Steel		Corrosion Resistant Steel		Titanium Alloy 6Al-4V	
	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp
-2 through -12 incl	3000 psi	-65° to +275°F	3000 psi	-65° to +275°F	3000 psi	-65° to +275°F	3000 psi	-65° to +450°F
-16	1500 psi		3000 psi		3000 psi		3000 psi	
-20	1500 psi		1500 psi		1500 psi		1500 psi	
-24	1000 psi		1500 psi		1500 psi		1500 psi	
-32	600 psi		1500 psi		1500 psi		1500 psi	

Add the following paragraph to section 6:

6.6 Subject term (key word) listing.

a. Fittings

b. Flareless, tube connection

c. 3000 psi operating temperature

d. -65° to +275°F operating temperature

e. Aerospace fluid systems.

Custodians:
Army - AV
Navy -AS
Air Force -99

Review activities:
Army - AR. MI
Navy - AS
Air Force - 82
DLA - CS

User activities:
Navy - OS
Army - GL, ME, AT

International interest

Preparing activity:
Navy -AS
(Project No. 4730-0859)