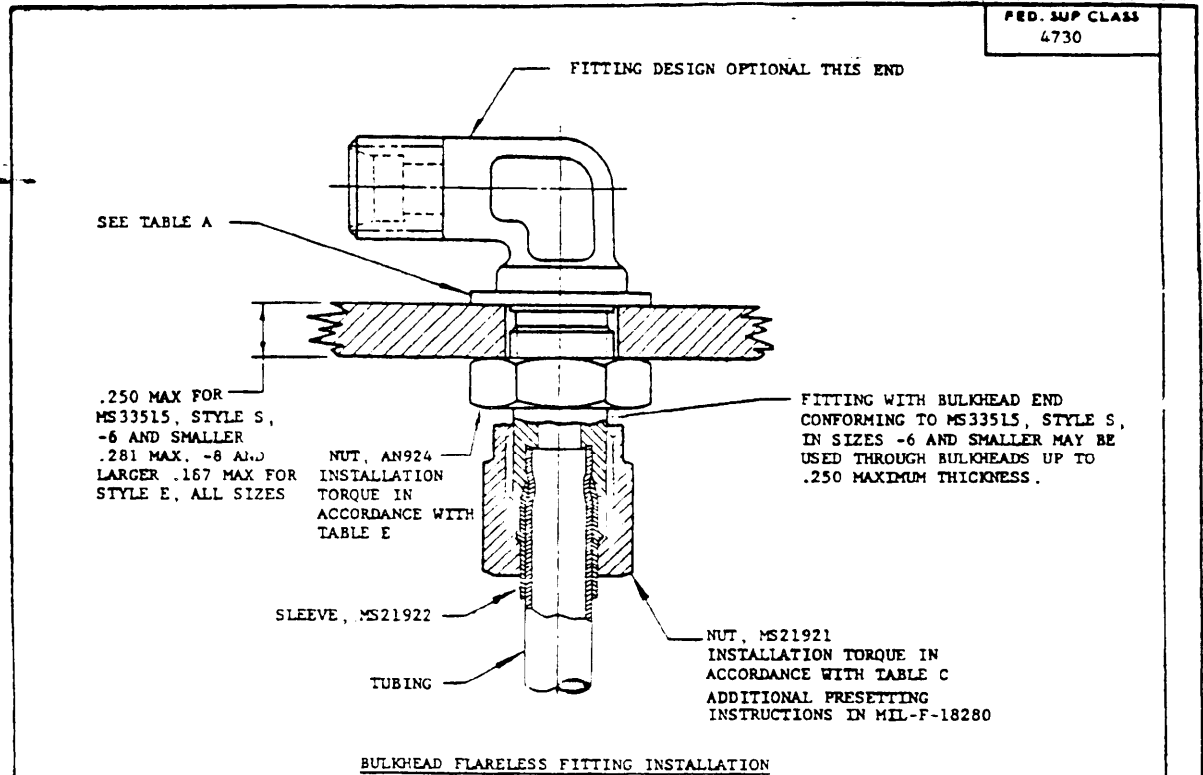


PROJECT NO. 4730-0377

FED. SUP CLASS  
4730USER SYMBOLS:  
USAF - 82  
ARMY - UC, AT, MEREVIEWER SYMBOLS:  
USAF - 82  
NAVY - AS  
ARMY - AV, MU

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be made from this document.

BULKHEAD FLARELESS FITTING INSTALLATION

## \* BULKHEAD HOLE SIZES AND WASHER THICKNESS

TABLE A

FITTING SIZE	BULKHEAD HOLE DIA (REF)	AN960 WASHER THICKNESS (BULKHEAD .187 THICK OR LESS)	FITTING SIZE	BULKHEAD HOLE DIA (REF)	AN960 WASHER THICKNESS (BULKHEAD .187 THICK OR LESS)
-2	.318/.338	.062	-10	.880/.900	.094
-3	.380/.400		-12	1.068/1.088	
-4	.443/.463		-16	1.318/1.338	
-5	.505/.525		-20	1.630/1.650	
-6	.568/.588		-24	1.880/1.900	
-8	.755/.775	.094	-32	2.505/2.525	

\* NOTE: FOR HOLE SIZES SHOWN (BASED ON AN960ID), NO WASHER REQUIRED WITH MS33515, STYLE S. FOR BULKHEADS THICKER THAN .187, OR WITH MS33515, STYLE E FOR ALL THICKNESSES.

INSTALLATION INSTRUCTIONS

## 1. HAND PRESETTING OF MS21922 SLEEVE:

- BOTTOM THE TUBE END FIRMLY IN THE SEAT OF THE PRESET TOOL OR FITTING.
- TIGHTEN THE MS21921 NUT 1 1/6 TURNS PAST THE POINT OF RING GRIP ON ALL SIZES AND MATERIALS FOR ALL TYPES OF FITTINGS OR TUBES.

## 2. RESETTING (INSTALLATION)

TIGHTEN THE MS21921 NUT IN ACCORDANCE WITH TABLE C.

THIS IS A DESIGN STANDARD. NOT TO BE USED AS A PART NO.

(B) ENTIRE STD REVISED

P A NAVY - AS Other Cust: ARMY - AV USAF - 82	TITLE FITTINGS, INSTALLATION OF FLARELESS TUBE, STRAIGHT- THREADED CONNECTORS	MILITARY STANDARD <b>MS 33566</b>
PROCUREMENT SPECIFICATION 10000	SUPERSEDES MS33566 (ASG)	SHEET 1 OF 7

DD FORM 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

PLATE NO. 15320

APPROVED 2 MAY 56  
 REVISED (A) 28 DEC 62 (B) 20 MAR 75

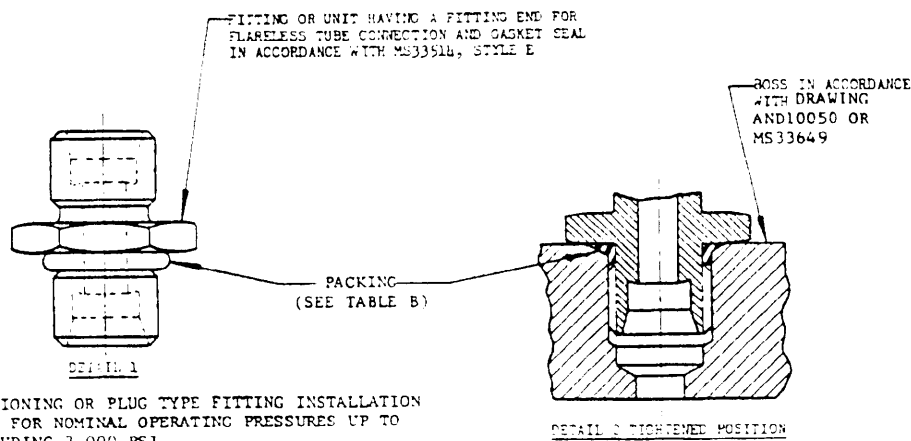
USER SYMBOLS:  
ARMY - MC, AT, ME

REVIEWER SYMBOLS:  
USAF - 82  
NAVY - AS  
ARMY - AV, MU

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FED. SUP CLASS  
4730



NONPOSITIONING OR PLUG TYPE FITTING INSTALLATION  
SUITABLE FOR NOMINAL OPERATING PRESSURES UP TO  
AND INCLUDING 3,000 PSI

PROCEDURE FOR BOSS INSTALLATION OF MS33514 FITTING END, STYLE E.

1. LUBRICATE THE PACKING IN APPROPRIATE LIQUID (SEE TABLE B).
2. INSTALL PACKING ON THE FITTING AS SHOWN IN DETAIL 1.
3. SCREW THE FITTING ASSEMBLY INTO THE BOSS USING INSTALLATION TORQUE IN ACCORDANCE WITH TABLE D.

TABLE B

PACKING AND LUBRICANT SELECTION		
APPLICATION	DOCUMENT NUMBER	APPROPRIATE LUBRICATION
HYDRAULIC (PETROLEUM BASE)	MS28778, MIL-R-83248/1, MIL-R-83248/2, MS3393	SYSTEM FLUID
HYDRAULIC (PHOSPHATE ESTER)	MS1612	SYSTEM FLUID
PNEUMATIC	MS9385	MIL-G-4343
ENGINE LUBRICANT (PETROLEUM BASE)	MIL-R-83248/1	SYSTEM FLUID
ENGINE LUBRICANT (SYNTHETIC BASE)		
ENGINE FUEL (GASOLINE; JP-3, -4, -5, -6; RJ-1; RP-1; HEP-2)		
OXYGEN	MS9385	NONE
VACUUM	MIL-R-83248/2	NONE
COOLANT (ETHYLENE GLYCOL)	MS28778	NONE
COOLANT (SILICATE ESTERS)		

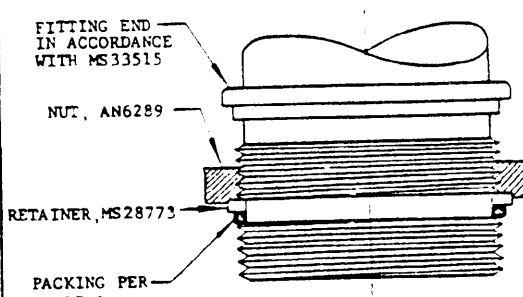
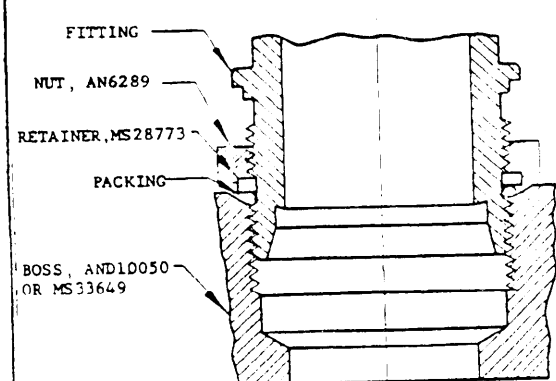
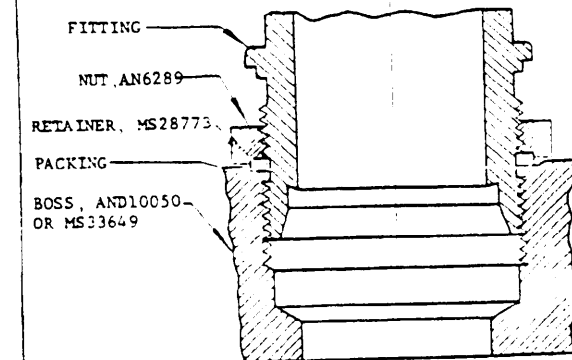
P A NAVY - AS Other Cust	TITLE FITTINGS, INSTALLATION OF FLARELESS TUBE, STRAIGHT-THREADED CONNECTORS	MILITARY STANDARD <b>MS33566</b>
PROCUREMENT SPECIFICATION NONE	SUPERSEDES MS33566 (ASG)	SHEET 2 OF 2

USER SYMBOLS:  
ARMY - UC, AT, ME

REVIEWER SYMBOLS:  
USAF - 82  
NAVY - AS  
ARMY - AV, MU

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FED. SUP CLASS 4730	
<p><b>STEP 1</b></p>  <p>COAT MALE THREADS OF FITTING, RETAINER, AND PACKING SPARINGLY WITH LUBRICANT PER TABLE B AND ASSEMBLE AS SHOWN. WORK THE RETAINER MS28773 INTO THE COUNTERBORE OF THE NUT, AN6289; THEN TURN THE NUT, AN6289, DOWN UNTIL THE PACKING IS PUSHED FIRMLY AGAINST THE LOWER THREADED SECTION OF THE FITTING.</p>	
<p><b>STEP 2</b></p>  <p>INSTALL THE FITTING INTO THE BOSS AND, AT THE SAME TIME, KEEP THE NUT, AN6289, TURNING WITH THE FITTING UNTIL THE PACKING CONTACTS THE BOSS. THIS POINT CAN BE DETERMINED BY A SUDDEN INCREASE IN TORQUE. WITH THE FITTING IN THIS POSITION, PUT A WRENCH ON THE NUT, AN6289, TO PREVENT ITS TURNING AND, AT THE SAME TIME, TURN THE FITTING IN 1 1/2 TURNS. POSITION FITTING BY TURNING IN NOT MORE THAN ONE ADDITIONAL TURN.</p>	
<p><b>STEP 3</b></p>  <p>HOLD FITTING AND TURN NUT, AN6289, DOWN TIGHTLY AGAINST BOSS USING INSTALLATION TORQUE IN ACCORDANCE WITH TABLE D.</p>	
<p><b>POSITIONING TYPE UNIVERSAL FITTING INSTALLATION SUITABLE FOR NOMINAL OPERATING PRESSURES UP TO AND INCLUDING 3,000 PSI</b></p>	
<p>P A NAVY - AS</p> <p>Other Cust:</p> <p>ARMY - AV</p> <p>USAF - 82</p>	<p>TITLE</p> <p>FITTINGS INSTALLATION OF FLARELESS TUBE, STRAIGHT-THREADED CONNECTORS</p>
<p>PROCUREMENT SPECIFICATION SUPERSEDES</p> <p>MS33566 (ASCI)</p>	
<p>MILITARY STANDARD</p> <p><b>MS33566</b></p>	
<p>SHEET 1 OF 1</p>	

APPROVED 7 MAY 56 REVISED (A) 28 DEC. 62 (B) FOR CHANGES SEE SHEETS 1 THRU 7

USER SYMBOLS:  
ARMY - WC, AT, ME

REVIEWER SYMBOLS:  
USAF - 82  
NAVY - AS  
ARMY - AV, MU

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4730

TABLE C TORQUE VALUES FOR MS21921 COUPLING NUT BASED ON LUBRICATION WITH MIL-H-5606 AND AS NOTED HEREIN					
TUBE SIZE	*CODE	ALUM. (6061-T6) TUBING WALL THICKNESS (IN.)		TORQUE (LB. IN.)	
		HEAVY	THIN	MIN.	MAX.
-2					
-2					
-2	A, B			75	85
-2					
-3	C	.028		95	105
-3					
-3	A, B			95	105
-3					
-4	C	.035		135	145
-4	D		.028	120	135
-4	A, B			135	145
-4					
-5					
-5					
-5	A, B			175 DRY	195 DRY
-5					
-6	C	.049		215	245
-6	D		.028	190	215
-6	A, B			215	245
-6					
-8	C	.065		470	510
-8	D		.035	340	380
-8	D		.049	340	380
-8	A, B			470	510
-8					
-10	C	.083		620	680
-10	D		.035	380	450
-10	D		.049	380	450
-10	A, B			620	680
-10					
-12	C	.095		855	945
-12	D		.049	400	470
-12	D		.065	400	470
-12	A, B			855	945

CONT.

P. A. NAVY - AS Other Cust  ARMY - AV USAF - 82	TITLE  FITTINGS INSTALLATION OF FLARELESS TUBE STRAIGHT-THREADED CONNECTORS	MILITARY STANDARD <b>MS 33566</b>
PROCUREMENT SPECIFICATION NONE	SUPERSEDES MS33566(ASG)	SHEET 4 OF

USER SYMBOLS:  
ARMY-WC, AT, ME

REVIEWER SYMBOLS:  
USAF-82  
NAVY-AS  
ARMY-AV, MU

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FED. SUP CLASS  
4730

TABLE C (CONT'D)

TUBE SIZE	*CODE	ALUM. (6061-T6) TUBING WALL THICKNESS (IN.)	TORQUE (LB. IN.)	
			MIN.	MAX.
-16	C	.065	1140	1260
-16	D	.049	750	850
-16	A, B		1140	1260
-20				
-20	D	.049	1000	1100
-20	A, B		1520	1680
-20				
-24				
-24				
-24	A, B		1900	2100
-24				
-32				
-32				
-32	A, B		2660	2940
-32				

\* CODE

- A STEEL OR CRES NUT TUBE OR FITTING
- B ALUMINUM FITTINGS OR NUTS USED WITH CRES TUBING
- C ALUMINUM FITTINGS OR NUTS USED WITH HEAVY WALL ALUMINUM TUBING (6061-T6)
- D ALUMINUM FITTINGS OR NUTS USED WITH THIN WALL ALUMINUM TUBING (6061-T6)

P.A.  
NAVY - AS  
Other: Cust  
ARMY - AV  
USAF - 82

TITLE

FITTINGS  
INSTALLATION OF FLARELESS TUBE  
STRAIGHT THREADED CONNECTORS

MILITARY STANDARD

MS33566

PROCUREMENT SPECIFICATION  
NONE

SUPERSEDES

MS 33566 (ASG)

SHEET 5 OF 7

USER SYMBOLS:  
ARMY - HC, AT, n.

REVIEWER SYMBOLS:  
USAF - B2  
NAVY - AS  
ARMY - AV, M1

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FED. SUP CLASS  
4720

TABLE D

TORQUE VALUES FOR BOSS INSTALLATIONS USING PACKINGS (LB. IN.) (FITTINGS PER MS33514 STYLE E, AN6289 NUT USED WITH FITTINGS PER MS33515, STYLE E OR S, ALL MATERIALS, BASED ON LUBRICATION WITH MIL-H-5606 AND AS NOTED HEREIN.)				
SIZE	TUBE OD (IN.) (REF)	THREAD	TORQUE	
			MIN	MAX
-2	1/8 (.125)	5/16-24	50	55
-3	3/16 (.187)	3/8-24	65	75
-4	1/4 (.250)	7/16-20	95	105
-5	5/16 (.312)	1/2-20	125 DRY	135 DRY
-6	3/8 (.375)	9/16-18	155	165
-8	1/2 (.500)	3/4-16	280	305
-10	5/8 (.625)	7/8-14	380	405
-12	3/4 (.750)	1 1/16-12	550	600
-16	1 (1.000)	1 5/16-12	800	900
-20	1 1/4 (1.250)	1 5/8-12	900	1000
-24	1 1/2 (1.500)	1 7/8-12	900	1000
-32	2 (2.000)	2 1/2-12	900	1000

TABLE E

TORQUE VALUES FOR AN924 JAM NUT USED ON FITTINGS PER MS33515 STYLE E OR S IN BULKHEAD INSTALLATIONS (LB. IN.)				
SIZE	TUBE OD (IN.) (REF)	THREAD	TORQUE	
			MIN	MAX
-2	1/8 (.125)	5/16-24	35	50
-3	3/16 (.187)	3/8-24	65	80
-4	1/4 (.250)	7/16-20	85	105
-5	5/16 (.312)	1/2-20	105	125
-6	3/8 (.375)	9/16-18	120	150
-8	1/2 (.500)	3/4-16	240	280
-10	5/8 (.625)	7/8-14	320	380
-12	3/4 (.750)	1 1/16-12	500	600
-16	1 (1.000)	1 5/16-12	720	880
-20	1 1/4 (1.250)	1 5/8-12	960	1200
-24	1 1/2 (1.500)	1 7/8-12	1200	1440
-32	2 (2.000)	2 1/2-12	1400	1500

NOTE: FITTING SHALL BE RESTRAINED FROM TURNING WHEN TORQUING TO VALUES GIVEN IN TABLES C AND E.

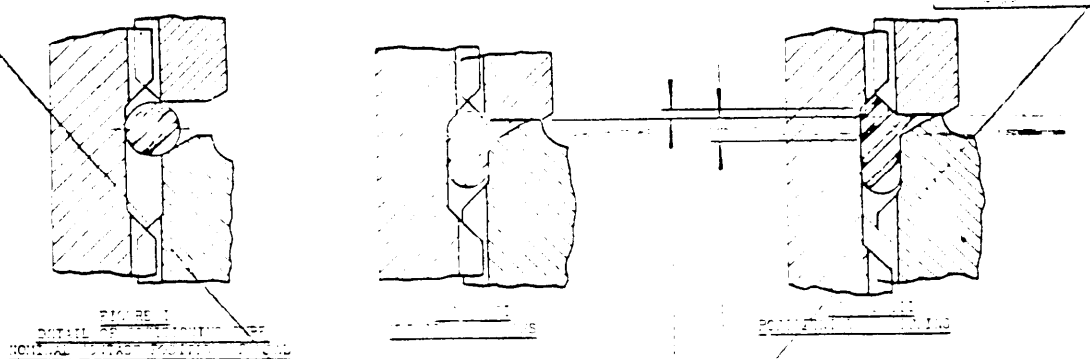
P.A. NAVY - AS Other Cust  ARMY - AV USAF - B2	TITLE  FITTINGS INSTALLATION OF FLARELESS TUBE, STRAIGHT-THREADED CONNECTORS	MILITARY STANDARD
		MS33566
PROCUREMENT SPECIFICATION NONE	SUPERSEDES MS33566(ASG)	SHEET 6 OF 7

USER SYMBOLS:  
ARMY - MC, AT, ME  
NAVY - AS  
ARMY - AV, AVI

REVIEWER SYMBOLS:  
USAF - R2  
NAVY - AS  
ARMY - AV, AVI

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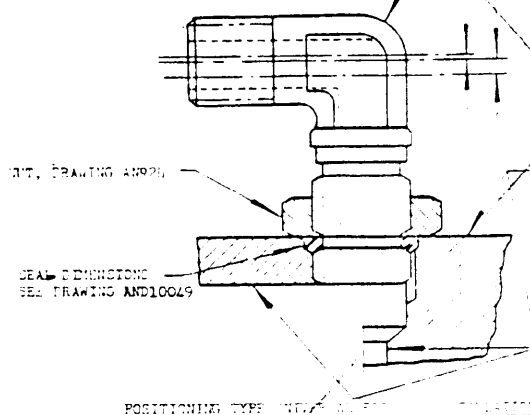
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APPLICABLE FITTING HAVING SEAL GROOVE ON THE BOSS SURFACE AND CONFORMING TO MS33566

— WHEN IN POSITION (A) —

— WHEN IN POSITION (B) —



NUT, DRAWING AND10049

SEAL DIMENSIONS SEE DRAWING AND10049

POSITIONING TYPE NUT AND WASHER ASSEMBLY

PROCEDURE FOR INSTALLATION

ASSEMBLE NUT, DRAWING AND10049, ON FITTING END UNTIL WASHER FACE OF NUT LINES UP WITH UPPER PORTION OF SEAL GROOVE, FIGURE 1.

LUBRICATE SEAL SPARINGLY WITH WHITE PETROLIUM AND PLACE SEAL ON FITTING GROOVE SO IT CONTACTS NUT (FIGURE 1).

TIGHTEN FITTING AND NUT UNTIL SEALING SURFACES OF SEALING SURFACES CONTACT BOSS SURFACE (FIGURE 1) AND UNTIL SEALING SURFACES CONTACT BOSS SURFACE.

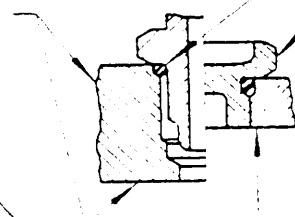
BEFORE TIGHTENING LOCKWASHER, DRAWING AND10049, POSITION FITTING AND NUT TO EITHER POSITION (A) OR (B) WHEN LUBRICATED SEALING SURFACES ARE IN CONTACT WITH BOSS SURFACE (FIGURE 1). ASSEMBLE NUT TO LINE UP WITH SEALING SURFACES, DRAWING AND10059.

LOCKWASHER THE FITTING STATIONARY IN SELECTED POSITION, TIGHTEN LOCKWASHER.

NOMINAL USE: AIRCRAFT ENGINE FLAME PROTECTION.

SEALING OR PLUG HAVING A SEAL GROOVE ON THE BOSS SURFACE AND CONFORMING TO MS33566, FIGURE 1

SEAL DIMENSIONS SEE DRAWING AND10049



SEAL DIMENSIONS SEE DRAWING AND10049

PROCEDURE FOR INSTALLATION

1. LUBRICATE SEAL SPARINGLY WITH WHITE PETROLIUM AND PLACE SEAL IN GROOVE.
2. CORE, FITTING OR PLUG INTO BOSS UNTIL CONTACT IS MADE WITH BOSS SURFACE.

THIS SHEET INACTIVE  
FOR DESIGN AFTER.

20 MAR 1975

SEE SHEET 2 & 3

NAVY - AS TITLE

Other Cust

ARMY - AV

USAF - R2

FITTING, INSTALLATION OF FLARELESS TUBE,  
TUBING-TYPE CONNECTOR

DOCUMENT SPECIFICATION SUPERSEDES

NONE

MS33566 (ASG)

MILITARY STANDARD

MS33566

SHEET 7 OF 7

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 149-R004
<p style="text-align: center;"><b>INSTRUCTIONS</b></p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).</p>		
SPECIFICATION		
ORGANIZATION (of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE