

INCH-POUND

MS20761B

7 August 2014

SUPERSEDING

MS20761A

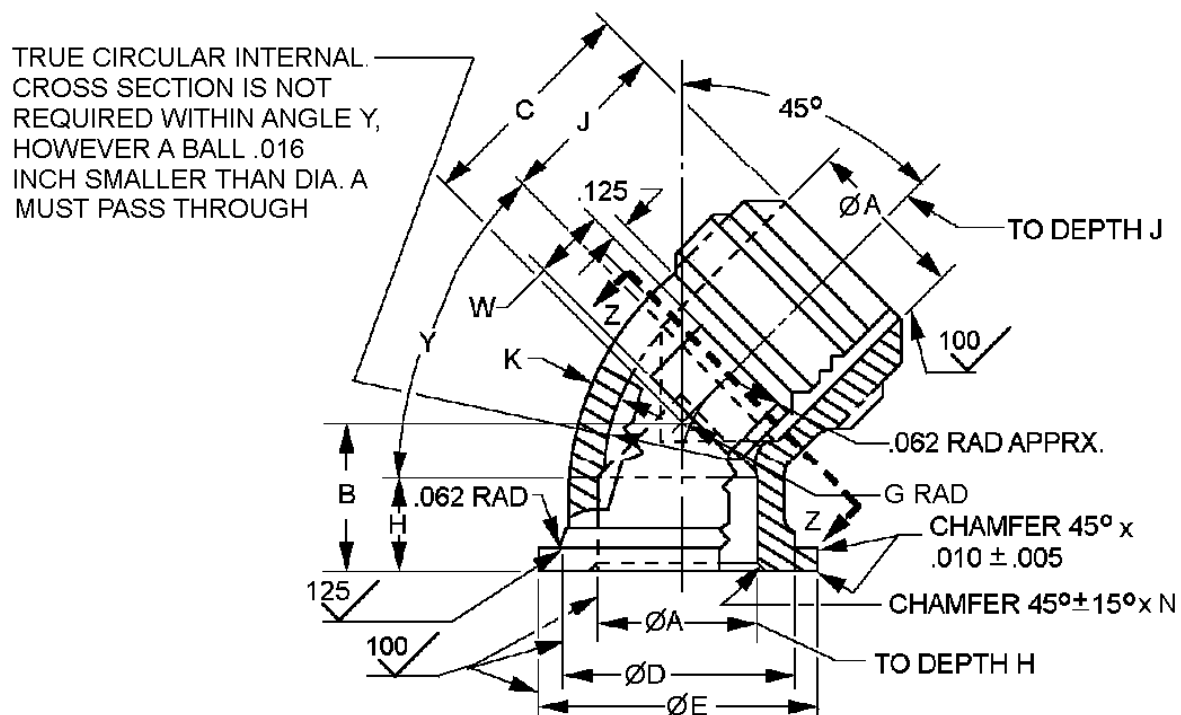
11 December 1970

DETAIL SPECIFICATION SHEET

ELBOW, FLARED TUBE, FLANGED, SWIVEL, 45°

This specification is approved for use by all Departments and Agencies of the Department of Defense.

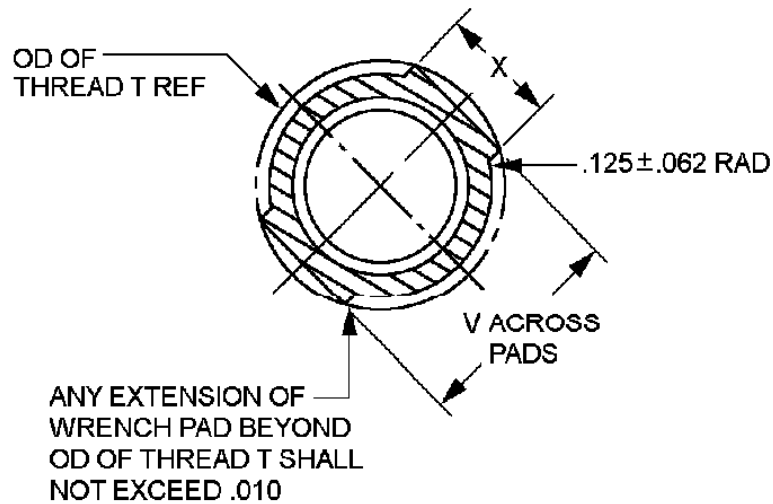
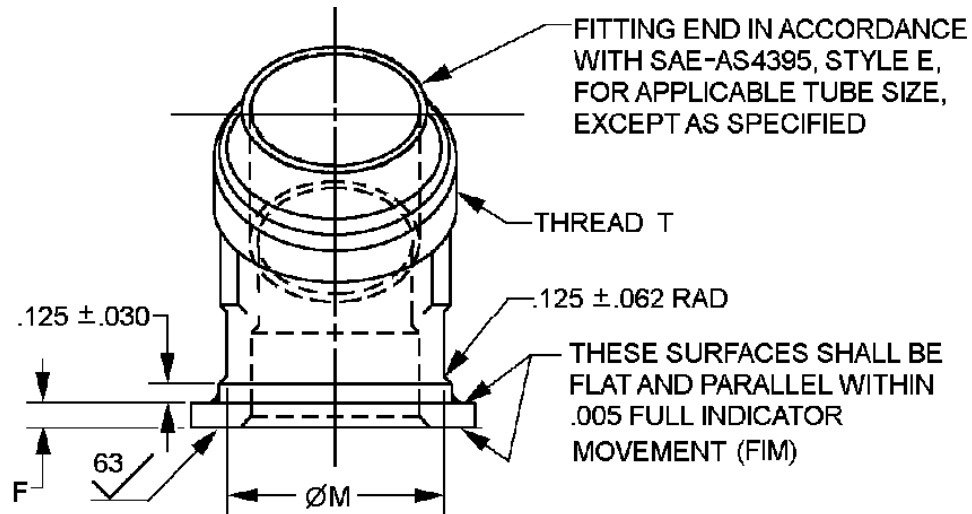
The requirements for acquiring the product described herein shall consist of this specification sheet and SAE-AS4875.



Inches	mm
.005	0.13
.010	0.25
.016	0.41
.062	1.57
.125	3.18

FIGURE 1. Elbow, flanged 45°.

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SECTION Z-Z

Inches	mm
.005	0.13
.010	0.25
.030	0.76
.062	1.57
.125	3.18

FIGURE 1. Elbow, flanged 45° - Continued.

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Size	Tube OD	Thread T SAE-AS4395	A dia ± .003	B +.047 -.000	C +.047 -.000	D dia. +.000 -.005	E dia. +.000 -.005	F +.000 -.005	G Radius reference	H +.047 -.000
-12	.750	1.0625-12UN-3A	.609	.812	1.312	.938	1.250	.156	.594	.562
-12-16							1.500			
-16	1.000	1.3125-12UN-3A	.844	.875	1.375	1.188	1.844		.719	
-20	1.250	1.6250-12N-3A	1.078	1.000	1.500	1.500	2.125	.188	.875	.625
-20-24				1.062			2.125			
-24	1.500	1.8750-12N-3A	1.312	1.094	1.750	1.750	2.125		1.000	.688
-32	2.000	2.500-12UN-3A	1.781	1.281	2.125	2.375	2.750		1.312	.750
-40	2.500	3.000-12UN-3A	2.281	1.469	2.000	2.875	3.281		1.562	.812
-48	3.000	3.500-12UN-3A	2.781	1.562	2.250	3.375	3.781		1.812	

Size	J	K		M ±.015	N dia.	V ±.015	W Approx	X Approx	Y ±.015	Weight Max		
	+.047 -.000	Min	Max							Al Alloy	Steel	Ti
-12	1.062	.125	.164	.922	.669	.891	.438	.562	.724	.09	.25	.15
-12-16										.11	.31	.18
-16		.141	.176	1.172	.904	1.156	.500	.625	.771	.13	.36	.21
-20	1.156	.156	.221	1.484	1.138	1.438		.750	.818	.23	.64	.38
-20-24										.26	.73	.43
-24	1.344	.172	.234	1.734	1.372	1.718	.750	.938	1.193	.943	.92	.55
-32	1.562	.203	.322	2.359	1.841	2.250				.70	1.96	1.16
-40	1.344	.234	.333	2.859	2.341	2.812				.90	2.52	1.49
-48	1.500	.250	.344	3.359	2.841	3.344	1.000	1.000	1.047	1.20	3.36	1.98

Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
.003	0.08	.250	6.35	.844	21.44	1.344	34.14	2.281	57.94
.005	0.13	.322	8.18	.875	22.23	1.372	34.84	2.341	59.46
.010	0.25	.333	8.46	.891	22.63	1.375	34.93	2.359	59.92
.015	0.38	.344	8.74	.904	22.96	1.047	26.59	2.375	60.33
.016	0.41	.438	11.13	.922	23.42	1.062	26.97	2.500	63.50
.030	0.76	.500	12.70	.938	23.83	1.078	27.38	2.750	69.85
.047	1.19	.562	14.27	.943	23.95	1.500	38.10	2.781	70.64
.062	1.57	.594	15.09	.969	24.61	1.562	39.67	2.812	71.42
.125	3.18	.609	15.47	1.000	25.40	1.718	43.64	2.841	72.16
.141	3.58	.625	15.88	1.094	27.79	1.734	44.04	2.859	72.62
.156	3.96	.669	16.99	1.138	28.91	1.750	44.45	2.875	73.03
.164	4.17	.688	17.48	1.156	29.36	1.781	45.24	3.000	76.20
.172	4.37	.719	18.26	1.172	29.77	1.812	46.02	3.281	83.34
.176	4.47	.724	18.39	1.188	30.18	1.841	46.76	3.344	84.94
.188	4.78	.750	19.05	1.193	30.30	1.844	46.84	3.359	85.32
.203	5.16	.771	19.58	1.250	31.75	2.000	50.80	3.375	85.73
.221	5.61	.812	20.62	1.281	32.54	2.125	53.98	3.781	96.04
.234	5.94	.818	20.78	1.312	33.32	2.250	57.15		

FIGURE 1. Elbow, flanged 45° - Continued.

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NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Internal flow passage around bend shall be smooth and free from projections. Break all sharp edges and remove all hanging burrs and slivers which might become dislodged during use.
4. Diameters A, D, and E shall be concentric with each other within ± 0.010 inch (0.25 mm) FIM, and angles $\pm 1/2^\circ$.
5. Unless otherwise specified surface roughness shall not exceed 100 μ -inches (2.54 μ m) Ra in accordance with ASME B46.1. Angular tool marks up to 63 μ -inches Ra will be allowed.
6. Reduction by forging draft angle of 7° is permissible.
7. Dimensioning and tolerancing are in accordance with ASME Y14.5. Unless otherwise specified, tolerance decimals $\pm .005$ and angles $\pm 0.30^\circ$.

FIGURE 1. Elbow, flanged 45° - Continued.

REQUIREMENTS:

Dimensions and configuration: See figure 1.

For nominal use on fuel and oil systems.

Sizes -40 and -48 are not to be used unless approved by the program office.

For tube sizes through 1 inch (25.4 mm): Maximum operating temperature 275°F (135°C), maximum pressure 1500 psi (10.3 MPa).

For tube sizes exceeding 1 inch (25.4 mm): Maximum operating temperature 275°F (135°C), maximum pressure 500 psi (3.4 MPa).

Materials shall be in accordance with SAE-AS4875 for forged parts.

Material and size designators shall be in accordance with table I.

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TABLE I. Material and size designators. 1/

Size number	Size number with letter material designator				
	Steel (Blank)	Aluminum Alloy <u>2/</u>	Aluminum alloy		CRES <u>3/</u> Titanium <u>4/</u>
12	-12	-D12	-W12		-R12 -T12
12-16	-12-16	-D12-16	-W12-16		-R12-16 -T12-16
16	-16	-D16	-W16		-R16 -T16
20	-20	-D20	-W20		-R20 -T20
20-24	-20-24	-D20-24	-W20-24		-R20-24 -T20-24
24	-24	-D24	-W24		-R24 -T24
32	-32	-D32	-W32		-R32 -T32
40	-40	-D40	-W40		-R40 -T40
48	-48	-D48	-W48		-R48 -T48

1/ Material designators blank/none, "D", "W", "J", "R", and "T" are in accordance with SAE-AS4875.

2/ Inactive material code: PINs with material code letter D are inactive for new design use W.

3/ Corrosion resistant steel (CRES).

4/ Titanium shall not be used in oxygen systems.

Finish and finish designators. Finish and finish designators shall be as specified in table II.

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TABLE II. Elbow finish code. 1/

Finish PIN code letter	Material	Plating finish
Blank	Steel	Cadmium plating in accordance with SAE-AMS-C-81562, type II, class 3 or SAE-AMS-QQ-P-416, type II, class 2. Die Black
	Aluminum <u>2/</u>	Anodize in accordance with MIL-A-8625, type II.
	CRES	No additional finish. Passivation in accordance with SAE-AMS2700, type 6 or 7.
	Titanium <u>3/</u>	Fluoride phosphated in accordance with SAE-AMS2486.
A	Steel	Aluminum-nickel in accordance with ASTM F1136/F1136M, grade 3, NC.
D	Aluminum <u>2/</u>	Anodize above with NAVAIR trivalent chromium pretreatment (TCP) in accordance with MIL-DTL-81706, type II, class 1A.
DA	Aluminum <u>2/</u>	Chemical conversion coating in accordance with, MIL-DTL-5541, type II, class 3.
CN	Steel	Cadmium plating in accordance with SAE-AMS-C-81562, type II, class 3 or SAE-AMS-QQ-P-416, type II, class 2 with NAVAIR TCP in accordance with MIL-DTL-81706, type II, class 1A.
G	Steel	Zinc plating with colorless passivate in accordance with ASTM B633, type V, Fe/Zn 25.
H	Steel	Zinc phosphate finish in accordance MIL-DTL-16232 type Z, class 1. <u>5/</u>
J	Steel	Zinc plating in accordance with ASTM B633; type II or III, Fe/Zn 5, or ASTM B695, type II, class 5.
N	Steel	NAVAIR TCP in accordance with MIL-DTL-81706, type II, class 1A.
R	Steel	Zinc plating in accordance with ASTM B633; type VI, Fe/Zn 5.
T	Titanium <u>3/ 4/</u>	Anodized in accordance with SAE-AMS2488, type 2.
V	Steel	Zinc-nickel in accordance with SAE-AMS2417, type 1.
Z	Steel	Zinc may be any zinc plating's from PIN codes H, J, R, V. <u>6/</u>
ZN	Steel	Zinc may be any zinc plating's from PIN codes H, J, R, V with NAVAIR TCP in accordance with MIL-DTL-81706, type II, class 1A. <u>6/</u>

1/ All finished materials shall withstand 96 hours salt spray test minimum.

2/ Aluminum alloys 2014 and 2024 shall be dyed light blue. Unless otherwise specified aluminum alloy 7075 shall be dyed brown.

3/ Titanium shall not be used in oxygen systems.

4/ Color equivalent to numbers in accordance with FED-STD-595/36076, FED-STD-595/36081, FED-STD-595/36099, FED-STD-595/36118, FED-STD-595/36134, FED-STD-595/36152, FED-STD-595/36170, FED-STD-595/36173, and FED-STD-595/36176.

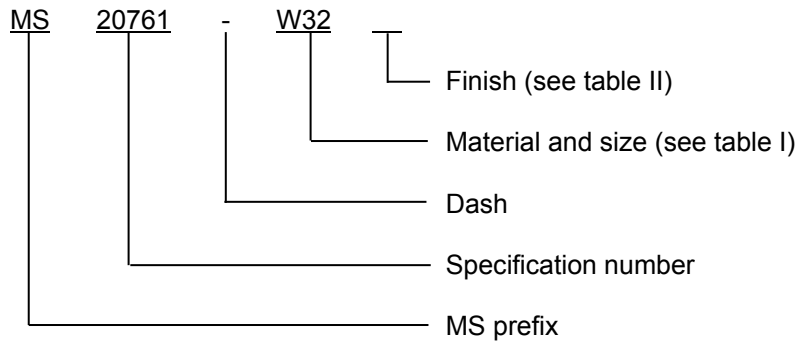
5/ Hexavalent chromium free.

6/ Not for use in Aircraft.

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Porosity test. Finished castings shall not leak when subjected to 100 psi air pressure and submerged in water for 3 minutes minimum.

Part or Identifying Number (PIN): The PIN consists of prefix "MS" the specification sheet number, a letter for material and size code and a blank or letter for finish. Unassigned PIN's shall not be used.



Example of PIN: MS20761-W32 is a 45° elbow, 7075 aluminum alloy, 2.000 inch (50.80 mm) tube diameter, and 2.750 (69.85 mm) flange.

Marking. The complete PIN shall be permanently marked on an unfinished surface.

Guidance on use of alternative parts with less hazardous or nonhazardous materials. This specification provides for a number of alternative plating materials via the PIN. Users should select the PIN with the least hazardous material that meets the form, fit and function requirements of their application.

Supersession data: Aluminum alloys 2014 and 2024 "D" designator is inactive for new design. For new design use aluminum alloy 7075 "W" designator.

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

Referenced documents. In addition to SAE-AS4875, this document references the following:

FED-STD-595/36076	MIL-A-8625	SAE-AMS-C-81562
FED-STD-595/36081	MIL-DTL-5541	SAE-AMS-QQ-P-416
FED-STD-595/36099	MIL-DTL-16232	SAE-AMS2417
FED-STD-595/36118	MIL-DTL-81706	SAE-AMS2486
FED-STD-595/36134	ASME B46.1	SAE-AMS2488
FED-STD-595/36152	ASME Y14.5	SAE-AMS2700
FED-STD-595/36170	ASTM B633	SAE-AS4395
FED-STD-595/36173	ASTM B695	
FED-STD-595/36176	ASTM F1136/F1136M	

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CONCLUDING MATERIAL

Custodians:

Army - AV
Navy - AS
Air Force - 99
DLA - CC

Preparing activity:

DLA - CC

(Project 4730-2014-049)

Review activities:

Army - AR
Navy - MC, SA
Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organization and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.