MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Initial Draft of: MS20762
       Project Number:  4730-2019-066

The initial draft for the subject document, is now available for viewing and downloading from the DLA Land and Maritime-VA Web site:


Major changes to this document include Figure 1 changes. Change angle from "Y" to "YY" and added the angle symbol, as not to confuse that the angle is not dimensioned. Added an arrow on the inside radius for true circular internal cross section… note. The “V” on the right side of the drawing changed back to a “Y”.

Concurrence or comments are required at this Center within 15 days from the date of this letter. Late comments will be held for the next coordination of the document. Comments from military departments must be identified as either "Essential" or "Suggested". Essential comments must be justified with supporting data. Military review activities should forward comments to their custodians of this office, as applicable, in sufficient time to allow for consolidating the department reply. Lack of response to this draft will be construed as concurrence.

If this document is of interest to you, please provide your comments or suggested changes. The point of contact for this document is Mr. William Carpenter, phone number 614-692-0573, facsimile transmission, 614-692-6939, e-mail William.F.Carpenter@dla.mil, or may be mailed via the US Postal Service to DLA LAND AND MARITIME, ATTN: VAI (Attention: William Carpenter), P.O. Box 3990, Columbus, OH  43218-3990.

Sincerely,

/ SIGNED /

ABDONASSER M. ABDOUNI
Chief,
Interconnection Branch

cc: (James Anderson)
DETAIL SPECIFICATION SHEET

ELBOW, FLARED TUBE, FLANGED, SWIVEL, 90 DEGREE

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 DLA Land and Maritime drawing 19002.

See notes at end of figure.

FIGURE 1. Elbow, flanged 90°.
### Table 1: Elbow, flanged 90° - Continued

<table>
<thead>
<tr>
<th>Size</th>
<th>Tube OD</th>
<th>Thread T SAE-AS8879</th>
<th>A Dia. ± .003</th>
<th>B ± .047 - .000</th>
<th>C ± .047 - .000</th>
<th>D Dia. ± .005</th>
<th>E Dia. ± .005</th>
<th>F ± .000 - .005</th>
<th>G Rad. Ref.</th>
<th>H ± .047 - .000</th>
</tr>
</thead>
<tbody>
<tr>
<td>-12</td>
<td>.750</td>
<td>1.0625-12UNJF-3A</td>
<td>.609</td>
<td>1.156</td>
<td>1.938</td>
<td>.938</td>
<td>1.250</td>
<td>.156</td>
<td>.594</td>
<td>.562</td>
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<tr>
<td>-12-16</td>
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<td>1.3125-12UNJF-3A</td>
<td>.844</td>
<td>1.281</td>
<td>2.125</td>
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<td>1.500</td>
<td>.719</td>
<td>.875</td>
<td>.625</td>
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<td>2.125</td>
<td>.132</td>
<td>.750</td>
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</tr>
<tr>
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<td>2.500-12UNJF-3A</td>
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<td>2.875</td>
<td>3.201</td>
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<td>.182</td>
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<tr>
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<td>.182</td>
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</tr>
<tr>
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<td></td>
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### Table 2: Elbow, flanged 90° - Continued

<table>
<thead>
<tr>
<th>Size</th>
<th>J ± .047 - .000</th>
<th>K Min</th>
<th>M Dia. ± .015</th>
<th>N Dia. ± .015</th>
<th>V ± .015</th>
<th>W Approx.</th>
<th>X Approx.</th>
<th>Y ± .015</th>
<th>Weight max</th>
</tr>
</thead>
<tbody>
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<td>-12</td>
<td>1.344</td>
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<td>.922</td>
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<td>.891</td>
<td>.500</td>
<td>.562</td>
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<td>.12</td>
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<td>1.172</td>
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<td>.562</td>
<td>.625</td>
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</tr>
<tr>
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<td>.750</td>
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<td>1.372</td>
<td>1.710</td>
<td>.688</td>
<td>.943</td>
<td>.45</td>
<td>.45</td>
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<td>.750</td>
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<td>.102</td>
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<td>-24</td>
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<td>.234</td>
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<td>.875</td>
<td>1.000</td>
<td>.969</td>
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<tr>
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<td>2.402</td>
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<td>3.389</td>
<td>2.841</td>
<td>3.344</td>
<td>1.000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See notes at end of figure.

**FIGURE 1.** Elbow, flanged 90° - Continued.
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.
4. Unless otherwise specified tolerances shall be ±.005 inches (0.13 mm) and angles ±.5°.
5. Unless otherwise specified surface roughness shall not exceed 100µ-inches (2.54µm) Ra in accordance with ASME B46.1. Angular tool marks up to 63 µ-inches (1.6µm) Ra will be allowed.
6. For steel castings surface roughness shall not exceed 125µ-inches. Level of acceptance shall be in accordance with ASTM A997 level III, samples as specified in DLA Land and Maritime drawing 19002. Angular tool marks up to 63 µ-inches (1.6µm) Ra will be allowed.
7. Diameters A, D, and E shall be concentric with each other within .010 inch (0.25mm) full indicator movement.
8. Reduction by forging draft angle of 7° is permissible.
9. Dimensioning and tolerancing are in accordance with ASME Y14.5.

FIGURE 1. Elbow, flanged 90° - Continued.

REQUIREMENTS:

Design and construction: See table I.

Additional testing and marking requirements shall be in accordance with DLA Land and Maritime drawing 19002.

For nominal use on fuel and oil systems.

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

Materials shall be in accordance with SAE-AS4875 or optional material: aluminum alloy casting in accordance with ASTM B108/B108M.

Surfaces. All machined surfaces shall be finished to 250 µin Ra (.00635mm), unless otherwise specified.

Fitting surface shall be free of all burrs and slivers.
Material designators and dash numbers for tube sizes see table 1.

Preferred method of steel casting is investment casting. Cast elbows may include machine stock to finish the geometry as required. Tolerances for investment castings reference MIL-HDBK-1897.

Porosity test. Finished elbows shall not leak when subjected to 100 psi (700 kPa) air pressure and submerged in water for 3 minutes.

**TABLE I. Material designators and dash numbers for tube sizes.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-12</td>
<td>-D12</td>
<td>-W12</td>
<td>-J12</td>
<td>-K12</td>
<td>-R12</td>
<td>-T12</td>
</tr>
<tr>
<td>-12-16</td>
<td>-D12-16</td>
<td>-W12-16</td>
<td>-J12-16</td>
<td>-K2-16</td>
<td>-R12-16</td>
<td>-T12-16</td>
</tr>
<tr>
<td>-16</td>
<td>-D16</td>
<td>-W16</td>
<td>-J16</td>
<td>-K16</td>
<td>-R16</td>
<td>-T16</td>
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<tr>
<td>-20</td>
<td>-D20</td>
<td>-W20</td>
<td>-J20</td>
<td>-K20</td>
<td>-R20</td>
<td>-T20</td>
</tr>
<tr>
<td>-24</td>
<td>-D24</td>
<td>-W24</td>
<td>-J24</td>
<td>-K24</td>
<td>-R24</td>
<td>-T24</td>
</tr>
<tr>
<td>-32</td>
<td>-D32</td>
<td>-W32</td>
<td>-J32</td>
<td>-K32</td>
<td>-R32</td>
<td>-T32</td>
</tr>
<tr>
<td>-40</td>
<td>-D40</td>
<td>-W40</td>
<td>-J40</td>
<td>-K40</td>
<td>-R40</td>
<td>-T40</td>
</tr>
<tr>
<td>-48</td>
<td>-D48</td>
<td>-W48</td>
<td>-J48</td>
<td>-K48</td>
<td>-R48</td>
<td>-T48</td>
</tr>
</tbody>
</table>

1/ Material designators are in accordance with SAE-AS4875 the procurement specification.
2/ Optional casting material ASTM A732/A732M.
3/ Aluminum alloys 2014/2024 code D are inactive for new design, use aluminum alloy 7075 code W aluminum for new design.
5/ Optional material: aluminum alloy forging 7075-T73 in accordance with (SAE-AMS-QQ-A-367 or SAE-AMS4141).
6/ Corrosion resistant steel (CRES) for 304, 316 and 321.
7/ Titanium shall not be used in oxygen systems.

Finish. Finishes shall be as specified in table II. All plating's shall be capable of meeting a minimum of 96 hours salt spray test in accordance with ASTM B117. The fittings shall show no evidence of red corrosion after 96 hours of salt spray. Fluid passages, other openings and internal threads shall not be subject to the plating thickness requirement and may have bare areas provided they are protected with a light film of oil.
<table>
<thead>
<tr>
<th>Finish code</th>
<th>Material</th>
<th>Plating finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>Steel</td>
<td>Cadmium plating in accordance with SAE-AMS-C-81562, type II, class 2 or SAE-AMS-QQ-P-416, type II, class 2, dye black. 1/ 5/ 8/</td>
</tr>
<tr>
<td></td>
<td>Aluminum</td>
<td>Anodize in accordance with MIL-A-8625, type II.</td>
</tr>
<tr>
<td></td>
<td>CRES</td>
<td>No additional finish. Passivation in accordance with SAE-AMS2700, method 1, type 6 or 7.</td>
</tr>
<tr>
<td></td>
<td>Titanium</td>
<td>Fluoride phosphate in accordance with SAE-AMS2486.</td>
</tr>
<tr>
<td>A</td>
<td>Steel</td>
<td>Zinc-Aluminum in accordance with ASTM F1136/F1136M, grade 3, NC.</td>
</tr>
<tr>
<td>D</td>
<td>Aluminum</td>
<td>Anodize in accordance with MIL-A-8625, type II, class 2. Chemical conversion coating in accordance with NAVAIR trivalent chromium pretreatment (TCP) in accordance with MIL-DTL-5541 type II, Class 1A. TCP applied after anodizing.</td>
</tr>
<tr>
<td>DA</td>
<td>Aluminum</td>
<td>TCP chemical conversion coating in accordance with NAVAIR TCP in accordance with MIL-DTL-5541 type II, Class 1A.</td>
</tr>
<tr>
<td>G</td>
<td>Steel</td>
<td>Zinc plating with colorless passivate in accordance with ASTM B633, type V, Fe/Zn 8 25.</td>
</tr>
<tr>
<td>H</td>
<td>Steel</td>
<td>Zinc phosphate finish in accordance MIL-DTL-16232 type Z, class 4.</td>
</tr>
<tr>
<td>J</td>
<td>Steel</td>
<td>Zinc plating in accordance with ASTM B633; type II or III, Fe/Zn 8, or ASTM B695, type II, class 8. 4/ 5/</td>
</tr>
<tr>
<td>R</td>
<td>Steel</td>
<td>Zinc plating in accordance with ASTM B633; type VI, Fe/Zn 8 4/ 5/</td>
</tr>
<tr>
<td>T</td>
<td>Titanium</td>
<td>Anodized in accordance with SAE-AMS2488, type 2.</td>
</tr>
<tr>
<td>V</td>
<td>Steel</td>
<td>Zinc-nickel in accordance with SAE-AMS2417, type 2, grade B. 6/</td>
</tr>
<tr>
<td>W</td>
<td>Aluminum alloy 7075-T73 or T7352 7/ in accordance with SAE-AS4875</td>
<td>Anodize in accordance with MIL-A-8625, type II, class 2, dye brown.</td>
</tr>
<tr>
<td>WC</td>
<td>Aluminum alloy 7075-T73 or T7352 7/ in accordance with SAE-AS4875</td>
<td>Anodize in accordance with MIL-A-8625, type II, class 2, dye brown. TCP chemical conversion coating in accordance with MIL-DTL-5541, type II, class 1A. TCP applied after anodizing.</td>
</tr>
<tr>
<td>WD</td>
<td>Aluminum alloy 7075-T73 or T7352 7/ in accordance with SAE-AS4875</td>
<td>TCP chemical conversion coating in accordance with MIL-DTL-5541, type II, class 1A. Paint brown after applying the TCP</td>
</tr>
<tr>
<td>Z</td>
<td>Steel</td>
<td>Zinc may be any zinc plating's from PIN codes H, J, R, V. 4/ 5/</td>
</tr>
<tr>
<td>ZN</td>
<td>Steel</td>
<td>Zinc may be any zinc plating from PIN codes H, J, R, V with a colored chrome coating 4/ 5/</td>
</tr>
</tbody>
</table>

1/ Embrittlement test need not be run.
2/ Aluminum alloys 2014 and 2024 shall be dyed light blue.
3/ A pretreatment, a modification of the fluoride treatment, or a post treatment shall be applied so the final color of the fittings shall be similar to SAE-AMS-STD-595 colors 36076 through 36293.
5/ These finishes have a chromate conversion coating or chromic acid rinse which includes hexavalent chromium and are not recommended for Army ground systems.
6/ The zinc-nickel alloy plate shall contain 12% to 16% nickel. The coating thickness shall be 315µ inches (8µm) minimum coating thickness.
Unless otherwise specified aluminum alloy 7075 shall be dyed brown.

Cadmium shall not be used in oxygen or potable water systems. Cadmium is prohibited from use in NAVSEA-owned shipboard systems in accordance with the requirements of T9070-AL-DPC-020/077-2, unless otherwise approved by NAVSEA.

Titanium shall not be used in oxygen or potable water systems.

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

PIN example: MS20762-D32DA indicates a 2-inch 7075 aluminum elbow with chemical conversion coating in accordance with MIL-DTL-5541 type II, class 3.

Marking. The complete PIN shall be permanently marked on one wrench surface along with the manufacturer's name, CAGE code, or trademark, shall be marked on the other wrench surface. The part shall also be marked with the manufacturer's lot number on either wrench flat.

Example:

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.

Cadmium is prohibited from use in NAVSEA-owned shipboard systems in accordance with the requirements of T9070-AL-DPC-020/077-2, unless otherwise approved by NAVSEA.

Class I and II ozone depleting substances (ODS) shall not be used in MS20762 or any referenced procedures.

Referenced documents shall be of the issue in effect on date of invitations for bid.
Supersession data: Aluminum alloys 2014 and 2024 "D" designator is inactive for new design. For new design use aluminum alloy 7075 "W" designator.

Amendment notations: The margins of this specification are marked with vertical lines to indicate where modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Referenced documents. In addition to DLA Land and Maritime drawing 19002, this document references the following:

- MIL-A-8625
- MIL-DTL-5541
- MIL-DTL-16232
- MIL-HDBK-1897
- ASME B46.1
- ASME Y14.5
- ASTM A732/A732M
- ASTM B108/B108M
- ASTM B117
- ASTM B633
- ASTM B695
- ASTM F1136/F1136M
- ASTM MNL37
- SAE-AMS-STD-595/36081
- SAE-AMS-STD-595/36099
- SAE-AMS-STD-595/3618
- SAE-AMS-STD-595/36134
- SAE-AMS-STD-595/36152
- SAE-AMS-STD-595/36170
- SAE-AMS-STD-595/36173
- SAE-AMS-STD-595/36176
- SAE-AMS-STD-595/36231
- SAE-AMS-STD-595/36251
- SAE-AMS-STD-595/36270
- SAE-AMS-STD-595/36280
- SAE-AMS-STD-595/36293
- SAE-AMS-C-81562
- SAE-AMS-QQ-P-416
- SAE-AMS-QQ-A-367
- SAE-AMS2417
- SAE-AMS2486
- SAE-AMS2488
- SAE-AMS2700
- SAE-AMS4134
- SAE-AMS4141
- SAE-AS4395
- SAE-AS4875
- SAE-AS8879
- T9070-AL-DPC-020/077-2

CONCLUDING MATERIAL

Custodians: Preparing activity:
Army - AV DLA - CC
Navy - AS
Air Force - 71 (Project 4730-2019-066)
DLA - CC

Review activities:
Army - AR, MI
Navy - SA
Air Force - 11

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.