

**HOSE ASSEMBLIES, FLEXIBLE METAL, AERONAUTICAL,
LOW PRESSURE**

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Revised

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1. SCOPE:

1.1 Scope: This Aeronautical Recommended Practice constitutes a specification covering the requirements and basic qualification tests of flexible metal hose assemblies intended for use in aeronautical applications to convey fuels, lubricants, coolants and gases in fuel systems, bleed air systems, heating and ventilating systems, cooling systems, anti-icing systems, fire extinguishing systems, instrument air systems, and for hydraulic and pneumatic system drain lines when used at pressures and temperatures within limits of Table I, and Figure I for type specified.

1.2 Classification: Hose assemblies shall be furnished in the following classified types, as specified. Unless otherwise specified, any of the types indicated may be furnished, at the option of the vendor provided that all material furnished on an individual order shall be of one type only.

1.3 Types:

Type I	-	400° F. Maximum
Type II	-	600° F. Maximum
Type III	-	800° F. Maximum
Type IV	-	1200° F. Maximum

1.3.1 Items qualified for Type I temperature rating may be furnished for temperature rating applications covered by Type I.

1.3.2 Items qualified for Type II temperature rating may be furnished for temperature rating applications covered by Type I or Type II.

1.3.3 Items qualified for Type III temperature rating may be furnished for temperature rating applications covered by Type I, Type II, or Type III.

1.3.4 Items qualified for Type IV temperature rating may be furnished for temperature rating applications covered by Type I, Type II, Type III or Type IV.

1.4 Code for Part Number Identification: The hose assembly part number shall be expressed in twelve digits beginning with the ARP Code Symbol Letter in the sequence stated below; except, when the relative position angle is other than zero degrees.

Section 8.3 of the SAE Technical Board rules provides that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

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it shall be expressed in degrees by three digits following the basic twelve digit code. In this case the hose assembly part number shall then contain 15 digits which is the maximum allowable.

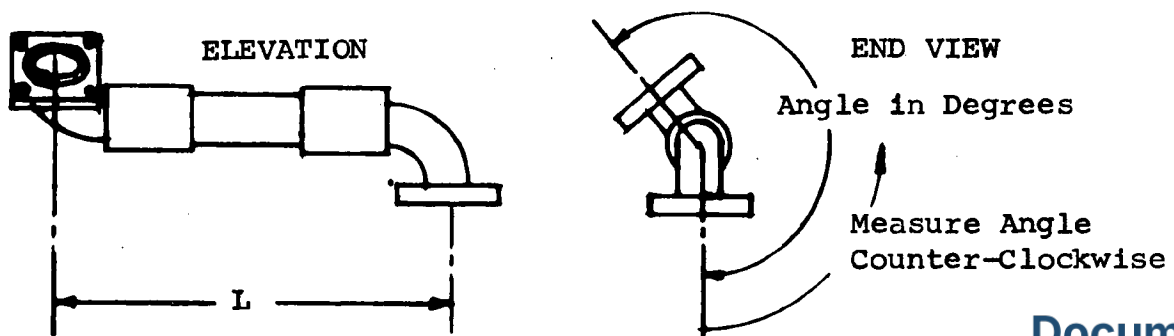
The basic 12 digit code shall contain the following information:

- 1 - First Digit - Code Symbol for ARP.
- 2 - Second Digit - Code number for ARP type.
- 3 - Third Digit - Code number for AS Fitting End Type on left hand end of assembly.
- 4 - Fourth Digit - Code number for Fitting End Style and Material on left hand end of assembly.
- 5 - Fifth Digit - Code number for AS Fitting End Type on right hand end of assembly.
- 6 - Sixth Digit - Code number for Fitting End Style and Material on right hand end of assembly.
- 7 - Seventh and Eighth Digits - Hose diameter in sixteenths of an inch.
- 8 - Ninth, Tenth, Eleventh and Twelfth Digits - Hose length in inches with twelfth digit expressing fractions in eighths of an inch.

1.4.1 Position Angle: The relative position angle is not shown in the part number unless the elbows are positioned at other than 0° .

1.4.1.1 Position Angle Code: The position angle code symbol shall be expressed in degrees in accordance with Section 1.4.1.2 in three digits using Arabic numerals.

1.4.1.2 To obtain the position angle, show the hose assembly in an elevation view. Draw an end view with the right end placed in front and in the vertical plane, and the left end placed behind it as shown. On an assembly with elbow fitting on each end, measure the relative angle counter-clockwise from the centerline of the front (right end) elbow to the centerline of the rear (left end) elbow fitting.



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1.4.2 ARP Code Symbol: The code symbol for ARP601 shall be the capital letter "A".

1.4.3 ARP Type Code Symbol: The code symbol for ARP601 Types shall be represented by Arabic numerals as follows:

Type I	Code Symbol 1
Type II	Code Symbol 2
Type III	Code Symbol 3
Type IV	Code Symbol 4

1.4.4 Fitting End Code Symbol: The code symbol for Aeronautical Standard (AS) Fitting End shall be represented by Arabic numerals as follows:

AS1011 Style "E" Hex	Code Symbol 0
AS1011	Code Symbol 1
AS1012	Code Symbol 2
AS1013	Code Symbol 3
AS1014	Code Symbol 4
AS1015	Code Symbol 5
AS1016	Code Symbol 6
AS1016 Style "E" Hex	Code Symbol 7

1.4.5 Fitting Style and Material: The code symbol for Aeronautical Standard (AS) Fitting End Style and Material shall be represented by Arabic numerals as follows:

Straight Style Stainless Steel	Code Symbol 1
45° Elbow Style Stainless Steel	Code Symbol 2
90° Elbow Style Stainless Steel	Code Symbol 3
Straight Style Steel Cadmium Plated*	Code Symbol 4
45° Elbow Style Steel Cadmium Plated*	Code Symbol 5
90° Elbow Style Steel Cadmium Plated*	Code Symbol 6

* Only the following parts of these AS Fitting End Styles are Steel Cadmium Plated:

Nut	- AN818 or MS21921 or similar thereto.
Sleeve	- MS20819

1.4.6 Size Code Symbol: The code symbol for hose size shall be expressed in two digits using Arabic numerals to represent the nominal hose ID in sixteenths of an inch.

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Examples: 1/2" ID is indicated by 08.
1" ID is indicated by 16.
2" ID is indicated by 32.

1.4.7 Length Code Symbol: The code symbol for hose assembly length in inches shall always be specified by 4 digits using Arabic numerals and the last digit shall always indicate fractions in eighths of an inch.

1.4.8 Example of a Part Number:

1.4.8.1 Basic 12 Digit Code Number: A14343160254

NOTE: If the relative position angle is not specified, elbows will be positioned at zero degrees.

The above example represents an ARP601 Type I Assembly 1" ID x 25-1/2" OA with AS1014 Fitting End 90° Elbow in Stainless Steel each end. Note: Being at 0°, the position angle is not expressed in the code number.

1.4.8.2 Code Number Specifying Relative Position Angle:
A14343160254210

The above example represents an ARP601 Type I Assembly 1" ID x 25-1/2" OA with AS1014 Fitting End 90° Elbow in Stainless Steel each end with 210° position angle of fittings.

Note: Drawing in Section 1.4.1.1 illustrates a 210° position angle with AS1014 fittings each end.

2. APPLICABLE DOCUMENTS:

2.1 The following documents shall form a part of this specification to the extent specified herein. The applicable issue of each shall be that in effect on the date of this Aeronautical Recommended Practice unless otherwise specified in the manufacturer's Model Specification. Supplementary specifications, standards, etc., which by reference in any of the following publications are indicated to be part thereof, shall not be considered as effective, except as specifically stated in the manufacturer's Model Specification, or as may be otherwise mutually agreed upon between the vendor and the purchaser.

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2.1.1 Specifications:

Military:

MIL-E-5272 Environmental Testing, Aeronautical and
Associated Equipment, General Specifications For
MIL-F-5509 Fittings, Fluid Connection
MIL-O-5606 Oil; Hydraulic, Aircraft, Petroleum Base
MIL-L-6082 Lubricating Oil; Aircraft Reciprocating (Piston)
Engine
MIL-F-18280 Fittings, Flareless, Fluid Connection

2.1.2 Standards:

MS20756 Flange, Swivel Fitting, Flanged
MS20819 Sleeve, Coupling
MS21921 Nut, Sleeve Coupling Flareless
MS33514 Fitting End, Standard Dimensions for Flareless
Tube Connection and Gasket Seal
MS33566 Fittings, Installation of Flareless Tube,
Straight Threaded Connectors
MS33584 Tubing End, Standard Dimensions for Flared
MS33656 Fitting End - Standard Dimensions for Flared
Tube Connection and Gasket Seal

2.1.3 Drawings:

Air Force - Navy Aeronautical Standard Drawings:

AN763 Gasket - Swivel Fitting, Flanged
AN818 Nut, Coupling

Air Force - Navy Aeronautical Design Standard Drawings:

AND10064 Fittings - Installation of Flared Tube,
Straight Threaded Connectors

2.2 Other Publications:

2.2.1 Aeronautical Material Specifications:

AMS2667 Brazing Silver, for Flexible Metal Hose
AMS2668 Brazing Silver, Flexible Metal Hose - 400 F Max
AMS2669 Brazing Silver, Flexible Metal Hose - 800 F Max
AMS3410 Flux, Silver Brazing
AMS4768 Brazing Alloy, Silver 35 Ag - 26 Cu - 21 Zn -
18 Cd
AMS4770 Brazing Alloy, Silver 50 Ag - 18 Cd - 16.5 Zn -
15.5 Cu
AMS4771 Brazing Alloy, Silver 50 Ag - 16 Cd - 15.5 Zn -
15.5 Cu - 3 Ni

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2.2.1 Aeronautical Material Specifications: (Continued)

AMS4772 Brazing Alloy, Silver 54 Ag - 40 Cu - 5 Zn - 1 Ni

2.2.2 Aeronautical Standards:

AS1011 Fitting End; Attachable, Male for 37° Flared Tube Connection, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

AS1012 Fitting End; Attachable, Swivel Female 37° Machined Flare, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

AS1013 Fitting End; Attachable, Swivel Female 37° Flared Tube, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

AS1014 Fitting End; Attachable, Swivel Flange, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

AS1015 Fitting End; Attachable, Flareless Female, Machined Nipple, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

AS1016 Fitting End; Attachable, Flareless Male, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles.

(Copies of the Aeronautical Material Specifications and Aeronautical Standards may be obtained from the Society of Automotive Engineers, Inc., 485 Lexington Avenue, New York 17, New York.)

3. REQUIREMENTS:

3.1 Qualification: Any hose assembly furnished under this specification shall be a product which consists of a pressure carrier and external braid covering, with fittings suitable for use in aeronautical piping systems at the applicable pressure and temperatures per Table I, and Figure I, and which has passed the basic qualification tests specified herein.

3.2 Materials and Processes: Materials and processes used in the construction of various types of hose assemblies enumerated in 1.3 shall be suitable for use at the maximum operating temperature specified for the applicable type of hose assembly. Materials and processes shall conform to applicable specifications; and to the requirements specified therein. All materials and processes which are not specifically described herein shall be of the highest quality and suitable for the purpose intended.