

# NATIONAL AIRCRAFT STANDARDS COMMITTEE

AIRCRAFT INDUSTRIES ASSOCIATION OF AMERICA, INC., 610 SHOREHAM BUILDING, WASHINGTON 5, D. C.

## SPECIFICATION FOR THE INSTALLATION OF

### PLASTIC FITTINGS AND TUBING

This specification covers the installation of plastic tube fittings and tubing. All parts of this specification shall apply unless otherwise specified.

- A. Applicable Specifications and Drawings
- B. Type
- C. Material and Workmanship
- D. General Requirements
- E. Detail Requirements
- F. Method of Inspection and Tests
- G. Packing, Marking, and Storage
- H. Notes

#### A. APPLICABLE SPECIFICATIONS AND DRAWINGS

A-1. Specifications and Drawings: The specifications and standard drawings listed below form a part of this specification, unless otherwise modified in the order or contract.

##### A-1a. Specifications:

NAS 278 Specification for tube fittings molded from thermosetting plastic materials

NAS 279 Specification for tubing fabricated from thermoplastic materials

##### A-1b. Standard Drawings:

NAS 240 Nut-Coupling, Flared Tube, Plastic

NAS 242 to NAS 276 inclusive, Plastic Fittings

NAS 281 Tubing - Thermoplastic

AN902 Gasket-Flared Tube, Universal Fitting

AN884 Hose - Aromatic Resistant Synthetic

AN748 Clamp-Hose

AND10065 Connection Assemblies; Flexible, Fluid, Standard design of

##### A-1c. Commercial Standards:

A3122 Clamp, Light Duty (Tinnerman)

#### B. TYPE

B-1. This specification covers the general requirements for the installation of synthetic tube-fittings and tubing for applications where the pressures are below 100 psi.

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| TITLE                                                                | CLASSIFICATION<br>SPECIFICATION                                                                                                                    |
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## C. MATERIAL AND WORKMANSHIP

C-1. Material: The material shall be selected with suitable properties for the particular application for which it is required as specified herein.

C-1a. Substitution: No substitutions shall be made unless the substitution material has at least the desired characteristics of the material specified.

C-a. Workmanship: The workmanship shall be consistent with the best practice and shall meet every requirement of this specification.

## D. GENERAL REQUIREMENTS

D-1. Fittings and Tubing: The use of plastic tube-fittings and tubing shall be in accordance with the general and detail requirements of this specification.

D-2. Applications: The fittings and tubing specified in this specification may be used in the following applications in accordance with limits of applicable tables.

- D-2a. Instrument Air Vacuum System
- D-2b. Instrument Air Pressure System
- D-2c. Instrument Pitot System
- D-2d. Air Pressure Anti-Icer System
- D-2e. Water System
- D-2f. Hydraulic Oil Return
- D-2g. Miscellaneous Oil Drain
- D-2h. Miscellaneous Air Vent
- D-2i. Fuel Vent
- D-2j. Pilot Relief
- D-2k. Battery Vent

D-3. Dissimilar Materials: Dissimilar material which meets the requirements of this specification may be used in combinations as follows:

- D-3a. Thermosetting plastic fittings with thermoplastic tubing.
- D-3b. Thermosetting plastic fittings with metal tubings.
- D-3c. Thermosetting plastic fittings with metal fittings.
- D-3d. Thermosetting plastic fittings with rubber and synthetic rubber.
- D-3e. Thermoplastic tubing with rubber and synthetic rubber.
- D-3f. Thermoplastic tubing shall not be used with metal fittings.

### D-4. Fittings:

D-4a. Fittings shall be properly selected for the application for which they are suited.

D-4b. Thermal resistance: Plastic fittings shall not be installed where the external or internal temperatures might exceed 121°C (250°F) or where the temperatures might fall below -62°C (-80°F).

D-4c. Chemical Resistance: Plastic fittings shall not be used with strong alkalies.

D-4d. Interchangeability: Where mechanical strength is not of primary importance, plastic fittings specified herein may be used interchangeably with corresponding AN standard fittings except as noted in D-3f.

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# NAS 280

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THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME PRODUCT, AND SHALL BECOME EFFECTIVE FOR VENDOR MANUFACTURERS NOT LATER THAN 6 MONTHS AFTER THE LATEST DATE OF APPROVAL SHOWN.

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D-4e. Substitution: Where weight and chemical resistance is not of primary importance, corresponding AN standard fittings may be substituted, except as noted in D-3f.

D-4f. Wrench Torque: The minimum and maximum installation wrench torque shall be established for each size and shape of fitting. The minimum installation wrench torque shall be 60% and the maximum shall be 70%, of the torque required for failure of the fittings.

D-4g. Thread Lubricant: Thread Lubricant which contains petroleum with no ingredients harmful to the fittings and tubing may be used. When thread lubricant is used, it shall be applied in the proper proportions to avoid excess lubricant on the inside and outside of the connection.

D-4h. Gaskets: Standard AN902 gaskets shall be used with applicable fittings.

## D-5. Tubing:

D-5a. Selection: The class and size of tubing shall be selected from applicable detail drawings to suit the required application.

D-5b. Thermal Resistance: Plastic tubing shall be selected for thermal resistance in accordance with the limits of detail drawings, but not in excess of the limits of NAS 279.

D-5c. Chemical Resistance: Plastic tubing shall be selected for chemical resistance in accordance with the limits of Table I.

D-5d. Internal Pressure: Tubing shall not be subjected to pressures exceeding 30% of the bursting pressures at the maximum temperature recommended in the detailed specification NAS279.

D-6. Flexible Connections: Where the hose and clamp type of flexible connections are required, approved type hose shall be used. Except in special cases, the hose shall overlap both the fittings and tubing in accordance with AND10065.

D-6a. Flexible Cap: NAS 244 cap shall be used to close auxiliary beaded outlets in vacuum and pitot systems. This includes beaded fitting, beaded tubing, and beaded connections on manifolds.

D-7. Hose Clamps: Only light duty hose clamps shall be used to secure flexible hose to plastic tubing which has no metal reinforcements. The following commercial products are approved as light duty clamps: Tinnerman A3122

① D-7a. Light or heavy duty clamps shall be used to secure flexible hose to plastic tubing which is reinforced in accordance with Figure 6. The following clamps are approved for this application. AN748 (Medium or heavy duty) Tinnerman A3122 (Light duty)

D-7b. Tightening Load: The torque applied to the screw of screw take-up type clamps, shall not be more than 20 inch pounds nor less than 15 inch pounds. Ratchet type clamps shall be approximately the highest value obtainable using standard 6" pliers.

D-7c. Deformation: The following shall be inspected at room temperature at least three (3) hours after application. The application of hose clamps shall not cause the plastic tubing to become out-of-round by more than 3% of the tubing O.D. Extreme circumferential pressures which would decrease the tubing diameter by more than 2% shall be avoided.

D-8. Tubing Supports: Standard practices for supporting non-ferrous metal tubing shall be used in supporting plastic

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