

SEMI F52-1101

DIMENSIONAL SPECIFICATION FOR METRIC TETRAFLUOROETHYLENE PERFLUOROALKYL VINYL-ETHER COPOLYMER (PFA) TUBES FOR LIQUID CHEMICAL DISTRIBUTION IN SEMICONDUCTOR AND FLAT PANEL DISPLAY MANUFACTURING

This Standard was technically approved by the Liquid Chemicals Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on June 19, 2001. Available at www.semi.org in November 2001; originally published June 2000.

NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Purpose

1.1 This Document defines sizes and their measurement methods of metric tetrafluoroethylene perfluoroalkyl vinyl-ether copolymer (PFA) tubes for liquid chemical distribution in semiconductor and flat panel display manufacturing equipment and facilities.

2 Scope

2.1 This Document applies to metric tubes made from PFA.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 ISO Standard¹

ISO 4397 — Fluid Power System and Components – Connectors and Associated Components – Outside Diameters of Tubes and Inside Diameters of Hoses

3.2 JASO Standards²

JASO F 409-91 — Fittings for Polyamide (Nylon) Tube

JASO M 317-73 — Nylon Tube for Automobile Air Brake Piping

3.3 JIS Standards³

JIS B 7502 — External Micrometer

JIS B 8381 — Fittings for Flexible Tube Used at Atmospheric Pressure

JIS K 6890 — Tube Made from Tetra-Fluoroethylene Resin

3.4 SAE Standards⁴

SAE J 844 — Nonmetallic Air Brake System Tubing

SAE J 1394 — Metric Nonmetallic Air Brake System Tubing

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

¹ International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland; Telephone: +41.22.749.01.11, <http://www.iso.org>

² Japanese Automobile Standards Organization/Society of Automotive Engineers of Japan, Goban-cho Center Bldg., 10-2 Goban-cho, Chiyoda-ku, Tokyo 102-0076, Japan.

³ Japanese Standards Association, 4-1-24 Akasaka, Minato-ku, Tokyo 107-8440, Japan; Telephone: +81.3.3583.8005, Fax: +81.3.3586.2014, <http://www.jsa.or.jp>

⁴ Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA.

4 Terminology

4.1 Abbreviations and Acronyms

- 4.1.1 *ID* — inside diameter
- 4.1.2 *ISO* — International Organization for Standardization
- 4.1.3 *JASO* — Japan Automobile Standard
- 4.1.4 *JIS* — Japanese Industrial Standard
- 4.1.5 *OD* — outside diameter
- 4.1.6 *PFA* — tetrafluoroethylene perfluoroalkylvinyl-ether copolymer
- 4.1.7 *SAE* — Society of Automotive Engineers

4.2 Definitions

- 4.2.1 *dial thickness gauge* — an instrument used to measure wall thickness with a dial meter.
- 4.2.2 *liquid chemical* — acid, alkali, organic solvent, and pure water used for wet stations; resists and developers used for track system; and other chemicals used for process or maintenance (such as slurry of chemical-mechanical polishing) of equipment or facilities.
- 4.2.3 *outside diameter tolerance* — allowable deviation of the outside diameter of PFA tube from the specified dimension.
- 4.2.4 *projector* — an instrument used to measure shape and dimension of an object by optically projecting it at a given magnification. Also referred to as a measuring projector or profile projector.
- 4.2.5 *wall thickness* — thickness of the wall of the PFA tube.
- 4.2.6 *wall thickness deviation* — deviation of wall thickness.
- 4.2.7 *wall thickness tolerance* — allowable deviation of actual measurement of wall thickness from its specification.

5 Nominal Size and Dimensional Specification

5.1 A nominal tube size is indicated by 'outside diameters/inside diameter'. This Document provides specifications for eight nominal tube sizes as shown in Table 1.

5.2 The indication of the nominal size for metric PFA tubes is preferably printed on each package for shipping.

Table 1 Tube Size (mm)

OD/ID	25/22	19/16	12/10	10/8	8/6	6/4	4/3	3/2
OD Tolerance	±0.2	±0.15	±0.15	±0.12	±0.12	±0.1	±0.1	±0.1
Wall Thickness	1.5	1.5	1.0	1.0	1.0	1.0	0.5	0.5
Wall Thickness Tolerance	±0.15	±0.15	±0.1	±0.1	±0.1	±0.1	±0.05	±0.05
Wall Thickness Deviation	0.15	0.15	0.1	0.1	0.1	0.1	0.05	0.05

#1 The specified sizes should be measured at $23 \pm 3^{\circ}\text{C}$. The specimen should be kept in the environment for more than 1 hour prior to the measurement.

#2 Refer to JASO F 409-91 and JASO M 317-73 for outside and inside diameter of 10/8, 8/6 and 6/4 tubes.

#3 Refer to JIS B 8183 for outside and inside diameter of 8/6 and 6/4 tubes.

#4 Refer to JIS B 6890 for outside and inside diameter of 12/10, 10/8, 8/6, 6/4, 4/3 and 3/2 tubes.

#5 Refer to SAE J 844 for outside diameter of 19/16 tube.

#6 Refer to SAE J 1394 for outside and inside diameter of 8/6 and 6/4 tubes.

#7 Refer to ISO 4397 for outside diameter of 25/22, 12/10, 10/8, 8/6 and 4/3 tubes.