

SEMI F18-95 (Reapproved 0413) GUIDE FOR DETERMINING THE HYDROSTATIC STRENGTH OF, AND DESIGN BASIS FOR, THERMOPLASTIC PIPE AND TUBING

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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 To identify a test method for measuring the hydrostatic strength of thermoplastic pipe and tubing, a method for estimating long-term hydrostatic strength, and recommendations for developing design bases.

2 Scope

2.1 This Guide references the industry-recognized Standard Test Method for determining the time-to-failure of plastic pipe under constant internal pressure.

2.2 This Guide references the industry-recognized Standard Test Method for determining the long-term hydrostatic strength of plastic pipe in order to obtain the hydrostatic design basis of the pipe material.

2.3 This Guide references the Technical Report of policies and procedures for developing recommended hydrostatic design stresses for thermoplastic pipe materials from 23°C to 93.3°C (73°F to 200°F).

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3 Referenced Standards and Documents

3.1 *ASTM Standards*¹

ASTM D1598 — Standard Test Method for Time-to-Failure of Plastic Pipe under Constant Internal Pressure

ASTM D2837 — Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials

3.2 *PPI Technical Report*²

TR-3/92 — Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials

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

4 Terminology

4.1 Currently this Document contains no terminology.

5 Summary of Referenced Documents

5.1 *ASTM Standards*

5.1.1 *ASTM D1598* — This test method consists of exposing specimens of pipe/tube to a constant internal pressure while in a controlled environment. Such a controlled environment may be accomplished by immersing the specimens in a controlled-temperature water or air bath. The time-to-failure is measured.

5.1.2 *ASTM D2837* — The procedure for estimating long-term hydrostatic strength is essentially an extrapolation, with respect to time, of a stress-time regression line based on data obtained in accordance with ASTM D1598. Stress-

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, <http://www.astm.org>

² Plastic Pipe Institute, 355 Lexington Avenue, New York, NY 10017, USA

failure time plots are obtained for the selected temperature and environment: the extrapolation is made in such a manner that the long-term hydrostatic strength is estimated for these conditions.

5.2 PPI Technical Report

5.2.1 TR-3/92 — These policies and procedures are for development of recommendations for thermoplastic pipe compounds based on test data from good quality pipes made by specific processing techniques. These recommendations may or may not be valid for pipes made by differing processing techniques.

6 Comments

6.1 The Hydrostatic Stress Committee of the Plastic Pipe Institute (PPI) has recommended a minimum safety factor of 200% based on the hydrostatic design basis. The safety factor is intended to make allowance for manufacturing and testing variables such as normal variations in the material, manufacturing process, dimensions, and in the evaluation procedures (ASTM D2837 and ASTM D1598).

6.2 Application conditions also need to be taken into consideration and may require an increased safety factor. For example, with liquid hydrocarbons and other chemicals, temperature can have a disproportional effect on the long-term performance of the tubing or pipe. No general safety factor has been established for these types of services, so each case should be designed on its own merit.

NOTE 1: It is strongly recommended that the user of pipe/tube confirm that the product has been tested per ASTM D1598, ASTM D2837, and TR-3/92 to ensure a proper pressure rating.

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