



ICBO Evaluation Service, Inc.

A subsidiary corporation of the International Conference of Building Officials

5360 WORKMAN MILL ROAD

• WHITTIER, CALIFORNIA 90601-2299

• (310) 699-0543
FAX (310) 695-4694

ACCEPTANCE CRITERIA FOR CROSS-LINKED POLYETHYLENE (PEX) TUBE AND FITTINGS FOR USE IN HYDRONIC HEATING SYSTEMS (PROPRIETARY)

AC112
July 1996

Previously issued July 1995

PREFACE

Evaluation reports issued by the ICBO Evaluation Service, Inc. (ICBO ES), are based upon performance features of the *Uniform Building Code*[™], *ICBO Uniform Mechanical Code*[™] and related codes. Section 104.2.8 of the Uniform Building Code is the primary charging section upon which evaluation reports are issued. Section 104.2.8 reads as follows:

The provisions of this code are not intended to prevent the use of any material, alternate design or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.

The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with the provisions of this code and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.

The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency.

The attached acceptance criteria for the general code sections noted have been issued to provide all interested parties with guidelines on implementing performance features of the codes. The attached acceptance criteria were developed and adopted following public hearings conducted by the Evaluation Committee. These criteria may be revised from time to time as the need dictates.

ICBO ES may consider alternate criteria, provided the proponent submits valid data demonstrating that the alternate criteria are at least equivalent to the attached criteria and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a material, type or method of construction, or equipment, meets the attached acceptance criteria, or it can be demonstrated that valid alternate criteria are equivalent and otherwise meet the applicable performance requirements of the codes, if the material, product, system or equipment is such that either unusual care with its installation or use must be exercised for satisfactory performance, or malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use thereof, ICBO ES retains the right to refuse to issue or renew an evaluation report.

Published by the

International Conference of Building Officials

5360 WORKMAN MILL ROAD • WHITTIER, CALIFORNIA 90601-2298

Copyright © 1996 ICBO Evaluation Service, Inc.

PRINTED IN THE U.S.A.

ACCEPTANCE CRITERIA FOR CROSS-LINKED POLYETHYLENE (PEX) TUBE AND FITTINGS FOR USE IN HYDRONIC HEATING SYSTEMS (Proprietary)

1. INTRODUCTION

Scope: The purpose of these criteria is to establish requirements for ICBO Evaluation Service, Inc. (ICBO ES), recognition of proprietary cross-linked polyethylene (PEX) tubing and associated fittings under Appendix B, Chapter 12, of the 1994 ICBO Uniform Mechanical Code. These criteria cover PEX tube and fittings which do not conform to the dimensional requirements of ASTM F 876 which are intended for use in hydronic heating systems with a maximum continuous use temperature of 180°F. at a pressure of 100 psi.

2. DEFINITIONS

Failure is defined as:

2.1 Failure is any continuous loss of pressure resulting from the transmission of the test liquid through the body of the specimen under test.

2.2 Ballooning is any abnormal localized expansion of a tubing specimen while under internal hydraulic pressure.

2.3 Bursting is failure by a break in the tubing with immediate loss of test liquid and continued loss at essentially no pressure.

2.4 Seepage or Weeping is failure that occurs through essentially microscopic breaks in the tubing wall, frequently only at or near the test pressure. At lower pressures, the tubing may carry liquids without evidence of loss of the liquids.

3. BASIC INFORMATION AND REPORTS OF TESTS

3.1 Product Description: Complete information, as applicable, concerning dimensions, tolerances, formulation, components, manufacturing process and installation procedures.

3.2 Packaging and Identification: Method of packaging and identification of components.

3.3 Testing: An ICBO ES or NES accredited independent testing agency shall sample test specimens, conduct tests and prepare test reports.

Testing Laboratories shall comply with the ICBO ES Acceptance Criteria for Laboratory Accreditation (AC89).

3.4 Test Reports: Test reports shall comply with the ICBO ES Acceptance Criteria for Test Reports.

3.5 Test Conditioning: Condition test specimens at 73.4°F. ± 3.6°F. and 50 ± 5 percent relative humidity for not less than 40 hours prior to test, unless otherwise specified in these criteria.

3.6 Test Specimens: Not less than 50 percent of the test specimens required for any test shall have at least a part of the marking in their central sections. The central section is that portion of the hose that is at least one tubing diameter away from an end closure.

3.7 Testing: Tests must be performed using representative proprietary fittings assembled in accordance with manufacturer's recommended methods.

4. REQUIRED DATA

4.1 Dimensions: Outside diameter and wall thickness of tube and outside diameter of fittings shall be determined in accordance with Section 7.4 of ASTM F 876-90.

4.2 Physical Tests: Tests must be conducted in accordance with Sections 4.2, 6.1, 6.3, 6.4, 6.5, 6.6, 6.7 and 6.8 of ASTM F 876-90 and Sections 4.2, 5.2, 6.1, 6.3, 6.4, 6.5, 6.6, 6.7 and 9 of ASTM F 877-89.

4.3 Hydrostatic Design Basis: The hydrostatic design basis of the tube shall be determined in accordance with the requirements of

PPI Technical Report TR-3/92 for standard grades at 180°F., following the methods of ASTM D 2837.

The rated pressure of the tube is calculated as follows:

$$P = \frac{2(DF)(HDB)}{(D_o/t - 1)}$$

Where:

P = Rated pressure, psi.

DF = Design factor = 0.50.

HDB = Hydrostatic design basis, psi.

D_o = Outside diameter of tube, in.

t = Thickness of tube, in.

Condition of acceptance is that the tube and fittings shall be rated at 100 psi pressure at 180°F. temperature.

Exception: For products cross-linked by peroxides, Azo compounds in extrusion, electron beams after extrusion or silane method, hydrostatic design basis may be determined in accordance with PPI Technical Report TR-3/92 for experimental grades at 180°F., provided the requirements of the standard grade at 180°F. are met, and data submitted to ICBO ES, within the period of time specified in PPI TR-3.

5. LIMITATIONS OF RECOGNITION

5.1 Systems using this tube are not connected to the potable water supply.

5.2 The PEX tubing is recognized for use only with fittings as determined by testing in these criteria.

6. QUALITY CONTROL

The PEX tube and associated fittings shall be produced under a quality control program administered by an inspection agency currently accredited by ICBO Evaluation Service, Inc., or the National Evaluation Service, Inc. A quality control manual developed in conjunction with the approved agency and complying with the ICBO ES Acceptance Criteria for Quality Control Manuals (AC10) must be submitted.

7. MARKING

7.1 Tube shall be marked at minimum intervals of 5 feet as follows:

7.1.1 Manufacturer's name or trademark.

7.1.2 Name or logo of quality control agency.

7.1.3 Pressure rating at 180°F.

7.1.4 Nominal size.

7.1.5 A code number identifying the materials and the date of manufacture.

7.1.6 Evaluation report number.

7.2 Fittings shall be identified with markings as noted in Sections 7.1.1 and 7.1.2 in addition to the designation 180°F.

7.3 Packaging for fittings shall be identified as follows:

7.3.1 Manufacturer's name or trademark.

7.3.2 Name or logo of quality control agency.

7.3.3 Pressure rating at 180°F.

7.3.4 Nominal size.

7.3.5 Evaluation report number.

7.4 Manufacturer shall provide adequate labeling and instruction on tube and fitting compatibility to prevent use of noncompatible components.