

PMG LISTING CRITERIA FOR UNDERGROUND PLASTIC AIR DUCTS

**LC1014
(Reference EG290)**

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PREFACE

Plumbing, mechanical and fuel gas (PMG) listings issued by ICC Evaluation Service, LLC (ICC-ES), are based upon performance features of the *International Plumbing Code*®, *International Mechanical Code*®, *International Residential Code*®, *Uniform Plumbing Code* and *Uniform Mechanical Code*. Section 105.2 of the *International Plumbing Code*® reads as follows:

Alternative materials, methods and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of 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 quality, strength, effectiveness, fire resistance, durability and safety.

Similar provisions are contained in the Uniform Codes.

ICC-ES may consider alternate listing criteria, provided the listing applicant submits valid data demonstrating that the alternate listing criteria are at least equivalent to the listing criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise demonstrate compliance with the performance features of the codes, ICC-ES retains the right to refuse to issue or renew a listing, if the product, material, or type or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

Listing criteria are developed solely for use by ICC-ES for purposes of issuing ICC-ES PMG listings.

1.0 INTRODUCTION

1.1 Purpose: The purpose of this listing criteria is to establish requirements for underground plastic air ducts with plastic fittings to be recognized in an ICC Evaluation Service, LLC (ICC-ES), listing.

1.2 Scope: This listing criteria addresses plastic air ducts with plastic fittings that are to be installed underground or within concrete slabs.

1.3 Codes and Referenced Standards:

Note: Any standard referenced herein shall be the current edition of that standard. In instances where the applicable code references a different edition of a given standard, the applicant shall also provide documentation of conformance with the code referenced standard edition.

1.3.1 2006, 2009, 2012, and/or 2015 *International Mechanical Code*[®] (IMC), Chapter 6, Duct Systems. International Code Council.

1.3.2 2006, 2009, 2012, and/or 2015 *International Residential Code*[®] (IRC), Chapter 16, Duct Systems. International Code Council.

1.3.3 2006, 2009, 2012, and/or 2015 *International Plumbing Code*[®] (IPC), Chapter 3, General Regulations. International Code Council.

1.3.4 2006, 2009, 2012, and/or 2015 *Uniform Mechanical Code*^{*} (UMC), Chapter 1, Administration and Chapter 6, Duct Systems. International Association of Plumbing and Mechanical Officials.

1.3.5 2006, 2009, 2012, and/or 2015 *International Energy Conservation Code*[®] (IECC). International Code Council.

1.3.6 ASTM C 518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. ASTM International.

1.3.7 ASTM D 1248, Specification for Polyethylene Plastic Extrusion Materials for Wires and Cables. ASTM International.

1.3.8 ASTM D 1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (PVC) Compounds. ASTM International.

1.3.9 ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers

and Other Gravity-Flow Applications. ASTM International.

1.3.10 ASTM D 2412, Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading. ASTM International.

1.3.11 ASTM D 3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings. ASTM International.

1.3.12 ASTM E 84, Test Method for Surface Burning Characteristics of Building Materials. ASTM International.

1.3.13 ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe. ASTM International.

1.3.14 NSF Protocol P374, Air Duct Thermal Efficiency Performance. National Sanitation Foundation.

1.3.15 UL 723, Standard Test for Surface Burning Characteristics of Building Materials. Underwriters Laboratories Inc.

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2.0 BASIC INFORMATION

2.1 Product Description: Complete information shall be submitted concerning material specifications, thickness, size and the manufacturing process.

2.2 Installation Instructions: Product shall be installed in accordance with the manufacturer's instructions and the requirements of codes and standards referenced in Section 1.3.

2.3 Product and Packaging Identification: The unit and the packaging shall be permanently and legibly marked with the manufacturer's name or trademark and the model number. The ICC-ES listing number shall be placed on the listed product's packaging or installation instructions.

3.0 GENERAL REQUIREMENTS FOR UNDERGROUND PLASTIC AIR DUCTS

3.1 Code-prescribed Materials: The International Codes specifically allow plastic materials as noted in Sections 3.1.1 and 3.1.2 for use in underground air duct systems. Other materials, when

successfully tested according to Section 4.0, are considered acceptable alternatives.

3.1.1 IMC: Plastic ducts shall be polyvinyl chloride (PVC) or high-density polyethylene (HDPE) having a minimum pipe stiffness of 8 psi (55kPa) at 5 percent deflection when tested in accordance with ASTM D 2412.

3.1.2 IRC: Plastic ducts shall conform to cell classification 12454-B of ASTM D 1248 or ASTM D 1784, and the external loading properties of ASTM D 2412.

3.2 Sealing Methods: The listing shall include sealing methods specified by the manufacturer.

4.0 TEST METHOD AND PERFORMANCE REQUIREMENTS

4.1 Surface Burning Comparison Tests: When plastic duct materials are used other than those noted in Section 3.0, above, comparative testing shall be performed. Testing in accordance with ASTM E 84 shall be performed on both the product samples and the equivalent size of one of the following plastic pipings: for the IMC, any PVC piping or HDPE fittings having a minimum pipe stiffness of 8 psi (55kPa) at 5 percent deflection when tested in accordance with ASTM D 2412; for the IRC, plastic piping conforming to cell classification 1254-B of ASTM D 1248 or ASTM D 1784. Tests shall be conducted on the smallest and largest diameter for which recognition is sought. The maximum flame-spread and smoke-developed indices of the submitted material shall be less than or equal to the indices for equivalent-size plastic pipe conforming to the referenced standards.

Exceptions: No comparison tests are required for:

1. Ducts which have been shown, by testing, performed in accordance with ASTM E 84, to have a maximum flame-spread index of not more than 25 and a maximum smoke-developed index of not more than 50.
2. For uses limited to the IRC: Plastic material demonstrating a maximum flame spread rating of 200 when tested according to ASTM E 84 / UL 723 or for materials qualifying for use under the IMC.

4.2 Strength Testing: Testing in accordance with ASTM D 2412 shall be performed on samples of the smallest and largest diameter for which recognition is sought. The minimum pipe stiffness shall be 8

psi (55kPa) at 5 percent deflection. Results of testing shall produce allowable loading values in pounds per linear foot for each duct diameter to be included in the listing.

4.3 Leakage Testing:

4.3.1 For Use Underground, But Above the Base Flood Elevation (BFE): All longitudinal and transverse joints, seams and connections shall be sealed in accordance with IMC Section 603.9 and in accordance with the manufacturer's installation instructions.

4.3.2 For Use Underground, But Below the BFE: For recognition of installation below the BFE, a minimum of four fittings shall be attached to five lengths of straight duct sections in accordance with the manufacturer's installation instructions. The ends shall be sealed. The duct assembly noted shall be externally tested with water to a pressure equivalent to two times the pressure exerted by the depth for which recognition is sought. Water shall not enter the assembly for the 24-hour test period.

4.4 Determination of Thermal Resistance Values (R-Value) for Ducting Systems: Thermal resistance value of insulation should be determined by ASTM C 518.

4.5 Determination of Thermal Distribution Efficiency (TDE) for Ducting Systems: Thermal distribution efficiency of air ducts should be determined by NSF Protocol 374.

4.6 Energy Conservation Characteristics: Chapter 4 of the IECC should be used to determine the energy conservation capabilities of the duct system.

5.0 LISTING RECOGNITION

5.1 The listing shall state that the maximum temperature for air conveyed by the underground plastic duct system shall be 150°F (66°C) at the discharge of the unit entering the system.

5.2 The listing shall state that the duct evaluated under this criteria shall only be installed underground or embedded, and that the pipe shall not be used in exposed applications.

5.3 The listing shall state that duct sizing shall be in accordance with Section 603.2 of the IMC.

5.4 The listing shall state that the installed duct shall slope to allow drainage to a point provided with access.

5.5 The listing shall state that design of concrete slabs with embedded air duct pipe is beyond the scope of this evaluation.

5.6 The listing shall state that underground air duct pipes located below the base flood elevation shall be designed and installed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design floor elevation, in accordance with IMC Section 603.13.

5.7 The listing shall state the maximum depth Below Flood Elevation at which the duct can be installed, based on testing in accordance with Section 4.3.2.