



Standard Guide for Evaluating the Relative Effectiveness of Building Systems to Resist the Passage of Products of Combustion Based on the Aggregation of Leakage Rates¹

This standard is issued under the fixed designation E3021/E3021M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides a method of evaluating the relative effectiveness of building systems to resist the passage of smoke.

1.2 The method of evaluating the relative effectiveness of a building system is based on the aggregation of leakage rates of openings, penetrations, joints and interfaces of the construction elements forming the building system.

1.3 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

E176 Terminology of Fire Standards

E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E1424 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen

2.2 Underwriters Laboratories Standards:³

UL 555S Standard for Smoke Dampers

UL 1479 Fire Tests of Through-Penetration Firestops

UL 1784 Standard for Air Leakage Tests of Door Assemblies

UL 2079 Tests for Fire Resistance of Building Joint Systems

3. Terminology

3.1 For definitions of terms other than those contained in this guide, refer to Terminology E176.

3.2 Definitions:

3.2.1 *building system, n*—for the purpose of this guide, a building system is defined as any assembly of wall, floor, or combination floor and ceiling elements, as applicable, including any penetrating items, intended to function as a barrier to resist the passage of products of combustion through the barrier.

NOTE 1—See commentary for examples of building systems.

4. Summary of Guide

4.1 Using current air leakage rate tests and test results, this guide provides a method of aggregating the air leakage rates for the various components, interfaces and penetrations in a building system.

4.2 The determination of the total air leakage rates of building systems provides a direct comparative tool for the relative ranking of such building systems.

5. Significance and Use

5.1 Use of this guide can be beneficial in determining the relative effectiveness of building systems as it relates to potential protection from passage of products of combustion between building spaces under both ambient and elevated temperatures.

5.2 Determining the relative effectiveness of a building system to limit the total air leakage between building spaces is

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, <http://www.ul.com>.