



Designation: E1091 – 21

Standard Specification for Nonmetallic Honeycomb Core for Use in Shelter Panels¹

This standard is issued under the fixed designation E1091; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification is for nonmetallic honeycomb core used in the manufacture of adhesively bonded sandwich panels for tactical shelters. The materials are intended for adhesive bonding to aluminum facings using materials and processes defined by Practices E864 and E874, and Specifications E865, E866, and E990. This specification covers five main types of honeycomb for use in sandwich panels, Types I, II, III, IV, and V. Types I, II, and III honeycombs correspond to three honeycomb densities. Types IV and V are similar to Types II and III, respectively, but have lower performance requirements.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard. For conversion of quantities in various systems of measurement to SI units, refer to Practice E380.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.53 on Materials and Processes for Durable Rigidwall Relocatable Structures.

Current edition approved Feb. 1, 2021. Published February 2021. Originally approved in 1986. Last previous edition approved in 2013 as E1091 – 13. DOI: 10.1520/E1091-21.

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.

B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C366/C366M Test Methods for Measurement of Thickness of Sandwich Cores

C481 Test Method for Laboratory Aging of Sandwich Constructions

C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

E380 Practice for Use of the International System of Units (SI) (the Modernized Metric System) (Withdrawn 1997)³

E631 Terminology of Building Constructions

E864 Practice for Surface Preparation of Aluminum Alloys to Be Adhesively Bonded in Honeycomb Shelter Panels

E865 Specification for Structural Film Adhesives for Honeycomb Sandwich Panels

E866 Specification for Corrosion-Inhibiting Adhesive Primer for Aluminum Alloys to Be Adhesively Bonded in Honeycomb Shelter Panels

E874 Practice for Adhesive Bonding of Aluminum Facings to Nonmetallic Honeycomb Core for Shelter Panels

E990 Specification for Core-Splice Adhesive for Honeycomb Sandwich Structural Panels

E1749 Terminology Relating to Rigid Wall Relocatable Shelters

F501 Test Method for Aerospace Materials Response to Flame, with Vertical Test Specimen (for Aerospace Vehicles Standard Conditions) (Withdrawn 1998)³

2.2 *Federal Aviation Regulation:*⁴

FAR 25.853(a) Compartment Interiors

2.3 *Federal Standards:*⁵

FED-STD-191A Textile Test Methods

QQ-A-250/8 Aluminum Alloy 5052, Plate and Sheet

QQ-A-250/11 Aluminum Alloy 6061, Plate and Sheet

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, <http://www.faa.gov>.

⁵ Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil/>.

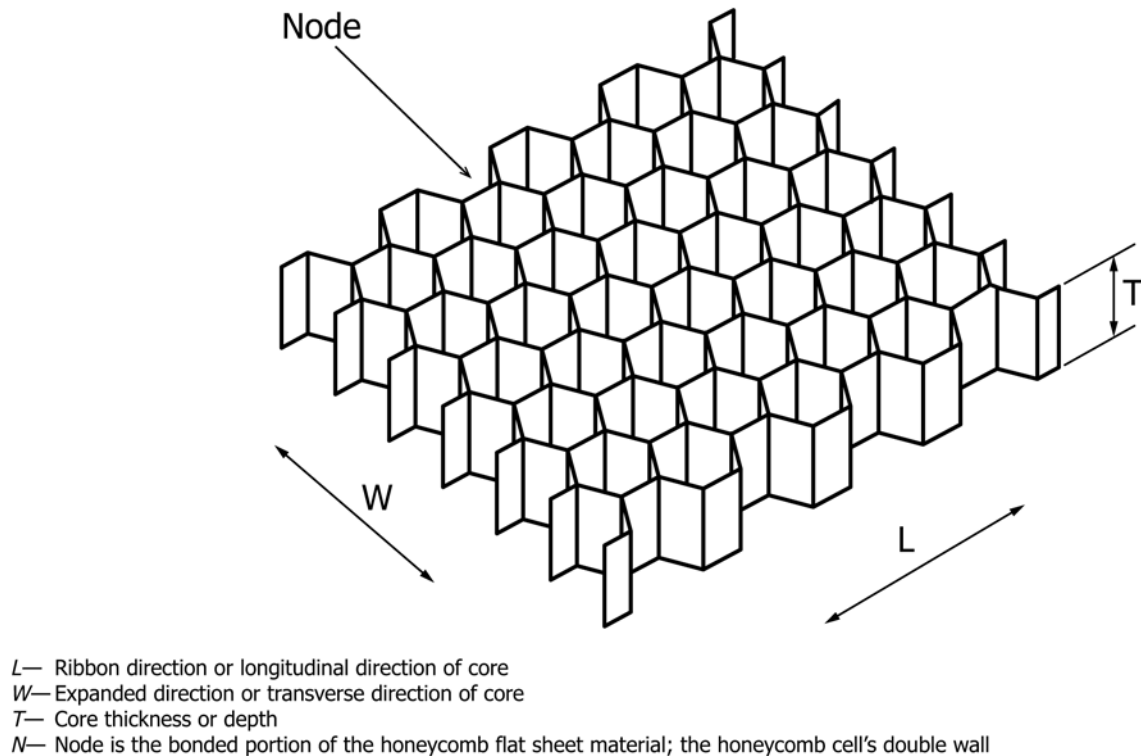


FIG. 1 Orientation of Cells in Honeycomb-Core Material

2.4 Military Standards:⁵

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-401 Sandwich Constructions and Core Materials; General Test Methods

2.5 TAPPI Standard:⁶

T 435-SU-68 Test Method for Hydrogen Ion Concentration of Paper Extracts, Hot Extraction Method

2.6 Other Publications:

Uniform Freight Classification⁷

National Motor Freight Classification⁸

3. Terminology

3.1 Definitions:

3.1.1 For definitions of general terms related to building construction used in this specification, refer to Terminology E631, and for general terms related to rigid wall relocatable shelters, refer to Terminology E1749.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *block, n*—a single production unit of honeycomb before slicing.

3.2.2 *cell size, n*—the average distance between node bonds, measured along the W direction (Fig. 1), for at least 60 cells, selected at random in groups containing 10 adjacent cells.

3.2.3 *core material, n*—a slice or sheet cut from a production block that is used in a honeycomb sandwich panel. The orientation of the cells in the honeycomb core material as produced is shown in Fig. 1. The honeycomb core materials exhibit anisotropic behavior, therefore the following notation is used:

L = ribbon direction or longitudinal direction of core,

W = expanded direction or transverse direction of core,

T = core thickness or depth, and

N = bonded portion of the honeycomb flat sheet material; the honeycomb cell's double wall.

3.2.4 *first article, n*—a sample sheet of honeycomb from the first lot produced.

3.2.5 *lot, n*—1000 ft³ (28.3 m³) or less of honeycomb of the same type produced during consecutive operating or working days using the same basic materials and operating conditions.

3.2.6 *sheet, n*—a slice of honeycomb cut from a production block.

⁶ Available from Technological Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Suite 115, Peachtree Corners, GA 30092, <http://www.tappi.org>.

⁷ Available from RAILINC, 7001 Weston Parkway, Suite 200, Cary, NC 27513, <https://public.railinc.com/>.

⁸ Available from National Motor Freight Traffic Association, Inc. (NMFTA), 1001 N. Fairfax St., Suite 600, Alexandria, VA 22314-1798, <http://www.nmfta.org>.