



Designation: D1185 – 98a (Reapproved 2025)

Standard Test Methods for Pallets and Related Structures Employed in Materials Handling and Shipping¹

This standard is issued under the fixed designation D1185; 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 These test methods cover the performance of pallets and related structures, functioning as skids, bases, platforms, and bins in materials handling and shipping. Their use facilitates the protection of both packaged and unpackaged products during storage and transportation. The test methods include measurements of the relative resistance of pallets and related structures to deformations, damages, and structural failures which detrimentally affect the functionality of the unit load.

1.2 These test methods include conditioning requirements, static stiffness and strength tests, and dynamic tests of structural reliability. These test methods are used to evaluate the relative performance of new, used, or reconditioned general and special-purpose pallets fabricated from various materials including solid wood, wood composites, fiberboard, honeycomb, plastics, or metal, or to compare the performance of such pallets and related structures to specified performance criteria. Recommended criteria for all tests specified in this standard are listed in [Appendix X2](#).

1.2.1 These test methods are also used to classify pallets as single- or multiple-use pallets and to determine the safe working loads for pallets under specified load and support conditions.

1.3 *Nonmandatory Preliminary Tests*—Because each pallet may be used under several different conditions of load and support, pallet-design considerations and safe working-load estimates shall be based on that condition under which the pallet offers least resistance or is most severely stressed.

1.3.1 Preliminary, short-duration static tests up to the ultimate (see [8.2](#), [8.3](#), and [8.4](#)) shall be performed on previously non-tested pallets to determine which load and support conditions influence most severely the pallet load-carrying capacity and safe working loads.

¹ These test methods are under the jurisdiction of ASTM Committee D10 on Packaging and are the direct responsibility of Subcommittee D10.21 on Shipping Containers and Systems - Application of Performance Test Methods.

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1.3.2 During the development of prototypes leading to designs that will be subject to acceptance testing, as described in [1.4](#), these preliminary tests shall include the free-fall drop tests in accordance with [9.1](#).

1.4 Mandatory Acceptance Tests :

1.4.1 *General-Purpose Pallets*—When the objective of the test is to determine the safe working load or to classify a general-purpose pallet as a single- or multiple-use pallet, all tests described in these test methods shall be performed in the order specified. The same pallet shall be used for all static and dynamic tests, where feasible.

1.4.2 *Special-Purpose Pallets*—When the objective of the test is to determine the safe working load or to classify a special-purpose pallet, as a single- or multiple-use pallet, only those tests representing the intended condition of use shall be performed. Certain special-purpose pallet designs, because of the pallet size, its shape, or the material of fabrication, or combinations thereof, cannot be reliably tested using this methodology. When available, alternative test methods should be used.

1.4.3 *Field Testing*—It is recommended that pallet designs passing these acceptance tests be further subjected to field testing in the distribution environment.

1.5 *Simulation of the Distribution Environment*—These test methods are not intended to lead to exact simulations of pallet performance in the distribution environment. These test methods are designed to relate to practice with the added provision that they are repeatable, do not depend on exceptional skills, and are safe to conduct without elaborate precautions. The test findings are not expected to lead to unalterable conclusions. Testing in the distribution environment may be necessary to verify the results obtained from laboratory tests.

1.6 *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.* Specific warnings are given in [9.5.3.5](#).

1.7 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

- D642** Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads
- D996** Terminology of Packaging and Distribution Environments
- D999** Test Methods for Vibration Testing of Shipping Containers
- D1505** Test Method for Density of Plastics by the Density-Gradient Technique
- D1761** Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials
- D2395** Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials
- D4003** Test Methods for Programmable Horizontal Impact Test for Shipping Containers and Systems
- D4332** Practice for Conditioning Containers, Packages, or Packaging Components for Testing
- D4442** Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials
- D4444** Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters
- D4728** Test Method for Random Vibration Testing of Shipping Containers
- F680** Test Methods for Nails
- F1575** Test Method for Determining Bending Yield Moment of Nails, Spikes, and Dowel-type Threaded Fasteners
- F1667** Specification for Driven Fasteners: Nails, Spikes, and Staples

2.2 ASME Standard:³

- MH 1** Pallets, Slipsheets, and Other Bases for Unit Loads

2.3 ISO Standard:³

- ISO 445** Pallets for Material Handling— Vocabulary

2.4 TAPPI Standard:⁴

- TAPPI T 208 OM - 89** Moisture in Wood, Pulp, Paper and Paper Board by Tolvane Distillation

3. Terminology

3.1 Definitions:

3.1.1 The following standards are applicable, with Terminology **D996**, to be considered the governing standard in the case of a dispute: Terminology **D996**, MH 1, and ISO 445.

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

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from Technical Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Norcross, GA 30092, <http://www.tappi.org>.

3.1.2 *datum load*—a preload level applied to the specimen to reduce test variables as influenced by the test setup during the initial stage of testing. Test deformations shall be assumed to be zero at this preload level.

3.1.3 *general-purpose pallets*—pallets designed and constructed to support a wide range of loads using a variety of applicable handling devices.

3.1.4 *preliminary safe working load*—an estimate of the safe working load of a pallet not yet confirmed by all of the appropriate tests specified in these test methods.

3.1.5 *safe working load*—The maximum load, determined from tests, that a pallet can support without failure in handling, storage, and distribution including an appropriate allowance for variations in performance as well as necessary safety factors.

3.1.6 *special-purpose pallets*—pallets designed and constructed to support a specified load using certain handling devices.

4. Significance and Use

4.1 Static compression and bending tests provide data that are used to estimate stiffness, strength, and safe working loads for pallets under specified load and support conditions. These estimates provide a basis for designing pallets and comparing the performance between pallets of different designs and constructions.

4.2 Dynamic tests provide data which are used to estimate the physical durability and functionality of a pallet in specified material handling and shipping environments. These estimates provide a basis for designing single or multiple-use pallets.

4.3 Other tests may be performed to assess the properties of specific materials (Test Methods **D2395**, **D4442**, **D4444**, and T 208 OM) and connecting devices (Test Methods **D1761**, **F680**, Test Method **F1575**, and Specification **F1667**), design features, use applications, and other variables encountered.

5. Materials

5.1 These test methods are pertinent to pallets constructed of materials listed in **Table 1**.

6. Sampling

6.1 Sampling shall provide for the selection of representative specimens. The number of test replications required varies. At least three replications per pallet design shall be tested.

7. Conditioning

7.1 Some pallets are constructed of materials whose properties are affected by changes in temperature, relative humidity, and environmental moisture conditions prior to and during use in the distribution environment. Prior to test, these pallets shall be conditioned as described in **Table 1**.

7.2 Where conditioning influences pallet performance, the specified test-specimen environment shall exist during the time of testing. If the test environment cannot be maintained at the required conditioning level, the tests shall be performed immediately after the pallet has been removed from the