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January 31, 2017 - Litco International Inc. announces the first product standard describing molded, “presswood” pallets was recently approved by the American National Standards Institute (ANSI).

Attached is Part 14 “Molded, Wood Based Composite Pallets” of the ANSI pallet standard, MH1 – 2016, “Pallets, Slipsheets, and Other Bases for Unit Loads”.

The purpose of consensus, national, product standards is to help buyers and sellers of products communicate. This standard is the single best source of information regarding the manufacture, use, and performance of molded, “presswood” pallets.

The standard is in three parts. The first part of the standard describes typical pallet designs and materials and methods of manufacture. Part II of the standard describes presswood pallet performance. This includes test methods and an example pallet, weight and capacity classification for 48 X 40 inch nestable designs. Part III describes recycling options for the presswood pallets after use.

Litco International Inc., the source of the INCA presswood pallet made in the USA, provided resource materials referenced in the standard. Gary Sharon, Litco’s Vice President, served as a member of the drafting working group.

The comprehensive ANSI standard, “Pallets, Slipsheets, and Other Bases for Unit Loads” is published by the Materials Handling Institute of Charlotte, North Carolina. It is available to the public, free, on line, at mhi.org/free/8956. Registration on the site is free.

MH1 – 2016
(Revision of ASME MH1-2005)



Pallets, Slip Sheets, and Other Bases for Unit Loads

Approved: 8 Jan 2016

Abstract

This standard pertains to pallets used in the unit load method of assembling, stacking, storing, handling, and transporting materials and products. The standards were to accomplish the following: define terminology and nomenclature associated with pallets; apply to pallets irrespective of components and materials used in their fabrication; provide a series of recommended pallet dimensions and sizes; describe procedures for pallet sampling, inspection and testing; indicate procedures for designating pallet requirements.

Developed by:

**MH1 Committee, Pallets, Slip Sheets,
and other Bases for Unit Loads**

Published by MH1 Secretariat:

MHI
8720 Red Oak Blvd., Suite 201
Charlotte, NC 28217-3992
standards@mhi.org
phone: (704) 676-1190
fax: (704) 676-1199



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Phone: 704-676-1190, Fax: 704-676-1199
Email: standards@mhi.org

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MH1 – 2016

American National Standard

Pallets, Slip Sheets, and Other Bases for Unit Loads

Developed by:

MH1 Committee, Pallets, Slip Sheets, and other Bases for Unit Loads

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8720 Red Oak Blvd., Suite 201
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Approved 8 Jan 2016

American National Standards Institute, Inc.

Requests for Interpretation and Correspondence with MH1 Committee

MHI standards are developed and maintained with the intent to represent the consensus of concerned interests. Users of the standard may interact with the committee by requesting interpretations or proposing revisions.

All correspondence shall be addressed to:

MH1 – 2016
8720 Red Oak Boulevard, Suite 201
Charlotte, NC 28217-3992
Attention: MH1 Secretary
Phone: (704) 676-1190
Fax: (704) 676-1199

Electronic submissions may also be made to the Standards Coordinator at standards@mhi.org.

Interpretations Policy. Upon request, the MH1 Committee will render an interpretation of this standard. ANSI does not provide interpretations and shall refer to any inquiries to the MH1 Committee. Requests for interpretation shall follow the procedures below and shall be provided in a written request sent to the Secretariat as follows:

In general, only questions or interpretation and applicability of Standards will be given a response. The request for interpretation should be clear and unambiguous.

The inquirer shall submit the request utilizing the following format:

- | | |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Designation: | Cite the standard designation, for example, MH1-2016. |
| Subject: | Cite the applicable paragraph number(s) and provide a concise description. |
| Question: | Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for approval of a proprietary design or situation. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain proprietary names or information. |

Requests that are not in this format will be required to be rewritten in this format prior to being answered. The inquiry shall be forwarded promptly to the Chair of the MH1 Committee by the MH1 Secretary. Within forty-five (45) days, the inquirer shall receive a response from the MH1 Secretary.

Disclaimer

This standard was approved by ANSI on 8 Jan 2016. It was developed with the sole intent of offering information to parties engaged in the manufacture, marketing, purchase, or use of pallets, slip sheets and other bases for unit loads. This standard is advisory only and acceptance is voluntary and the standard should be regarded as a guide that the user may or may not choose to adopt, modify, or reject. The information does not constitute a comprehensive safety program and should not be relied upon as such. Such a program should be developed and an independent safety adviser consulted to do so.

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Foreword (This foreword is not part of American National Standard MH1 – 2016)

Hundreds of millions of wood pallets were manufactured in the United States of America during each of the past 30 years, considerably more than the 37 million pallets produced during 1953 when the ASME Standards Committee MH1 was established. It was estimated that approximately 20% of the total annual production of lumber in the United States was required for the assembly of these pallets. One pallet size of the approximately 100 sizes used, the 48 x 40 in. and the 40 x 48 in. (1219 x 1016 mm and 1016 x 1219 mm) size, accounts for more than one-third of all the pallets produced; while ten additional sizes account for more than 1% of all pallets produced. Pallets made of metal, paper, and plastics are also manufactured in the United States. However, their production is limited and no production statistics are available.

The need for standardization of pallets used in the unit-load method of assembling, stacking, storing, handling, and transporting materials and products, originated from the interconnecting nature of pallet usage. The great variety of pallet sizes and constructions restricted their movement through manufacturing and distributing channels. This variety was the result of each user treating pallet design as a private problem. More intense application of the unit-load method of assembling, stacking, storing, handling, and transporting of commodities in the United States and in international trade fostered extensive use of pallets both as captive and exchange pallets. The latter pallets, especially, required maximum standardization for any exchange to be successful.

Some industries and military services developed, by evolution, certain pallet standards to solve specific problems which are also existent with other users. Consequently, their sizes and constructions of pallets established a pattern of value to all users.

The American National Standards Institute (formerly the American National Standards Association) project on pallet standardization was initiated in October 1953. A Material Handling Standards Committee, MH1 (initially B69), was organized to coordinate information and prepare standards under the scope of standardization of nomenclature, types, sizes, materials, and components of pallets, including sampling, inspection, and test procedures. The standards pertain to pallets used in the unit-load method of assembling, stacking, storing, handling, and transporting materials and products. The standards were to accomplish the following:

- (a) define terminology associated with pallets;
- (b) apply to pallets irrespective of components used in their fabrication;
- (c) provide a series of recommended pallet dimensions;
- (d) describe procedures for pallet testing; and
- (e) indicate procedures for designating pallet requirements.

During 1967, the MH1 Committee was reorganized. A Nominating Committee was established in compliance with the procedures of ANSI. The Nominating Committee selected officers for the MH1 Committee during 1968 and, in turn, became the nucleus for the new MH1 Executive Committee to guide the continuing revision activities and organize the task groups to be formed.

The name of the MH1 Committee was changed in 1979 to Standardization of Pallets, Slip Sheets, and Other Bases for Unit Loads by action of ANSI's Physical Distribution Standards Management Board in light of the establishment of the MH1 Subcommittee on Standardization of Slip Sheets in March 1979. The following scope of the Committee was established: standardization of nomenclature, types, sizes, materials, and components of pallets, slip sheets, and other unit load bases, including sampling, inspection, and test procedures.

The MH1 Committee, consisting of individual members and representatives of trade associations, engineering societies, and government agencies, organized a Technical Committee to perform its work. During July 1981, this Technical Committee was reorganized as an ASME Standards Committee operating under the ANSI accredited organization procedures.

The following MH1 Committee standards were issued:

MH1.1.2	Definitions and Terminology Covering Pallets and Related Structures
MH1.2.2M	Pallet Sizes
MH1.4.1M	Procedures for Testing Pallets
MH1.5M	Slip Sheets
MH1.6	Standard Procedures for Determination of Durability of Wooden Pallets and Related Structures
MH1.7M	Driven Fasteners for Assembly of Pallets and Related Structures
MH1.8M	Wood Pallets
MH1.9	Export Pallets

The MH1 Committee published the above eight separate standards consolidated into a single publication, MH1 Pallets, Slip Sheets, and Other Bases for Unit Loads. The 1997 Edition contained the consolidation of the revised MH1.1.2, MH1.4M (formerly MH1.4.1M), MH1.6, and MH1.7M standards. All of the documents contained in the previous Edition of the Standard were approved by ANSI as American National Standards on July 16, 1996.

The first addenda to the previous Edition added the remaining four standards to be consolidated into MH1. Part 2, the revised MH1.2.2, was approved by ANSI on August 6, 1998. Part 3, the revised MH1.8, was approved on August 6, 1998. Part 4, the revised MH1.9, was approved on January 30, 1998. Part 8, the revised MH1.5M, received approval on August 6, 1998. In addition, the military-specific Part 9, entitled "Wood Pallets for U.S. Government Use," was developed by the MH1 Committee in response to the Government's need to use voluntary standards. This final Part was approved by ANSI on February 4, 1999.

The second addenda to the previous Edition added Part 10 and revisions to Parts 3, 8, and 9. Part 10 was approved by ANSI on January 19, 2000. Revisions to Part 9 were approved by ANSI on June 7, 2000. The 2005 Edition was approved by ANSI on August 28, 2003 and on March 9, 2005, incorporating changes in all parts and the addition of a new Part 6. This Edition incorporates changes in all parts (with the exception of Parts 8 and 10) and the addition of new Parts 11, 12, 13 and 14. This Standard was approved by ANSI on 8 Jan, 2016.

MHI STANDARDS COMMITTEE MH1
Standardization of Pallets, Slip Sheets, and Other Bases for Unit Loads

(The following is the roster of the Committee at the time of approval of this Standard)

COMMITTEE PERSONNEL

Don Balazs	ORBIS Corporation
Kevin C. Cheung	Western Wood Products Association
John Clarke	The Nelson Company
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Part 14

Molded, Wood-Based Composite Pallets

1 SCOPE

Part 14 of this Standard applies to molded, wood-based composite pallets. They are commonly referred to as presswood pallets. They are made entirely of compression molded, highly processed wood flakes and resin. A typical example is shown in Figure 1. Criteria contained in this Standard are applicable only at the completion of manufacture.



Figure 14-1
A Presswood Pallet

Photograph courtesy of Litco International, Inc.

This Standard is presented in three parts: Subpart I is the Prescriptive Standard, which concerns the manufacture of the pallet. This Subpart includes pallet descriptions, workmanship criteria, dimensional tolerances and markings. Subpart II is the Performance and Use Standard, which concerns the functionality of the pallet and addresses the environmental aspects of the presswood pallets. Subpart III addresses the Recycling of the Presswood Pallets.

This part does not address the safety associated with the use of presswood pallets. It is the responsibility of the user of this Part to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to its use.

Presswood pallets are manufactured for the sole purpose of storing and/or transporting material. Under no circumstances should any person stand, step, or lean upon them or otherwise use them for support unless they are specifically designed for such usage. The pallet user has the obligation and responsibility to inspect for damage prior to each pallet use and to determine that the pallet design is appropriate for that particular unit load application.

2 PURPOSE

The purpose of Part 14 of this Standard is to establish nationally recognized minimum quality requirements for presswood pallets and to provide a basis for common understanding among purchasers, distributors and users of presswood pallets.

3 REFERENCED AND RELATED DOCUMENTS

ISO 8611	General Purpose Flat Pallets for Through Transit of Goods – Test Methods. International Standards Organization (ISO). C. P. 56, CH 1211, Geneva 20, Switzerland.
ASTM D1185	Standard Test Methods for Pallets and Related Structures Employed in Material Handling and Shipping. American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

Subpart I Prescriptive Standard

4 DEFINITIONS AND TERMINOLOGY

For the purpose of this document, the definitions and terminology in MHI/ANSI MH1 Part 1 shall apply.

Nestable pallet – skid having hollow cups or other suitable spacers allowing those of adjacent empty sides to fit into each other for stacking; also, applicable to nestable wood pallets.

5 CLASSIFICATION

5.1 Use Categories

5.1.1 Reusable – Pallet is intended for more than one unit load.

5.1.2 Single-Use – Pallet is used for the storage and distribution of one unit load.

5.2 Types

Presswood pallets are typically a solid single deck, nestable pallet. However, such pallets can be molded with openings in the decks and separate bottom deck parts can be attached. The top deck may have structural ribbing molded throughout to enhance strength and stiffness.

5.2.1 Type 1 Two way entry pallet

A pallet with openings accepting handling equipment only on two pallet ends.

5.2.2 Type 2 Partial four-way entry

A pallet with openings at both ends and sides, with limiting accessibility of openings to common handling equipment on two sides and openings not limited to common handling equipment on the other two sides.

5.2.3 Type 3, Full four-way entry

A pallet with openings at both opposite ends and sides with accessibility of all openings not limited to common handling equipment.

6 MATERIALS

A presswood pallet consists of two main material components:

- I. Typically, wood flakes, wafers and/or particles. .
- II. Glue binder consisting of:
 1. Resin (for wood bonding)
 2. Wax emulsion (for water resistance)
 3. Catalyst or hardener (to react the resin for curing)

7 MANUFACTURING

Wood chips are first mixed by species to a determined ratio, typically some combination of hardwood chips, pine chips and recycled wood. This mixture of wood chips is then refined to produce a smaller flake. The finished wood particle dimensions are typically 0.375(+/- 0.125) inches long and 0.04(+/- 0.02) inches in thickness and width. Figure 2 shows a typical particle size. Other size wafers or flakes similar in size to those used in wafer board or OSB panels can be used. The particles are dried to approximately 3% moisture which prepares them for absorption of resin and eradication of all pests and larva. Fine dust and oversize flakes are screened out and the correct size and correct moisture particles are stored in a large silo, ready for use.



Figure 14-2
Typical Wood Particles Used in Presswood Pallets

Photograph courtesy of Litco International, Inc

The dried wood and liquid glue are blended in a mixer. The blended wood is conveyed to a press hopper where it is stored until pressing. The blended wood is then deposited into a mold. The press closes and compresses the wood with typically 1,200 tons of force. The mold is heated with high temperature (typically 400° F) during the pressing of the pallet causing the resin to react and harden to bond the wood flakes together. Various resin formulations are available, some that contain urea formaldehyde. Care should be given to ensure that formaldehyde levels, if any, are within regulatory levels.

After a preset time, the pressure is released and the pallet is removed from the mold. Pallet moisture at the time of manufacture is approximately 8 percent and approximately 13 percent at equilibrium. Edges should be trimmed to remove sharp edges. Pallets are typically allowed to condition for 24 hours prior to shipment to permit off gassing emissions. Most presswood pallets are not regulated by The International Standard for Phytosanitary Measures for Solid Wood Packaging Material (ISPM-15) because the manufacturing process renders them sanitary. Molded presswood pallets are uniform in size and should be within $-0/+0.125$ inches of the planned dimension in length, width, and height. The thickness of the deck wall should be with $+/-0.06$ " of target thickness.

Subpart II Performance and Use Standard

8 GENERAL STORAGE AND HANDLING

8.1 Pallet Storage

Presswood pallets should be stored indoors or at least under roof at all times. Due to the fact that wood is hygroscopic (readily taking or giving up moisture), the presswood pallet will absorb moisture. Normal air moisture will not adversely affect the pallet. If the wood moisture is below 30 percent, little change occurs. However, if the pallets take on high moisture via rain or snow for a prolonged period, the wood fiber moisture may rise above 30 percent and begin to swell. Excessive swelling in the range of 15 percent may cause the pallet to become rough textured and may cause the nested pallets to stick together and become difficult to de-nest when stacked. Upon de-nesting, the leg may actually pull off from the deck and stick in the nested position with the bottom pallet. The process for this to occur may take days, weeks, or months, depending on the climate and conditions. For these reasons, it is not recommended to store presswood pallets outside.

If outside storage is unavoidable, a poly bag should be used to cover each stack of pallets. These bags can be placed over each stack of pallets at the manufacturing plant prior to shipment. The bag will help protect the pallet from the elements and contaminants to keep them clean and dry for immediate use.

8.2 Pallet Handling

Presswood pallets should be designed to separate a desired quantity of pallets easily, manually, with a lift truck or an automated pallet dispenser, and from a stack of nested pallets. If properly handled, the presswood pallet can be reused.

8.3 Shipping

It is suggested that presswood pallets be shipped in closed vans to ensure that they are clean and dry upon arrival for best use. Because of their nestable design a 53 foot trailer load capacity can contain up to 1,320 pallets, size 48 inch x 40 inch. This feature yields greater shipping and handling efficiencies.

9. PERFORMANCE

9.1 Conditions of pallet use

The use conditions which presswood pallets shall sustain during unit-load materials handling will vary. Therefore, the conditions of use shall be specified, including performance levels. Where conditions of use vary, the condition which results in the highest stress levels shall be used as a basis of determining performance.

Actual load capacity is application specific and dependent upon the product, packaging, load containment and handling environment. The testing of the pallet with and within the specific application is strongly recommended.

Testing per ISO 8611 and ASTM D1185 can be done with specific loads for strength and stiffness expectations.

9.1.1 Load Conditions

Provide the description of the packages, containers, or units to be placed on the pallet (i.e. bags, case goods, bundles, barrels, flexible intermediate bulk containers (FIBC bags), blocks and machinery including the use of load stabilizers.

Provide measurements and location of bearing areas for the packages, containers, or units to be placed on the pallet and the pallet top and bottom decks.

Provide maximum and average load levels and load level variations.

9.1.2 Support Conditions

Indicate maximum unsupported free span along the pallet length and width when placed on conveyors.

Standard designs of presswood pallets are not recommended for storage in open beam and drive through racks. Extreme caution should be used if racking cannot be avoided. Use of rack supports that act like flooring is strongly recommended.

Presswood pallets may be custom designed for some types of loads and some designs of open racks.

Indicate maximum number of unit-loads in a stack.

Indicate the geometry of fork tines used to lift and move unit loads as well as spacing between fork tines.

Indicate the design and geometry of slings, if used, for lifting unit loads.

9.2 MEASURES OF PALLET PERFORMANCE

9.2.1 Strength

This is the average load causing failure from replicate tests for each support condition and each load condition. Failure can be due to fracture of a pallet or pallet component or excessive deformation.

9.2.2 Design of Safe Working Load Levels

These are less than strength when adjusted for variation in materials, manufacture, and conditions of pallets use as well as the relative consequence of failure. These safe working load levels are typically expressed as:

9.2.2.1 Dynamic capacity

Capacity when supported on fork tines, AGV decks or conveyors.
ASTM D1185 Section 8.4 Bending test on pallet – forktine support
ISO 8611 Fork lifting test

9.2.2.2 Static Capacity

Capacity during warehouse block stack storage. The capacity is determined as the lower result of the bending or compression tests
ASTM D1185 Section 8.3 compression
Section 8.5 bending test on pallet deck
ISO 8611 Test 3 Compression test
Test 4 Stacking test 4a, 4b

9.2.2.3 Racking Capacity

Capacity when supported in free span warehouse racks.
ASTM D1185 Section 8.4 Bending test of pallet – rack support
ISO 8611 Test 1 Bending test 1a, 1b

9.2.3 Stiffness

This is the relative deformation of a pallet or pallet component under load and depending on support conditions. Measurements of stiffness include relative deflection, strains, as deformation per unit of mass or load on the pallet.

9.2.4 Durability

This is a measure of resistance to handling. Measurements may include cumulative impact energy prior to failure or number of handling cycles prior to failure or significant loss of strength and functionality.

9.2.5 Other functionality requirements

These may include pallet weight, pallet size, location and size of openings, fire performance, resistance to biological contamination, etc.

9.2.6 Example classification of presswood pallets by weight and capacity

Presswood pallets can be divided into general weight and load carrying capacity classifications. For ease of selection, each weight class can be identified in some manner. For example, a painted stripe on a pallet stack could correspond to an approximated dynamic load carrying capacity. An example of such a classification for a common size 48" x 40" is shown in Table 1:

Table 1: Example of Weight Class Distributions. Basic weights are targets and are at the time of manufacture. Dynamic capacities are based on full uniform loads. They are guidelines and may differ from manufacturer to manufacturer.

Example Weight Class	Basic Weight (lb.)	Dynamic Capacity (lb.)	Example Color Code
Light	31(+/-1.5)	1,000	Yellow
Medium	35(+/-1.5)	1,500	Green
Heavy	39(+/-1.5)	2,000	Red
Extra Heavy	41(+/-1.5)	2,500	White

As shown in Table 1, basic pallet weights of a 48X40 range widely from 31 lbs. to 41 lbs. depending on size and dynamic capacity. When using the Light Weight Class as a baseline, in this example, the pallet deck thickness increases approximately 0.06 inches for each subsequent weight class.

These load capacities are approximated values based on full uniform loads and cannot fully be applied for every application encountered. Investigation of the specific application is required to properly discern which weight class of pallet would best suit the customers' needs.

10 TEST PROCEDURES

10.1 Testing Of Physical Models or Prototypes

When possible, actual loads and supports should be used in the test. However, load and support analogs, based on sound engineering principles, are acceptable. The following test methods are recognized:

10.1.1 ISO-8611 "General Purpose Flat Pallets for Through Transit of Goods – Test Methods." International Standards Organization (ISO). C. P. 56, CH 1211, Geneva 20, Switzerland.

10.1.2 ASTM D-1185 "Standard Test Methods for Pallets and Related Structures Employed in Material Handling and Shipping." American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

10.2 Testing of Computer Models

Structural analyses can be performed using computer models of pallet structures. These computer models must be capable of simulating the load and support conditions as well as the pallet structure and the properties of the materials.

10.3 Field Trials

It is recommended that prototype pallet designs having been tested according to section 10.1 or 10.2, be tested in an actual use situation to verify performance.
Note: Test criteria may be established by the users of this standard.

Subpart III Recycling of the Presswood Pallets

11 Recycling Into New Presswood Pallets and the Reuse of Material

It is recommended, where economy permits, that spent presswood pallets be recycled. Examples of the re-use for ground presswood pallets include:

- Recycled into new presswood products
- Livestock bedding
- Absorbent floor compound
- Top soil additive
- Compost material
- Boiler Fuel