13

From: "Bradfield, John" <jbradfield@cpamail.org>
To: <fb4p@oce.usda.gov>
Date: Mon, Oct 16, 2006 3:06 PM
Subject: RIN number 0503-AA30 and "Proposed Designation of Items"

To Whom It May Concern:

Attached are the comments of the Composite Panel Association on the proposed designation of biobased items for federal procurement. Also attached are several standards referenced in the comments.

John

John Bradfield
Director of Environmental Affairs
Composite Panel Association
18922 Premiere Court
Gaithersburg, MD 20879-1574 USA
301.670.0604 * Direct 301.840.9094 x229 * Fax 301.840.1252 *
1.866.4Composites * jbradfield@cpamail.org * http://www.pbmdf.com
<BLOCKED::http://www.pbmdf.com/>

COMPOSITE PANEL ASSOCIATION®
North American producers of particleboard, MDF, hardboard and other compatible products.

October 16, 2006

U.S. Department of Agriculture Docket
1400 Independence Ave., S.W.
Washington, D.C. 20250

Re: CPA Comments on U.S. Department of Agriculture (USDA) Proposed Designation of Biobased Items, RIN 0503-AA30 and RIN 0503-AA31, 71 *Fed. Reg.,* 47566 and 71 *Fed. Reg*. 47590 (August 17, 2006)

To Whom It May Concern:

The Composite Panel Association is pleased to submit these comments on the two USDA proposed rules identifying a total of 20 items for designation as biobased materials for preferred procurement by procuring federal agencies. CPA is the North American trade association of the Composite Panel Industry. Our organization represents over 150 member companies that produce and market hardboard, particleboard, MDF and the laminates and other decorative surfaces for those products as well as the suppliers and customers to the composite panel industry.

CPA is commenting on only the provisions of the proposals that address composite panels. The American Forest and Paper Association (AF&PA) submitted separate comments on the proposals which CPA also supports.

Application References. On page 47574 several applications for composite panels are mentioned where this initiative could be targeted - Construction—Laminated Paperboard and Structural Foam Board; Construction—Shower and Restroom Dividers; and Miscellaneous Products—Signage. Composite Panels are used in a wide variety of products that may be specified and purchased by the government including furniture, office and kitchen cabinets, exterior siding, laminate flooring, shelving, mouldings, mill work, doors, paneling, floor underlayment, stair treads. It is unclear whether this initiative is confined to the very narrow applications listed on page 47574, but it is CPA's recommendation that the purchasing applications need to be expanded to include the categories mentioned above. If additional assistance is needed to develop more specific descriptions of the applications where composite panels are used we encourage the USDA to

Head Office USA CANADA
18922 Premiere Court, Gaithersburg, Maryland USA 20879-1574 99 Bank Street, 7th Floor, Ottawa, Ontario Canada K1P 6B9
(301) 670-0604 Fax (301) 840-1252 (613) 232-6782 Fax (613) 232-8386
www.pbmdf.com
1-866-4COMPOSITES

contact us.

Standards References. On page 47575 several standards applying to composite panels are listed. Your final rule should also include the ANSI standards for the products, ANSI A208.1-1999 for Particleboard, ANSI A208.2-2002 for MDF, ANSI A135.4-2004 for Basic Hardboard, ANSI A135.5-2004 for Prefinished Hardboard Paneling and ANSI/AHA A135.6-1998 for Hardboard Siding. Your final rule should also include a reference to the industry standard that specifies recycled/recovered fiber content, the Environmentally Preferable Product Standard, EPPS 2-06. Copies of each standard are attached to these comments.

EPA-Designated Recovered Content Products. CPA wishes to point out, and reference in the final rules, that the CPA has adopted a Grademark Certification Program for Environmentally Preferable Products as defined by Federal Executive Order 13101. The EPP certification program covers particleboard, medium density fiberboard and hardboard and requires that 100% of the content of the product is recycled/recovered fiber. A copy of the Environmentally Preferable Product Standard is attached to this comment letter. The description of composite panel constituents in the proposal needs to be modified to become inclusive of this standard.

The description of composite panels (Section IV.B.4) states that "Biobased composite panels are typically formulated from natural wheat or rice straw, recycled or forest clean-up wood, and paper industry wastes." This description gives the misleading interpretation that biobased wood composite panels are made only from these materials. Biobased wood composite panels may be manufactured from a variety of raw material sources. CPA recommends the description be modified to say, "...wheat or rice straw or wood and/or wood fibers." Alternatively, if a reference to recycled/recovered wood is necessary, the EPPS CPA 2-06 standard should be referenced with its thorough reference list of recycled/recovered fibers sources used in composites.

The minimum bio-based content for composite panels (Section IV.C.4.) was set at 26%, apparently based on the biobased content of the lowest performing product tested. This seems a rather lenient way to set a standard, particularly when most composite products are 100% biobased when the metric includes the raw materials referenced in EPPS CPA 2-06. It would seem that the standard should be set to give preference to the highest biobased content products.

The EPPS CPA 2-06 standard is also referenced in the Environmental Stewardship Certification Program for Kitchen Cabinets run by the Kitchen

Cabinet manufacturers Association (703) 264-1690. For composite panel purchases linked to kitchen cabinets, the bio-based purchasing standard should also consider referencing the KCMA program.

Life Cycle Inventory and Life Cycle Analyses. To better understand the life cycle impact and life cycle cost of particleboard, medium density fiberboard and hardboard, the CPA has commissioned the Consortium for Research on Renewable Industrial Materials (CORRIM) to conduct life cycle inventory and life cycle analysis on the fore-mentioned composite panel products. We anticipate CORRIM to complete the life cycle inventory project in February 2007. The life cycle inventory data will be submitted to the U.S. LCI database in March 2007. We encourage the USDA to contact CPA about the CORRIM study and will submit a copy of the study when it becomes available. As just one important consideration that will influence the life cycle analysis report, wood is neutral with regard to carbon emission to the atmosphere, unlike petroleum-based products.

Thank you for the opportunity to make these comments.

Attachments:

ANSI A208.1-1999 Particleboard
ANSI A208.2-2002 MDF,
ANSI A135.4-2004 Basic Hardboard,
ANSI A135.5-2004 Prefinished Hardboard Paneling
ANSI/AHA A135.6-1998 Hardboard Siding
EPPS CPA 2-06 Environmentally Preferable Products Standard

ANSI A208.1-1999 Particleboard

American National Standard

Particleboard

COMPOSITE PANEL ASSOCIATION
18928 Premiere Court, Gaithersburg, MD 20879
Tel (301) 670-0604, Fax (301) 840-1252
Web www.pbmdf.com

ANSI A208.1-1999 Particleboard

American National Standard

Approval of an American Standard requires verification by the American National Standards Institute (ANSI) that the requirements for due process, consensus, and other criteria for approval have been met by the standard's developer.

Consensus is established when, in the judgement of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether they have approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

ANSI does not develop standards and will in no circumstance give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Abstract

This Standard sets forth requirements and test methods for dimensional tolerances, physical and mechanical properties and formaldehyde emissions for particleboard. Methods of identifying products conforming to the Standard are specified. Property requirements are described in metric and inch-pound units.

Published by

Composite Panel Association
18928 Premiere Court, Gaithersburg, MD 20879-1569

Copyright © 1999 by Composite Panel Association
All rights reserved. No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior permission of the publisher.

Printed in the United States of America

ANSI A208.1-1999 Particleboard

Contents

		Page
Foreword		2
1	Purpose and scope	3
1.1	Purpose	3
1.2	Scope	3
1.2.1	General	3
1.2.2	Suitability for certification	3
2	Definitions	3
2.1	Additive	3
2.2	Bonding System	3
2.3	Specified Thickness	3
2.4	Panel	3
2.5	Panel Average Thickness	3
2.6	Panel Average Thickness from Specified	3
2.7	Particleboard	3
2.8	Particles	3
2.9	Variance from Panel Average Thickness	3
3	Requirements	3
3.1	General	3
3.2	Dimensional tolerances	3
3.2.1	Width and length	3
3.2.2	Thickness	4
3.2.3	Squareness	4
3.2.4	Edge Straightness	4
3.3	Physical and mechanical properties	4
3.3.1	Moisture content	4
3.3.2	Density tolerance	4
3.3.3	Linear expansion	4
3.3.4	Thickness swell	4
3.3.5	Durability of exterior glue bonding system	4
3.3.6	Internal bond	4
3.3.7	Modulus of rupture and modulus of elasticity	4
3.3.8	Hardness	5
3.3.9	Face screw-holding capacity	5
3.3.10	Edge screw-holding capacity	5
3.3.11	Concentrated loading	5
3.3.11.1	Requirement	5
3.3.11.2	Test specimens	5
3.3.11.3	Test apparatus	5
3.3.11.4	Test procedure	5
3.4	Formaldehyde provisions	5
4	Identification	6
4.1	Explanation of grades	6
4.2	Information to be provided	6
4.3	Methods of identification	6
Tables		
A	Requirements for grades of Particleboard	7
B	Requirements for grades of Particleboard Flooring Products	8
Annex		
A	References (Normative)	9
B	General use and grades (Informative)	9
C	Metric values (Informative)	10

ANSI A208.1-1999 Particleboard

D Sample cut-up pattern (Informative) 11

ANSI A208.1-1999 Particleboard

Foreword (This foreword is not part of American National Standard A208.1-1999.)

The first standard for particleboard—Commercial Standard CS236—was developed by the U.S. Department of Commerce in 1961. This standard covered particleboard for interior applications. The Department published a revised Standard, CS236-66, in 1966.

The American National Standard for Mat-Formed Wood Particleboard, sponsored by the National Particleboard Association, was published as ANSI A208.1-1979. It was reaffirmed in 1986 as ANSI A208.1-1979(R1986). It was revised in 1987 as ANSI A208.1-1987, in 1989 as ANSI A208.1-1989 and in 1993 as ANSI A208.1-1993. In 1997 the National Particleboard Association and the Canadian Particleboard Association consolidated into the Composite Panel Association.

There are four annexes to this 1999 Standard. Annex A is normative and is part of this Standard; Annexes B, C, and D are informative and are not part of this Standard.

Consensus for this Standard was achieved by use of the ANSI Canvass Method. The following organizations, recognized as having an interest in particleboard standards, were contacted prior to the approval of this Standard. Inclusion in this list does not necessarily imply that the organization concurred with the proposed Standard as submitted to ANSI.

American Furniture Manufacturers Assn.
APA – The Engineered Wood Assn.
Architectural Woodwork Institute
Boise Cascade Corporation
Broyhill Furniture Industries, Inc.
Bush Industries, Inc.
Business and Institutional Furniture Manufacturers Assn.
Canadian Home Builders Assn.
CanPar Industries
Collins Products LLC
Florida Plywoods, Inc.
Forintek Canada Corporation
General Services Administration/FSS
Georgia-Pacific Corporation
G-P Flakeboard Limited
Hambro Forest Products, Inc.
Hardwood Plywood and Veneer Assn.
International Conference of Building Officials
International Paper Corporation
Isobord Enterprises, Inc.
Kimball International
Kitchen Cabinet Manufacturers Assn.
Laminating Materials Assn.
Louisiana-Pacific Corporation
MacMillan Bloedel Limited
Manufactured Housing Institute
Merillat Industries, Inc.
Michigan State University
National Association of Home Builders
National Council of the Paper Industry for Air and Stream Improvement
National Research Council of Canada
National Wood Window and Door Assn.
Natural Fibre Board
North American Wholesale Lumber Assn.
North Carolina State University
Northern Engineered Wood Products, Inc.
Oregon State University
Panolam Industries
Potlatch Corporation
Proboard Limited
PSI / Pittsburgh Testing Laboratory
Rodman Industries
Roseburg Forest Products Company
Sauder Woodworking, Inc.
SierraPine Ltd.
Smurfit Newsprint Corporation
States Industries, Inc.
Tafisa Canada and Company, Ltd.
TECO/PFS
Temple
Timber Products Company
Triwood, Inc.
Uniboard Canada, Inc.
Union Camp Corporation
University of California
University of Laval
University of Maine
USDA Forest Products Laboratory
U.S. Consumer Product Safety Commission
U.S. Department of Housing and Urban Development
Washington State University
Webb Furniture Enterprises

Weyerhaeuser Company
Willamette Industries, Inc.
Wilsonart International

Woodwork Institute of California

American National Standard for Particleboard

1 Purpose and scope

1.1 Purpose

The purpose of this Standard is to establish a nationally recognized voluntary consensus standard for particleboard which provides a common basis for understanding throughout the particleboard industry and among and between those specifying and using industry products.

1.2 Scope

1.2.1 General

This Standard covers particleboards which are made primarily from cellulosic materials (usually wood). This Standard includes definitions, dimensional tolerances, physical and mechanical property requirements, and maximum formaldehyde emissions for different grades of particleboard. Also included are test methods, inspection practices, and methods of identification. The mechanical property requirements are not engineering design values.

1.2.2 Suitability for certification

This Standard was revised with reference to ISO Guide 7-1994 and is suitable for certification purposes.

2 Definitions

2.1 Additive: Any material added during the particleboard manufacturing process, other than the cellulosic material and a bonding system, which enhances the particleboard's dimensional stability, fire retardance, resistance to fungi and insects, or imparts other desired properties into the particleboard.

2.2 Bonding System: Any system used to bind particles of cellulosic material together to form particleboard.

2.3 Specified Thickness: Thickness specified either by the manufacturer or by the purchaser.

2.4 Panel: A substantial, flat, rectangular piece of particleboard.

2.5 Panel Average Thickness: Average of the eight measurements taken 25.4 mm (1.0 inch) in from the edge at each panel corner and at the mid-length of each panel edge.

2.6 Panel Average Thickness from Specified: The difference between the panel average thickness and the specified thickness.

2.7 Particleboard: A generic term for a composite panel primarily composed of cellulosic materials (usually wood), generally in the form of discrete pieces or particles, as distinguished from fibers, bonded together with a bonding system, and which may contain additives.

2.8 Particles: Discrete, small pieces of cellulosic material (usually wood).

2.9 Variance from Panel Average Thickness: The difference between the panel average thickness and the individual thickness measurement that varies most from that average.

3 Requirements

3.1 General

Particleboard represented as conforming to any grade in this Standard shall meet, at the time of shipment from the manufacturer, the requirements specified for that grade when tested in accordance with the provisions of this section.

Panels represented as conforming to any grade in this Standard which, after shipment from the manufacturer, have been subjected to varying conditions of environment, storage, handling, or manufacture, may not continue to conform to the Standard when subsequently tested.

3.2 Dimensional tolerances

3.2.1 Width and length. The trimmed width and length of particleboard panels shall conform to the applicable dimensional tolerance requirements specified in Tables A and B. Width and length shall be determined in accordance with Section 7 of the American Society for Testing and Materials (ASTM) Standard D 1037-96a, "Standard Test Methods for Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials."

3.2.2 Thickness. Thickness of panels shall conform to the applicable tolerances specified in Tables A and B. Thickness shall be measured to the nearest 0.025 mm (0.001 inch).

3.2.3 Squareness. The two diagonal measurements of a trimmed panel shall not deviate more than 3 mm per meter (0.036 inch per foot) of panel width when trimmed to finished length and width.

3.2.4 Edge Straightness. Trimmed edges of panels 600 mm (2 feet) wide or wider shall not deviate more than 1 mm per 1.5 meters (0.016 inch per 2 feet) of panel length or width. Edge straightness shall be determined by measuring to the nearest 0.5 mm (0.020 inch) the maximum deviation from a straight line extending from corner to corner on the same trimmed panel edge.

3.3 Physical and mechanical properties

Particleboard shall conform to the applicable physical and mechanical property requirements in Tables A and B. These requirements represent 5 panel averages. However, for the properties in Subsections 3.3.3 and 3.3.4, no single panel average shall be more than 20% above the requirements shown for that grade. For the properties in Subsections 3.3.5 to 3.3.11, no single panel average shall be more than 20% below the requirements shown for that grade.

3.3.1 Moisture content. The average moisture content at the time of shipment from the manufacturer for all grades except "D" grades in Table B shall not exceed 10 percent (based on the oven dry weight of the board) except as otherwise maybe agreed upon by the manufacturer and purchaser. For "D" grades average moisture content shall not exceed 9 percent or be less than 6 percent. The moisture content shall be determined in accordance with Sections 9, 119, and 120.1 of ASTM D 1037-96a. Three specimens shall be cut from different representative locations in the panel and their test results averaged.

3.3.2 Density tolerance. The average density of any particleboard panel shall not be more than 10 percent below the nominal density as specified by the manufacturer. The average panel density shall be determined from the six modulus of elasticity specimens (see Subsection 3.3.7) in accordance with Sections 9, 119, and 120.2 of ASTM D 1037-96a.

3.3.3 Linear expansion. The linear expansion between 50 and 80 percent relative humidity shall be determined in accordance with Sections 107 through 110 and footnotes 37 through 39 of ASTM D 1037-96a. One specimen shall be cut parallel to the length of each panel to be tested, and one shall be cut perpendicular to the length of the same panel. The results of the two tests shall be averaged to determine the linear expansion for each panel.

3.3.4 Thickness swell. This section applies to the grades listed in Table B. The particleboard thickness swell shall be determined in accordance with Sections 100 through 106 of ASTM D 1037-96a for 24-hour submersion. For grade PBU one specimen shall be cut from each panel. For "D" grades two specimens shall be cut from each panel and the test results averaged to determine the thickness swell for each panel.

3.3.5 Durability of exterior glue bonding system. The average modulus of rupture after accelerated aging, when tested in accordance with Sections 111 through 117 of ASTM D 1037-96a, shall not be less than 50 percent of the modulus of rupture listed in the Table for a particular grade. The modulus of rupture shall be calculated based upon the thickness before the bonding system durability test.

3.3.6 Internal bond. The internal bond (IB) shall be determined in accordance with Sections 28 through 32 of ASTM D 1037-96a. Three specimens shall be cut from each panel to be tested and their test results averaged to determine the IB for one panel.

ANSI A208.1-1999 Particleboard

3.3.7 Modulus of rupture and modulus of elasticity. The values for modulus of rupture (MOR) and modulus of elasticity (MOE) shall be determined in accordance with Sections 12, 14 through 17, 20.1, and 20.3 of ASTM D 1037-96a. Alternatively, the following 2 approaches are acceptable: (1) It is not necessary to obtain a full force-deflection curve as specified in 17.1; only two force values (and corresponding deflections) within the elastic range need to be recorded, and (2) in 20.3, P1 shall be the difference between the two recorded forces and Y1 shall be the difference between the two corresponding recorded deflections. Six specimens shall be cut from each panel to be tested. Three specimens shall be cut parallel to the length of the panel and three specimens shall be cut perpendicular to the length of the same panel. The results of the six tests shall be averaged to determine the MOR and MOE of one panel.

3.3.8 Hardness. The hardness shall be determined in accordance with Sections 68 through 73 of ASTM D 1037-96a. Two specimens shall be cut from each panel and the test results averaged to determine the hardness for each panel.

3.3.9 Face screw-holding capacity. The face screw-holding capacity shall be determined in accordance with Sections 61 through 67 and notes 25 through 27 of ASTM D 1037-96a, except that: (1) Sections 62.2 and 64 shall not apply. (2) If the panel is less than 19 mm (3/4 inch) thick, the specimen shall be made up of 2 thicknesses bonded together with an adhesive. Panels less than 10 mm (3/8 inch) thick shall not be tested, and (3) Lead holes shall be predrilled a minimum of 13 mm (0.5 inch) deep, using a bit 3.2 mm (0.125 inch) in diameter. Four tests shall be made on each panel to be tested. The results of the four tests shall be averaged to determine the face screw-holding capacity of one panel.

3.3.10 Edge screw-holding capacity. The average edge screw-holding capacity shall be determined in accordance with Sections 61 through 67 and notes 25 through 27 of ASTM D 1037-96a, except that: (1) Sections 62.1 and 64 shall not apply. (2) Panels less than 16 mm (5/8 inch) thick shall not be tested, and (3) Lead holes shall be predrilled a minimum of 13 mm (0.5 inch) deep, using a bit 3.2 mm (0.125 inch) in diameter. Four tests shall be made on each panel to be tested. The results of the four tests shall be averaged to determine the edge screw-holding capacity of one panel.

3.3.11 Concentrated loading

3.3.11.1 Requirement. This Subsection applies only to the "D" grades specified in Table B. The particleboard shall (a) support a 2670 N (600 pound) force and (b) not deflect more than 3.2 mm (0.125 inch), relative to the supports at an applied force of 890 N (200 pounds).

3.3.11.2 Test specimens. The test specimens shall be 406 mm (16 inches) square by the thickness of the material. If Manufactured Home Decking is to be used with spans greater than 406 mm (16 inches) on center, the specimen size shall be increased so that the concentrated loading test will be conducted using the actual spans. One specimen shall be cut from each panel to be tested.

3.3.11.3 Test apparatus. A frame shall be used to support the test specimen on all four sides. The distance between supports shall be 38.1 mm (1.5 inch) less than the rated span. A method of rigidly fixing the specimen to the frame shall be provided. The test force shall be applied in the center of the specimen using the end of a loading bar having a 25.4 mm (1.0 inch) diameter with the end edges rounded to a radius of 1.25 mm (0.05 inch). A means of applying a force of up to 2670 N (600 pounds) to the bar shall be provided. The applied force shall be measurable within one percent.

A dial gauge for measuring specimen deflection relative to the supporting shall be mounted across the frame members immediately adjacent to the loading bar.

3.3.11.4 Test procedure. With the specimen firmly fixed in place, set the deflection gauge at zero. Apply a force of 890 N (200 pounds). Maintain this force until the deflection stabilizes and then record the deflection. Gradually increase the force until a 2670 N (600 pound) force is reached or failure occurs.

3.4 Formaldehyde provisions

Formaldehyde emissions from particleboard bonded with a resin system containing formaldehyde, other than an exclusively phenol formaldehyde resin system, shall be tested in

accordance with "Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber" (ASTM E 1333-96). Emissions shall not exceed the maximum levels for each grade specified in Tables A or B. The loading ratios for grades H, M, D, and PBU shall be 0.425 m^2/m^3 (0.13 ft^2/ft^3) and for grade LD shall be 0.13 m^2/m^3 (0.04 ft^2/ft^3).

4 Identification

4.1 Explanation of grades

The particleboard grades in this Standard are identified by a letter(s) designation, followed by a hyphen and a digit or letter. Special performance characteristics are identified by the use of a letter(s), number, or term located immediately following the grade designation.

The first letter(s) designations have the following meanings:

H High density (generally above 800 kg/m^3 (50 lb/ft^3))

M Medium density (generally between 640-800 kg/m^3 (40-50 lb/ft^3))

LD Low density (generally less than 640 kg/m^3 (40 lb/ft^3))

D Manufactured Home Decking

PBU Underlayment

The second digit or letter designation indicates the grade identification within a particular density or product description. For instance, "M-2" indicates medium density particleboard, Grade 2.

The optional third designation indicates that the particleboard has a special characteristic. For instance, "M-3-Exterior Glue" indicates medium density particleboard, Grade 3, made with exterior glue to comply with the durability requirements in Subsection 3.3.5.

4.2 Information to be provided

All particleboard which is represented as conforming to this American National Standard shall be identified with the following information:

a) Manufacturer's name or trademark and mill identification

b) "ANSI A208.1-1999"

c) Grade

d) Lot number or date of production

e) For D grade products only, the words "MANUFACTURED HOME DECKING" and the certified load span if greater than 406 mm (16 inches) for compliance with Subsection 3.3.11 Concentrated loading "CONCENTRATED LOAD TESTED AT (INSERT SPAN IN INCHES)"

f) For PBU grade products only, the word "UNDERLAYMENT".

g) For products complying with Subsection 3.3.5 only, the words "EXTERIOR GLUE".

4.3 Methods of identification

For grades in Table A, the information required by Section 4.2 shall be provided either by (a) stamping it on each panel or (b) providing a written statement thereof in a unit label, invoice or other document associated with each panel. For grades in Table B the information required by Section 4.2 shall be stamped on each panel.

ANSI A208.1-1999 Particleboard

Table A
Requirements for Grades of Particleboard [1,2]

Grade[3]	Dimensional Tolerances			Physical and Mechanical Properties[4]							
		Thickness Tolerance[5]						Screw-holding			
	Length & Width mm (inch)	Panel Average from Specified mm (inch)	Variance from Panel Average mm (inch)	Modulus of Rupture N/mm² (psi)	Modulus of Elasticity N/mm² (psi)	Internal Bond N/mm² (psi)	Hardness N (pounds)	Face N (pounds)	Edge N (pounds)	Linear Expansion max. avg. percent	Formaldehyde Maximum Emissions ppm
H-1	±2.0 (0.080)	±0.200 (0.008)	±0.100 (0.004)	16.5 (2393)	2400 (348100)	0.90 (130)	2225 (500)	1800 (405)	1325 (298)	NS[6]	0.30
H-2	±2.0 (0.080)	±0.200 (0.008)	±0.100 (0.004)	20.5 (2973)	2400 (348100)	0.90 (130)	4450 (1000)	1900 (427)	1550 (348)	NS	0.30
H-3	±2.0 (0.080)	±0.200 (0.008)	±0.100 (0.004)	23.5 (3408)	2750 (398900)	1.00 (145)	6675 (1500)	2000 (450)	1550 (348)	NS	0.30
M-1	±2.0 (0.080)	±0.250 (0.010)	±0.125 (0.005)	11.0 (1595)	1725 (250200)	0.40 (58)	2225 (500)	NS	NS	0.35	0.30
M-S	±2.0 (0.080)	±0.250 (0.010)	±0.125 (0.005)	12.5 (1813)	1900 (275600)	0.40 (58)	2225 (500)	900 (202)	800 (180)	0.35	0.30
M-2	±2.0 (0.080)	±0.200 (0.008)	±0.100 (0.004)	14.5 (2103)	2250 (326300)	0.45 (65)	2225 (500)	1000 (225)	900 (202)	0.35	0.30
M-3	±2.0 (0.080)	±0.200 (0.008)	±0.100 (0.004)	16.5 (2393)	2750 (398900)	0.55 (80)	2225 (500)	1100 (247)	1000 (225)	0.35	0.30
LD-1	±2.0 (0.080)	+0.125 (0.005) -0.375 (0.015)	±0.125 (0.005)	3.0 (435)	550 (79800)	0.10 (15)	NS	400 (90)	NS	0.35	0.30
LD-2	±2.0 (0.080)	+0.125 (0.005) -0.375 (0.015)	±0.125 (0.005)	5.0 (725)	1025 (148700)	0.15 (22)	NS	550 (124)	NS	0.35	0.30

1) Particleboard bonded with a resin system containing formaldehyde, other than an exclusively phenol formaldehyde resin system, is subject to the formaldehyde emission conformance requirements.

2) Grades listed in this table shall also comply with the appropriate requirements listed in Section 3 of this Standard. Panels designated as "Exterior Glue" must maintain 50% MOR after ASTM D 1037 accelerated aging (Subsection 3.3.5).

3) Refer to Annex B for general use and grade information.

4) Physical and mechanical property values represent a five panel average.

5) Thickness tolerance values are only for sanded panels. Unsanded panels shall be in accordance with any thickness tolerances specified by agreement between the manufacturer and the purchaser.

6) NS - Not Specified

Table B
Requirements for Grades of Particleboard Flooring Products [1,2]

Grade[3]	Dimensional Tolerances			Physical and Mechanical Properties[4]								
		Thickness Tolerance[5]										
	Length & Width Tolerance mm (inch)	Panel Average from Specified mm (inch)	Variance from Panel Average mm (inch)	Modulus of Rupture N/mm² (psi)	Modulus of Elasticity N/mm² (psi)	Internal Bond N/mm² (psi)	Hardness N (pounds)	Concentrated[6] Loading N (pounds)	Thickness Swell max. avg. mm (inch)	Thickness Swell max. avg. percent	Linear Expansion max. avg. percent	Formaldehyde Maximum Emissions ppm
PBU	+0 (0) -4.0 (0.160)	±0.375 (0.015)	±0.250 (0.010)	11.0 (1595)	1725 (250200)	0.40 (58)	2225 (500)	NS[7]	1.6 (0.063)	NS	0.35	0.20
D-2	±2.0 (0.080)	±0.375 (0.015)	±0.250 (0.010)	16.5 (2393)	2750 (398900)	0.55 (80)	2225 (500)	2670 (600)	NS	8	0.30	0.20
D-3	±2.0 (0.080)	±0.375 (0.015)	±0.250 (0.010)	19.5 (2828)	3100 (449600)	0.55 (80)	2225 (500)	2670 (600)	NS	8	0.30	0.20

1 Particleboard bonded with a resin system containing formaldehyde, other than an exclusively phenol formaldehyde resin system, is subject to the formaldehy de emission conformance requirements.

2) Grades listed in this table shall also comply with the appropriate requirements listed in Section 3 of this Standard. Panels designated as "Exterior Glue" must maintain 50% MOR after ASTM D 1037 accelerated aging (Subsection 3.3.5).

3) Refer to Annex B for general use and grade information.

4) Physical and mechanical property values represent a five panel average.

5) Thickness tolerance values are only for sanded panels. Unsanded panels shall be in accordance with any thickness tolerances specified by agreement between the manufacturer and the purchaser.

6) In addition to supporting 2670 Newtons, "D" grades shall not deflect more than 3.2 mm (0.125 inch), relative to the supports at an applied force of 890 N (200 pounds). See Subsection 3.3.11 "Concentrated loading."

7) NS - Not Specified

ANSI A208.1-1999 Particleboard

Annex A
(Normative)

References

The materials identified below are referenced in this American National Standard and are part of the Standard.

ASTM D 1037-96a, Standard Test Methods for Evaluating the Properties of Wood Based Fiber and Particle Panel Materials

ASTM E 1333-96, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber

ISO Guide 7-1994, Guidelines for drafting of standards suitable for use for conformity assessment

Annex B
(Informative)

General use and grades

Use	Grade	Table
Commercial	M-1, M-S	A
Industrial	M-2, M-3	A
High density industrial	H-1, H-2, H-3	A
Door core	LD-1, LD-2	A
Interior Stair Tread [1]	M-3	A
Exterior construction	M-1-Exterior glue, M-S-Exterior glue, M-2-Exterio r glue, M-3-Exterior glue	A
Exterior industrial	M-1-Ex terior glue, M-S-Exterior glue, M-2-Exterio r glue, M-3-Exterior glue	A
High density exterior industrial	H-1-Exterior glue, H-2-Exterior glue, H-3-Exterio r glue	A
Underlayment	PBU	B
Manufactured Home Decking	D-2, D-3	B

1) Product requirements for particleboard interior stair tread are specified in the U.S. Department of Housing and Urban Development (HUD), Use of Materials Bulletin No. 70b that is available from the Composite Panel Association or HUD.

ANSI A208.1-1999 Particleboard

Annex C
(Informative)

Metric values

The 1975 Metric Conversion Act, as amended by the Omnibus Trade and Competitiveness Act of 1988, states that metric (SI) is the preferred system of measurement in the U.S. All Federal agencies must conduct their business in metric by September 1992, to the extent feasible.

The testing and property requirements in this Standard were converted during the 1993 Standard revision from the English inch-pounds to metric, in most instances using a "rationalized" conversion where the new metric values are rounded to an appropriate degree of precision[1]. Inch-pound units are shown in parentheses after the metric value and are generally precise mathematical conversions from the metric.

The conversion factors for the units found in this Standard are as follows:

Dimensions	
1 inch	= 0.0254 meter (m)
1 inch	= 25.4 millimeters (mm)
1 m	= 39.370 inch
Mass	
1 gram (g)	= 0.0022046 pound (lb)
1 lb	= 453.5924 g
Force	
1 newton (N)	= 101.9716 g
1 N	= 0.2248029 lb
1 g	= 0.0098067 N
1 lb	= 4.448222 N
Force/area	
1 pascal (Pa)	= 1 N/m^2
1 kilopascal (kPa)	= 0.001 N/mm^2
1 megapascal (MPa)	= 1 N/mm^2
1 N/mm^2	= 145.037 pounds per square inch (psi)
1 psi	= 0.0068948 N/mm^2

[1] ASTM E 29-93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

Metric Values

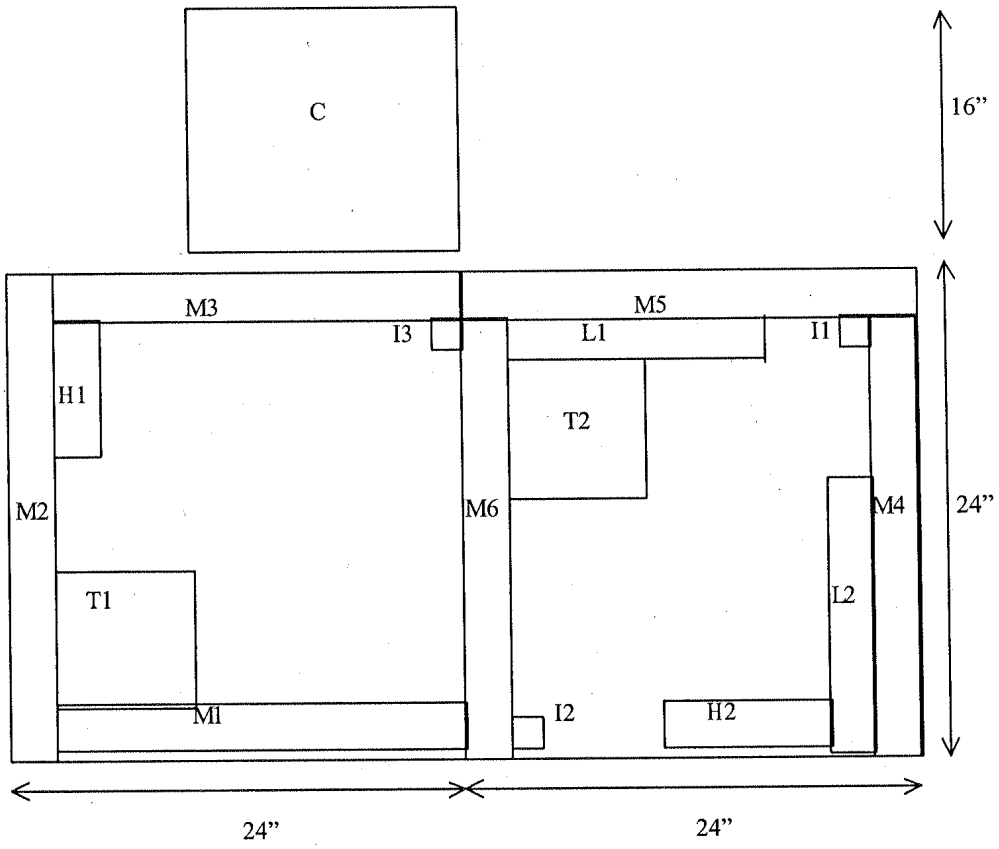
Conversion s for:		Rounded to:
force (Newtons)	less than 100 N	nearest 1 N
	greater than 100 N	nearest 10 N
stress (N/mm^2)	less than 2 N/mm^2	nearest 0.01 N/mm^2
	between 2 and 30 N/mm^2	nearest 0.1 N/mm^2
	greater than 30 N/mm^2	nearest 1 N/mm^2
dimension s	less than 50 mm	nearest 0.025 mm
	between 50 and 500 mm	nearest 0.1 mm
	greater than 500 mm	nearest 1 mm

ANSI A208.1-1999 Particleboard

Annex D
(Informative)

Sample cut-up pattern [1]

H - Hardness
I - Internal Bond
L - Linear Expansion
M - Modulus of Rupture/Elasticity[2,3,4]
T - Thickness Swell (Required only for grades PBU, D-2 and D-3)
C - Concentrated Load (Required only for grades D-2 and D-3)



1) Refer to the appropriate ASTM D 1037-96a test procedure for information on specimen size requirements .
2) Density shall be determined from the modulus of elasticity specimens and screw-holding specimens may be cut from modulus of rupture specimens after breaking.
3) The exact dimension of MOR/MOE specimens is dependent on specimen thickness.
4) Moisture content samples may be cut from broken MOR specimens.

ANSI A208.2-2002
Approved May 13, 2002

American National Standard

Medium Density Fiberboard (MDF) For Interior Applications

Composite Panel Association
18922 Premiere Court, Gaithersburg, MD 20879
Tel (301) 670-0604, Fax (301) 840-1252
Web www.pbmdf.com

ANSI A208.2-2002

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

American National Standard

Approval of an American Standard requires verification by the American National Standards Institute (ANSI) that the requirements for due process, consensus, and other criteria for approval have been met by the standard' s developer.

Consen sus is established when, in the judgement of the ANSI Board of Standards Review, substanti al agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether they have approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

ANSI does not develop standards and will in no circumstance give an interpretatio n of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standard s Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodic ally to reaffirm, revise, or withdraw this standard. Purchasers of American National Standard s may receive current information on all standards by calling or writing the American National Standards Institute.

Abstract

This Standard sets forth requirements and test methods for dimensional tolerances, physical and mechanical properties and formaldehyde emissions for medium density fiberboard (MDF). Methods of identifying products conforming to the Standard are specified. Property requirements are described in metric and English.

Publishe d by

Composite Panel Association
18922 Premiere Court, Gaithersburg, MD 20879-1569

Cop yright© 2002 by Composite Panel Association
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior permission of the Composite Panel Association.

Printed in the United States of America

Contents Page

Foreword 1
1 Purpose and scope 3
1.1 Purpose 3
1.2 Scope 3
1.2.1 General 3
1.2.2 Suitability for certification 3
2 Definitions 3
2.1 Additive 3
2.2 Advanced Bond Integrity 3
2.3 Bonding System 3
2.4 Fiber 3
2.5 Medium Density Fiberboard (MDF) 3
2.6 Moisture Resistance (MR) 3
2.7 Panel 3
2.8 Panel Average Thickness 3
2.9 Panel Average Thickness from Specified 4
2.10 Reduced Thickness Swell 4
2.11 Specified Thickness 4
2.12 Variance from Panel Average Thickness 4
3 Requirements 4
3.1 General 4
3.2 Dimensional tolerances 4
3.2.1 Width and length 4
3.2.2 Thickness 4
3.2.3 Squareness 4
3.2.4 Edge Straightness 4
3.3 Physical and mechanical properties 4
3.3.1 Moisture content 4
3.3.2 Linear expansion (LE) 5
3.3.3 Thickness swell (TS) 5
3.3.4 Reduced thickness swell 5
3.3.5 Advanced bond integrity 5
3.3.6 Modulus of rupture (MOR) and modulus of elasticity (MOE) 5
3.3.7 Internal bond (IB) 5
3.3.8 Face screw-holding 5
3.3.9 Edge screw-holding 5
3.4 Formaldehyde 6
4 Identification 6
4.1 Grade designation 6
4.2 Moisture resistance designation 6
4.3 Product identification 6
4.4 Identification methods 6
Tables
1 Physical and Mechanical Property Requirements for MDF When Determined in Accordance with ASTM D 1037-99 Part A 7
2 Physical and Mechanical Property Requirements for Thin MDF [≤ 9.5 mm (3/8 inch) Thick] When Determined in Accordance with ASTM D 1037-99 Part B Test Methods for Hardboard 8
Annex
A References (Normative) 9
B Metric values (Informative) 10
C Cut-up pattern guide (Informative) 11

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Foreword (This foreword is not part of American National Standard A208.2-2002.)
The first American National Standard for Medium Density Fiberboard For Interior Use was published in 1980 as ANSI A208.2-19 80, under combined sponsorship by the National Particleboard Association and the American Hardboard Association. It was reapproved in 1986 as Medium Density Fiberboard For Interior Use, ANSI A208.2-1986 under the sponsorship of the National Particleboard Association. The Standard was revised in 1994 as Medium Density Fiberboar d (MDF), ANSI A208.2-1994 under the sponsorship of the National Particleboard Association.

In 1997 the National Particleboard Association and the Canadian Particleboard Association consolidated into the Composite Panel Association.

This Standard is the 2002 revision of ANSI A208.2, Medium Density Fiberboard (MDF) for Interior Applications. It incorporates several significant modifications to the 1994 standard. New interior applications are addressed for which expanded evaluation criteria may be required. Specifically, the following major changes have been made:

- Deletion of references to density classifications in order to avoid potential confusion caused by the terms "Low Density," "Medium Density," and "High Density" Medium Density Fiberboard. Grades in this Standard are based solely on performance and are independent of density. The availability of a specific desired density for a given grade and panel thickness may vary by manufacturer.

- Addition of thickness swell requirements including specifications for "Reduced Thickness Swell" characteri stics.

- Substitution of the term "Advanced Bond Integrity" in place of "Exterior Glue Bonding System".

- Substitution of the term "Specified Thickness" in place of the sometimes confusing "Nominal Thickness".

- Inclusion of "Moisture Resistant" classifications defined by "Thickness Swell" and/or "Bond Integrity Characteristics".

- Deletion of references to "Exterior Grade" products.

- A reduction of allowable deviation for physical and mechanical properties.

- Addition of "Linear Expansion" in the property requirements tables.

- Creation of two property tables based on different test methods with each defining unique grades. Table 1 applies to all thicknesses of MDF as evaluated by ASTM D1037-99 Part A - General Test Methods for Evaluating The Basic Properties of Wood-Base Fiber and Particle Panel Materials. Table 2 is new, and applies to thin MDF [≤ 9.5mm (3/8 inch) thick] as evaluated by ASTM D1037-99 Part B - Acceptance and Specification Test Methods for Hardboard. Becaus e test methods in Part A and Part B of D1037-99 use different specimen dimensions and testing speeds, property values may differ for the same thickness.

This Standard has three Annexes. Annex A is normative and is part of this Standard; Annexes B and C are informative and are not part of this Standard.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Consensus for this standard was achieved by use of the Canvass Method. The following organizations, recognized as having an interest in MDF standards, were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

American Hardboard Association
APA - The Engineered Wood Association
Architectural Woodwork Institute
Canadian Council of Furniture Manufacturers
Canadian Wood Council
Flakeboard Company Ltd.
Forintek Canada Corporation
Georgia-Pacific Corporation
Hardwood Plywood and Veneer Assn.
Intech Consulting, Inc.
Kimball International
Kitchen Cabinet Manufacturers Assn.
Langboard, Inc.
L-P
Manufactured Housing Institute
Mississippi State University
National Council of the Paper Industry for Air and Stream Improvement
Norbord Industries, Inc.
North Carolina State University
Panolam Industries Ltd.
Pan Pacific Products, Inc.
Plum Creek MDF, Inc.
Woodcraft Industries (PrimeWood)
Sacopan Inc.
Sauder Woodworking, Inc.
SierraPine, Ltd.
Temple
TECO/PFS
Uniboard Canada Inc.
University of Laval
West Fraser Mills Ltd.
Willamette Industries, Inc.
Woodwork Institute of California

American National Standard, Medium Density Fiberboard (MDF) For Interior Applications

1 Purpose and scope

1.1 Purpose

The purpose of this Standard is to establish a nationally recognized voluntary consensus standard for medium density fiberboard (MDF) for interior applications which can serve as a common basis for understanding among those manufacturing, specifying or using MDF products.

1.2 Scope

1.2.1 General

This Standard covers MDF for interior applications, and includes definitions, dimensional tolerances, physical and mechanical property requirements, and a maximum formaldehyde emission level for different grades of MDF. Also included are references to test methods and means of identifying conforming products. The mechanical property requirements are not engineering design values.

1.2.2 Suitability for certification

The Standard was revised with reference to ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) ISO/IEC Guide 7:1994 (E) and is suitable for certification purposes.

2 Definitions

2.1 Additive: A material, other than the bonding system, added during the MDF manufacturing process, which enhances desired properties (e.g., resistance to moisture, dimensional stability, fire retardance, and resistance to fungi and insects).

2.2 Advanced Bond Integrity: The characteristic that allows MDF to meet the modulus of rupture requirement after accelerated aging cycles as referenced in Subsection 3.3.5 of this Standard.

2.3 Bonding System: A system that, when added to cellulosic fibers, constitutes the primary source of inter-fiber adhesion.

2.4 Fiber: A discrete element of cellulosic material.

2.5 Medium Density Fiberboard (MDF): A composite panel product composed primarily of cellulosic fibers and a bonding system cured under heat and pressure. MDF density is typically between 500 kg/m^3 (31 lbs/ft^3) and 1000 kg/m^3 (62 lbs/ft^3).

2.6 Moisture Resistance (MR): The term moisture resistance (MR) refers to the thickness swell and bond integrity characteristics of MDF, used in interior applications, when subjected to periodic exposure to moisture. The moisture resistance categories of MDF are identified by the following designations:

MR10	MDF that meets the reduced thickness swell criteria in Subsection 3.3.4.
MR30	MDF that meets the modulus of rupture criteria for advanced bond integrity in Subsection 3.3.5.
MR50	MDF that meets both the reduced thickness swell criteria in Subsection 3.3.4 and the modulus of rupture criteria for advanced bond integrity in Subsection 3.3.5.

2.7 Panel: A flat, rectangular piece of MDF with all trimmed edges $\geq$ 0.61 m (2 feet).

2.8 Panel Average Thickness: Average of eight measurements taken 25.4 mm (1.0 inch) in from the edge at each panel corner and taken 25.4 mm (1.0 inch) in from the edge at the mid-length point of each panel edge.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

2.9 Panel Average Thickness from Specified: The difference between the panel average thickness and the specified thickness.

2.10 Reduced Thickness Swell: The characteristic that allows MDF to meet the thickness swell requirements in Subsection 3.3.4.

2.11 Specified Thickness: Thickness specified by either the manufacturer or the purchaser.

2.12 Variance from Panel Average Thickness: The maximum difference between the panel average thickness and the individual thickness measurements.

3 Requirements

3.1 General

Physical and Mechanical Property Tables 1 and 2 are based on different test methods with each defining unique grades. Grades in Table 1, determined in accordance with American Society for Testing and Materials (ASTM) Standard D1037-99 Part A - General Test Methods for Evaluating The Basic Properties of Wood-Base Fiber and Particle Panel Materials, may be used to identify panels of any thickness. Grades in Table 2, determined in accordance with ASTM D1037-99 Part B - Acceptance and Specification Test Methods for Hardboard, may be used to identify thin panels with thickness ≤ 9.5 mm (3/8 inch). Because test methods in Part A and Part B of D1037-99 use different specimen dimensions and testing speeds, property values may differ for the same thickness.

MDF panels represented as conforming to any grade in this standard at the time of shipment from the manufacturer, shall meet the requirements specified for that grade when tested in accordance with the provisions of this section. After shipment from the manufacturer, MDF that has been subjected to varying conditions of environment, storage, handling, or manufacture, may not continue to conform to the Standard when subsequently tested.

3.2 Dimensional tolerances

3.2.1 Width and length. The trimmed width and length tolerance of MDF panels shall not exceed ± 2.0 mm (0.080 inch) for panel dimensions ≥ 0.61 m (2 feet) as specified in Tables 1 and 2. Width and length shall be determined in accordance with Section 7 of ASTM D 1037-99.

3.2.2 Thickness. Panel average from specified thickness shall not exceed ± 0.125 mm (0.005 inch) as specified in Tables 1 and 2. Variance from panel average thickness shall not exceed ± 0.125 mm (0.005 inch) as specified in Tables 1 and 2.

3.2.3 Squareness. The two diagonal measurements of a trimmed panel shall not differ more than 3 mm per meter (0.036 inch per foot) of panel width (shortest edge) when trimmed to finished length and width.

3.2.4 Edge straightness . A trimmed edge of a panel ≥ 0.61 m (2 feet) shall not deviate more than 1 mm per 1.5 meters (0.016 inch per 2 feet). Edge straightness shall be determined by measuring to the nearest 0.5 mm (0.020 inch) the maximum deviation from a straight line extending from corner to corner on the same edge.

3.3 Physical and mechanical properties. Physical and mechanical property requirements are listed in Tables 1 and 2. These requirements represent 5 panel averages. However, for the properties in Subsections 3.3.2, 3.3.3, and 3.3.4 no single panel average shall be greater than 10% above the requirements for that grade. For the properties in Subsections 3.3.5 through 3.3.9, no single panel average shall be greater than 10% below the requirements for that grade.

3.3.1 Moisture content. The average moisture content at time of shipment from the manufacturer shall not exceed nine percent. The moisture content shall be determined in accordance with Sections 9, 120, and 121.1 of ASTM D 1037-99, from two specimens per panel and their test results averaged to determine the moisture content for the panel.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

3.3.2 Linear expansion (LE). The LE between 50% and 80% relative humidity (RH) shall be determined in accordance with sections 108 through 111 and footnotes 38 through 40 of ASTM D1037-99. One specimen shall be cut parallel to the length of each panel to be tested, and one shall be cut perpendicular to the length of the same panel. The results of the two tests shall be averaged to determine the LE for the panel.

3.3.3 Thickness swell (TS). The TS shall be determined in accordance with sections 100 through 103 and sections 105 through 107 of ASTM D 1037-99 after 24-hour submersion. Two specimens per panel shall be cut and the test results averaged to determine the TS for the panel.

3.3.4 Reduced thickness swell. MDF represented as having a reduced TS characteristic (MR10) shall have a TS ≤ 50% of the TS requirement listed for a particular grade in Table 1 or 2. TS shall be measured according to Subsection 3.3.3.

3.3.5 Advanced bond integrity. MDF represented as having advanced bond integrity (MR30), when tested in accordance with Sections 112 through 118 of ASTM D 1037-99, shall have an average modulus of rupture after the accelerated aging cycles of at least 50 percent of the applicable modulus of rupture requirement of a particular grade in Table 1 or 2. The modulus of rupture shall be calculated using the original sample thickness before the accelerated aging test cycles.

3.3.6 Modulus of rupture (MOR) and modulus of elasticity (MOE). The MOR and MOE values in Table 1 shall be determined in accordance with Sections 12, 14 through 17, 20.1 and 20.3 of ASTM D 1037-99 Part A. Alternatively, the following approaches are acceptable for determining MOE: (1) It is not necessary to obtain a full force-deflection curve as specified in 17.1; only two force values (and corresponding deflections) within the elastic range need to be recorded; and (2) in 20.3, P1 shall be the difference between the two recorded forces and Y1 shall be the difference between the two corresponding recorded deflections. Three specimens shall be cut parallel to the length of the panel and three specimens shall be cut perpendicular to the length of the same panel. The results of the six tests shall be averaged to determine the MOR and MOE of the panel.

The MOR values in Table 2 shall be determined in accordance with Sections 156 through 159, of ASTM D 1037-99 Part B. Three specimens shall be cut parallel to the length of the panel and three specimens shall be cut perpendicular to the length of the same panel. The results of the six tests shall be averaged to determine the MOR of the panel.

3.3.7 Internal bond (IB). The IB values in Table 1 shall be determined in accordance with Sections 28 through 32 of ASTM D 1037-99 Part A. The IB values in Table 2 shall be determined in accordance with Sections 162 and 163 of ASTM D 1037-99 Part B. Five specimens per panel shall be cut and the test results averaged to determine the IB for the panel.

3.3.8 Face screw-holding. The face screw-holding values in Table 1 shall be determined in accordance with Sections 61 through 67, and notes 25 through 27 of ASTM D 1037-99 Part A, except that: (1) Sections 62.2 and 64 shall not apply; (2) if the panel is less than 19 mm (3/4 inch) thick, the specimen shall be made up of two thicknesses bonded together with an adhesive; and (3) lead holes shall be predrilled a minimum of 19 mm (3/4 inch) deep, using a bit 3.2 mm (1/8 inch) in diameter. Four specimens per panel shall be cut and the test results averaged to determine the face screw-holding for the panel.

Panels of thickness less than 9.5 mm (3/8 inch) shall not be tested for face screw-holding.

3.3.9 Edge screw-holding. The edge screw-holding values in Table 1 shall be determined in accordance with Sections 61 through 67, and notes 25 through 27 of ASTM D 1037-99, except that: (1) Sections 62.1 and 64 shall not apply; and (2) lead holes shall be predrilled a minimum of 19 mm (3/4 inch) deep, using a bit 3.2 mm (1/8 inch) in diameter. Four specimens per panel shall be cut and the test results averaged to determine the edge screw-holding for the panel.

Panels of thicknesses less than 16 mm (5/8 inch) shall not be tested for edge screw-holding.

3.4 Formaldehyde
Formaldehyde emissions from MDF bonded with a resin system containing formaldehyde, other than an exclusively phenol-formaldeh yde resin system, shall be tested in accordance with ASTM E 1333-96. The loading ratio for MDF shall be 0.260 m^2/m^3 (0.08 ft^2/ft^3). Emissions shall not exceed the maximum limit of 0.30 ppm as specified in Tables 1 or 2.

4 Identification

4.1 Grade designation
The MDF grades in this standard are identified by a three digit number. Table 1 grades are designated by 100 series numbers and Table 2 grades are designated by 200 series numbers. The grade number designates the property value level first based on MOR and secondarily on IB.

4.2 Moisture resistance designation
MDF with moisture resistant characteristics shall be identified by using a grade designation followed by a hyphen and a moisture resistance designation in Subsection 2.6. Using grade 140 for example: 140-MR10; 140-MR30; 140-MR50.

4.3 Product identification
All MDF which is represented as conforming to this American National Standard shall be identified with at least the following information:

a) ANSI Standard A208.2-2002
b) Thickness
c) Grade
d) Other applicable designations

MR10 for products meeting the requirements of Subsection 3.3.4

MR30 for products meeting the requirements of Subsection 3.3.5

MR50 for products meeting both requirements of Subsection 3.3.4 and Subsection 3.3.5

4.4 Identification methods
The information required by Subsection 4.3 shall be provided either by:

a) a shipping or package label with the conforming product(s), or
b) an invoice or other commercial document, or
c) stamping or labeling each conforming panel.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Table 1

Physical and Mechanical Property Requirements for MDF When Determined In Accordance with ASTM D 1037-96a Part A [1,2]

Grades	Physical and Mechanical Properties[3]											
	Modulus of Rupture (MOR)		Modulus of Elasticity (MOE)		Internal Bond (IB)		Screw-holding[4]				Thickness Swell (TS)	
							Face		Edge		Panel Thickness	
	N/mm²	(psi)	N/mm²	(psi)	N/mm²	(psi)	N	(pounds)	N	(pounds)	≤15 mm mm (inch)	>15mm percent
110	27.0	3850	1400	203100	0.38	54	780	175	670	151	1.5 (0.059)	10%
120	27.0	3850	1400	203100	0.50	73	875	197	775	174	1.5 (0.059)	10%
130	27.0	3861	2400	348100	0.60	87	1100	247	875	197	1.5 (0.059)	10%
140	27.0	3861	2400	348100	0.75	108	1325	298	1000	225	1.5 (0.059)	10%
150	31.0	4496	3100	449600	0.90	131	1400	315	1200	270	1.5 (0.059)	10%
160	31.0	4496	3100	449600	1.05	152	1555	350	1335	300	1.5 (0.059)	10%

Property Requirements Common to all MDF

Properties	Tolerance Limits
Panel Length or Width ≥ 0.61 m (2 feet)	± 2.0 mm (0.080 inch)
Panel Average from Specified Thickness[3,5]	± 0.125 mm (0.005 inch)
Variance from Panel Average Thickness[3,5]	± 0.125 mm (0.005 inch)
Linear Expansion (LE)[3,6]	≤ 0.3 percent
Formaldehyde Emissions[7]	≤ 0.30 ppm

1) Grades shall also meet the requirements listed in Section 3 of this Standard. Panels designated as MR10 shall have a TS ≤ 50% of the TS value specified in the Table. Panels designated as MR30 shall retain at least 50% of the MOR value after tested in accordance with ASTM D 1037-96a Accelerated Aging Test. Panels designated as MR50 shall have a TS ≤ 50% of the TS value specified in the Table and shall retain at least 50% of the MOR value after tested in accordance with ASTM D 1037-96a Accelerated Aging Test.

2) MDF bonded with a resin system containing formaldehyde, other than an exclusively phenol-formaldehyde resin system, is subject to the formaldehyde emission limit.

3) Property values represent a five panel average.

4) Panels of thickness less than 9.5 mm (3/8 inch) shall not be tested for face screw-holding. Panels of thickness less than 16 mm (5/8 inch) shall not be tested for edge screw-holding.

5) Thickness tolerance values only apply to sanded panels.

6) LE shall be measured between 50% and 80% RH in accordance with ASTM D 1037-96a.

7) Tested in accordance with ASTM E 1333-96 at 0.26 m^2/m^3 (0.08 ft^2/ft^3) loading ratio.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Table 2

Physical and Mechanical Property Requirements for Thin MDF (≤ 9.5 mm (3/8 inch) Thick) When Determined in Accordance with ASTM D 1037-96a Part B Test Methods for Hardboard[1,2]

Grades	Physical and Mechanical Properties[3]				
	Modulus of Rupture (MOR)[4]		Internal Bond (IB)[4]		Thickness Swell (TS)
	N/mm²	(psi)	N/mm²	(psi)	mm (inch)
210	21.0	3046	0.35	51	2.0 (0.080)
220	31.0	4496	0.60	87	2.0 (0.080)
230	31.0	4496	1.00	145	2.0 (0.080)
240	45.0	6527	1.50	218	2.0 (0.080)

Property Requirements Common to all MDF

Properties	Tolerance Limits
Panel Length or Width ≥ 0.61 m (2 feet)	± 2.0 mm (0.080 inch)
Panel Average from Specified Thickness[3,5]	± 0.125 mm (0.005 inch)
Variance from Panel Average Thickness[3,5]	± 0.125 mm (0.005 inch)
Linear Expansion (LE)[3,6]	≤ 0.3 percent
Formaldehyde Emissions[7]	≤ 0.30 ppm

1) Grades shall also meet the requirements listed in Section 3 of this Standard. Panels designated as MR10 shall have a TS ≤ 50% of the TS value specified in the Table. Panels designated as MR30 shall retain at least 50% of the MOR value after tested in accordance with ASTM D 1037-96a Accelerated Aging Test. Panels designated as MR50 shall have a TS ≤ 50% of the TS value specified in the Table and shall retain at least 50% of the MOR value after tested in accordance with ASTM D 1037-96a Accelerated Aging Test.

2) MDF bonded with a resin system containing formaldehyde, other than an exclusively phenol-formaldehyde resin system, is subject to the formaldehyde emission limit.

3) Property values represent a five panel average.

4) MOR and IB shall be tested in accordance with part B of ASTM D 1037-96a

5) Thickness tolerance values only apply to sanded panels.

6) LE shall be measured between 50% and 80% RH in accordance with ASTM D 1037-96a.

7) Tested in accordance with ASTM E 1333-96 at 0.26 m^2/m^3 (0.08 ft^2/ft^3) loading ratio.

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Annex A
(Normative)

References

The materials identified below are referenced in this American National Standard and are part of the Standard.

American Society for Testing and Materials (ASTM):

ASTM D 1037-99, Standard Test Methods for Evaluating the Properties of Wood Based Fiber and Particle Panel Materials (Vol 04.10)

ASTM D 1037 - Part A - General Test Methods for Evaluating The Basic Properties of Wood-Base Fiber and Particle Panel Materials

ASTM D 1037 - Part B - Acceptance and Specification Test Methods for Hardboard

ASTM E 1333-96, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber (Vol 11.03)

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission):

ISO/IEC Guide 7:1994 (E), Guidelines for drafting of standards suitable for use for conformity assessment

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Annex B
(Informative)

Metric values

The 1975 Metric Conversion Act, as amended by the Omnibus Trade and Competitiveness Act of 1988, states that metric (SI) is the preferred system of measurement in the U.S. All Federal agencies must conduct their business in metric by September 1992, to the extent feasible.

The testing and property requirements in this Standard were converted during the last revision from English to metric, in most instances using a "rationalized" conversion where the new metric values are rounded to an appropriate degree of precision [1]. English units are shown in parentheses after the metric value and are generally precise mathematical conversions from the metric.

---

[1] ASTM E 29-93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications (Vol 14.02)

The conversion factors for the units found in this Standard are as follows:

Dimensions	
1 inch	= 0.0254 meter (m)
1 inch	= 25.4 millimeters (mm)
1 m	= 39.370 inch
Mass	
1 gram (g)	= 0.0022046 pound (lb)
1 lb	= 453.5924 g
Force (newtons)	
1 newton (N)	= 101.9716 g
1 N	= 0.2248029 lb
1 g	= 0.0098067 N
1 lb	= 4.448222 N
Stress (force/area)	
1 pascal (Pa)	= 1 N/m^2
1 kilopascal (kPa)	= 0.001 N/mm^2
1 megapascal (MPa)	= 1 N/mm^2
1 N/mm^2	= 145.037 pounds per square inch (psi)
1 psi	= 0.0068948 N/mm^2

Metric Values

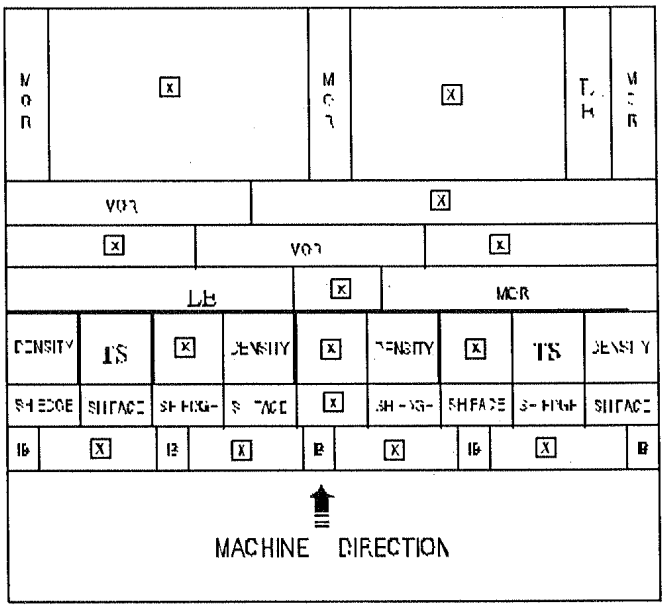
Conversions for:		Rounded to:
Dimensions	less than 50 mm	nearest 0.025 mm
	between 50 and 500 mm	nearest 0.1 mm
	greater than 500 mm	nearest 1 mm
Force (newtons)	less than 100 N	nearest 1 N
	greater than 100 N	nearest 10 N
Stress (force/area) (N/mm^2)	less than 2 N/mm^2	nearest 0.01 N/mm^2
	between 2 and 30 N/mm^2	nearest 0.1 N/mm^2
	greater than 30 N/mm^2	nearest 1 N/mm^2

ANSI A208.2-2002 Medium Density Fiberboard (MDF) For Interior Applications

Annex C
(Informative)

Cut-up pattern guide

This cut-up pattern is a guide for specimen preparation.



Property Test[1,2,3]		
IB	-	Internal Bond
MOR	-	Modulus of Rupture - Modulus of Elasticity
LE	-	Linear Expansion
SH	-	Screw-holding - Edge and Face
TS	-	Thickness Swell
☒	-	Discard/Extra

1) Refer to the appropriate ASTM D 1037-99 test procedure for specimen size.
2) Exact dimensions of MOR/MOE specimens depend on specimen thickness.
3) Moisture content can be obtained from the MOR, density or other specimens.

COMPOSITE PANEL ASSOCIATION℠

Association des fabricants de panneaux de composites

The Composite Panel Association (CPA) is the trade association for North American Producer s of particleboard, medium density fiberboard and other compatible products.

USA

18922 Premiere Court, Gaithersburg, MD 20879

Tel 301.670.0604, Fax 301.840.1252, Web www.pbmdf.com

Canada

1260 Crescent Street, Suite 216, Montreal, Quebec, Canada H3G 2A9

Tel 514.878.2883, Fax 514.989.9318