

American National Standard

Medium Density Fiberboard (MDF) For Interior Applications



Composite Panel Association
19465 Deerfield Avenue, Suite 306, Leesburg, VA 20176
Tel (703) 724-1128, Fax (703) 724-1588
Web www.pbmdf.com

ANSI A208.2-2009 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.

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CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time.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 medium density fiberboard (MDF). Methods of identifying products conforming to the Standard are specified. Property requirements are described in metric and English.

Published by

Composite Panel Association
19465 Deerfield Avenue, Suite 306, Leesburg, VA 20176

Copyright © 2009 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

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.....	3
2.10 Reduced Thickness Swell.....	3
2.11 Specified Thickness.....	3
2.12 Variance from Panel Average Thickness.....	3
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).....	4
3.3.3 Thickness swell (TS).....	4
3.3.4 Reduced thickness swell.....	4
3.3.5 Advanced bond integrity.....	4
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.....	5
4 Identification.....	5
4.1 Grade designation.....	5
4.2 Formaldehyde emission designation.....	5
4.3 Moisture resistance designation.....	5
4.4 Product identification.....	6
4.5 Identification methods.....	6
5 Conformity Assessment.....	6
5.1 Manufacturers' Inspection and Testing.....	6
5.2 Sampling for Acceptance.....	6
Tables	
1 Physical and Mechanical Property Requirements for MDF When Determined in Accordance with ASTM D 1037-06a 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 1037-06a Part B Test Methods for Hardboard.....	8
Annex	
A References (Normative).....	9
B Metric values (Informative).....	10
C Cut-up pattern guide (Informative).....	11
D Calculation of lower 5th percentile value (L5%) and upper 95th percentile (U95%) (Normative).....	12

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

Foreword (This foreword is not part of American National Standard A208.2-2009.)

The first American National Standard for Medium Density Fiberboard For Interior Use was published in 1980 as ANSI A208.2-1980, 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 Fiberboard (MDF), ANSI A208.2-1994 under the sponsorship of the National Particleboard Association. In 2002 the Standard was revised and titled, Medium Density Fiberboard (MDF) for Interior Applications, ANSI A208.2-2002.

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

This Standard is the fifth revision of ANSI A208.2, Medium Density Fiberboard (MDF) for Interior Applications. It incorporates several significant modifications to the 2002 standard.

The modifications in this 2009 version have been made in an effort to harmonize with other international product standards. All physical, except moisture content, and mechanical property specifications have been converted from a "5 panel average" value to either a 5th percentile (lower or minimum value) or a 95th (upper or maximum value) percentile expression. The upper or lower specification limits in Tables 1 and 2 can be used to determine whether or not the five-panel mean for the lot selected statistically satisfies the 5th/95th percentile limit. This Standard cannot be used to properly evaluate single panels, but as an approximation, the upper or lower specification limits may be taken as maximum or minimum values.

The conversion from 5 panel averages to percentile expressions has been carefully performed using industry-wide coefficient of variation data to ensure physical and mechanical property values remain consistent relative to the 2002 Standard. For example; an ANSI A208.2-2009 Grade 130 panel is essentially equivalent to, and meets the same requirements as, an ANSI A208.2-2002 Grade 130 panel. Other grades have been added, modified or deleted based on a stakeholder survey and are representative of what is available in today's marketplace.

This 2009 standard has a tiered classification of formaldehyde emission levels. The levels have been developed to include specifications that correspond with the California Air Resources Board's (CARB) Air Toxic Control Measure (ATCM) Phase 1 and Phase 2 emission requirements. Due to rapidly changing adhesive technology, influenced in part by the CARB ATCM, the Composite Panel Association plans to initiate a review of this standard prior to the CARB Phase 2 implementation date of January 1, 2011. This review will help ensure that product grades, physical and mechanical properties and classifications are appropriate for products complying with Phase 2 emission levels.

This Standard has four Annexes. Annexes A and D are normative and are part of this Standard; Annexes B and C are informative and are not part of this Standard.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

Consensus for this Standard was achieved by use of a canvass body and ANSI's Essential Requirements for due process. The following organizations, recognized as having an interest in the standard, 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 Fiberboard Association	Mississippi State University
American Home Furnishings Alliance	N.C. State University
APA—The Engineered Wood Association	National Assn. Of Home Builders
Architectural Woodwork Inst.	NCASI
Bassett Fiberboard	Norbord Industries, Inc.
BIFMA International	Oregon State University
Bush Industries	Plum Creek MDF, Inc.
California Air Resources Board	PSI/Pittsburgh Testing Lab.
Casey Industrial, Inc.	Roseburg Forest Products
CDM Décor Papers, Inc.	Sauder Woodworking
Clarion Boards, Inc.	SierraPine Ltd.
Columbia Forest Products	South Shore Industries, Ltd.
Del-Tin Fiber LLC	Temple-Inland
Flakeboard Company Ltd.	U.S. Consumer Product Safety Commission
FPInnovations-Forintek	U.S. General Services Administration
Georgia-Pacific Wood Products LLC	Uniboard Canada Inc.
Hardwood Plywood & Veneer Association	Unilin US MDF
ICC Evaluation Services, Inc.	Université Laval
Kimball International Inc.	West Fraser Mills Ltd.
Kitchen Cabinet Manufacturers Association	Wilsonart International Inc.
Kronospan LLC	Window & Door Manufacturers Assn.
Langboard, Inc.	Woodcraft Industries (PrimeWood)
Marshfield DoorSystems, 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. Throughout this Standard, the metric values represent the standard and English values are offered in parentheses for informational purposes. The mechanical property requirements are not engineering design values.

1.2.2 Suitability for certification

The Standard was revised with reference to ISO/IEC Guide7:1994 and is suitable for certification purposes.

2 Definitions

2.1 Additive: A material, other than the cellulosic fiber and bonding system, added during the MDF manufacturing process, which enhances desired properties or imparts other desired properties to MDF (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/m³ (31 lbs/ft³) and 1000 kg/m³ (62 lbs/ft³). For formaldehyde emission limits, thin MDF is defined as MDF with a thickness less than or equal to 8 mm (0.315 inches).

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 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.

2.9 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 either by the manufacturer or by the purchaser.

2.12 Variance from panel average thickness: The difference between the panel average thickness and the individual thickness measurement that varies the most from that average.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

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 D 1037-06a Part A—Standard Test Methods for Evaluating the 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 D 1037-06a Part B—Acceptance and Specification Test Methods for Hardboard, may be used to identify panels with thickness < 9.5 mm (3/8 inch). Because test methods in Part A and Part B of D 1037-06a use different specimen dimensions and testing speeds, property values derived from the two methods 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 8 of ASTM D 1037-06a.

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. Thickness tolerance values only apply to sanded panels.

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 properties are listed in Tables 1 and 2.

Values in Subsections 3.3.2, 3.3.3 and 3.3.4 represent an upper specification limit. The 95th percentile value, calculated in accordance with Appendix D, shall be equal to or less than the upper specification limit in the Tables (refer to Section 5.2 for sampling).

For the properties in Subsections 3.3.5 through 3.3.9, values represent lower specification limits. The 5th percentile values, calculated in accordance with Appendix D, shall be equal to or greater than the lower specification limits in the Tables (refer to section 5.2 for sampling).

3.3.1 Moisture content. The average moisture content at time of shipment from the manufacturer shall not exceed nine percent. The moisture content of a panel shall be determined in accordance with Section 8.4, using Note 5, of ASTM D 1037-06a, by averaging the test results from two specimens per panel.

3.3.2 Linear expansion (LE). The LE between 50% and 80% relative humidity (RH) shall be determined in accordance with Section 24 and footnotes 47 through 49 of ASTM D 1037-06a. 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 section 23 of ASTM D 1037-06a 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 Section 7 of ASTM D 1037-06a, 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.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

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 Section 9 of ASTM D 1037-06a Part A.

The MOR values in Table 2 shall be determined in accordance with Section 33 of ASTM D 1037-06a 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 and MOE of the panel.

3.3.7 Internal bond (IB). The IB values in Table 1 shall be determined in accordance with Section 11 of ASTM D 1037-06a Part A. The IB values in Table 2 shall be determined in accordance with Section 35 of ASTM D 1037-06a 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 Section 16, and notes 34 and 35 of ASTM D 1037-06a Part A, except that: (1) Section 16.4 shall not apply; (2) if the panel is less than 19 mm (0.750 inch) thick, the specimen shall be made up of two thicknesses bonded together with an adhesive; (3) lead holes shall be predrilled a minimum of 19 mm (0.750 inch) deep, using a bit 3.2 mm (0.125 inch) in diameter; and (4) the speed of testing shall be 0.6 inch per minute. 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 (0.375 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 Section 16, and notes 34 through 36 of ASTM D 1037-06a, except that: (1) Section 16.4 shall not apply; (2) lead holes shall be predrilled a minimum of 19 mm (0.750 inch) deep, using a bit 3.2 mm (0.125 inch) in diameter; and (3) the speed of testing shall be 0.6 inch per minute. 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 (0.625 inch) shall not be tested for edge screw-holding.

3.4 Formaldehyde

Formaldehyde emissions from MDF shall be tested in accordance with ASTM E 1333-96(2002). ASTM E 1333 shall be used when Sampling for Acceptance as required in Section 5.2.

As an alternative to ASTM E 1333, the average of three test results using the "Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small Scale Chamber" (ASTM D 6007-02) can be used for on-going compliance testing as described in Section 93120.9 of the California Code of Regulations, Title 17, Sections 93120-93120.12, *Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products*. ASTM D 6007 shall not be used when Sampling for Acceptance under Section 5.2.

The loading ratio for MDF shall be 0.260 m²/m³ (0.08 ft²/ft³). Emissions shall not exceed the maximum limit of either 0.21 ppm or 0.11 ppm for MDF with a minimum thickness greater than 8 mm. Emissions shall not exceed the maximum limit of either 0.21 ppm or 0.13 ppm for thin MDF with a maximum thickness ≤ 8 mm. Products shall be labeled in accordance to Section 4.1, Grade designation.

4 Identification

4.1 Grade designation

The MDF grades in this standard are identified by a three digit number followed by the formaldehyde emission level. 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 Formaldehyde emission designation

The formaldehyde maximum emission level is designated immediately after the grade with a hyphen and a "-F21" or "-F11" for MDF with a minimum thickness greater than 8 mm or "-F21" or "-F13" for thin MDF (≤ 8 mm). These designations correspond to emission limits of 0.21 ppm, 0.13 ppm and 0.11 ppm, respectively.

4.3 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 130 and a maximum emission level of 0.21 ppm for example: 130-F21-MR10; 130-F21-MR30; 130-F21-MR50.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

4.4 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 A208.2-2009
- b) Thickness
- c) Grade
- d) Formaldehyde emission limit
- e) 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

4.5 Identification methods

The information required by Subsection 4.4 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.

5 Conformity Assessment

5.1 Manufacturers' inspection and testing. Each manufacturer who represents his products as conforming to this Standard shall utilize statistically-based sampling plans and appropriate quality control procedures to assure compliance with this Standard.

5.2 Sampling for acceptance.

Should a buyer or third party desire to perform the inspections and tests specified in this Standard, five panels for physical and mechanical testing and two panels for emission testing of each grade and thickness, selected at random from the shipment, shall be used as the sample. This Standard cannot be used to properly evaluate single panels, but as an approximation, the upper or lower specification limits may be taken as maximum or minimum values. Annex D provides the statistical equations required to perform the compliance calculation.

ASTM E 1333 test method for formaldehyde emissions shall be used for Sampling for Acceptance.

Panels which have been allowed to exceed the specified moisture content after shipment may not conform to the physical and mechanical property requirements of the Standard when subsequently tested.

Should a dispute arise, the metric values, not the English unit values, shall be used as the standard.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

Table 1
Physical and Mechanical Property Requirements for MDF When Determined in
Accordance with ASTM D 1037-06a Part A ^{1,2}

Grades	Physical and Mechanical Properties ³												
											Maximum Thickness Swell (TS)		
											Panel Thickness		
	Modulus of Rupture (MOR)			Modulus of Elasticity (MOE)			Internal Bond (IB)		Screw-holding ⁴				
N/mm ²		(psi)	N/mm ²		(psi)	N/mm ²		(psi)	Face	Edge	≤15 mm	>15 mm	
									N (pounds)	N (pounds)	mm (inch)	percent	
115	12.4	1800	1241	180000	0.47	68	703	158	601	135	1.65 (0.065)	11%	
130	21.6	3130	2160	313000	0.54	78	988	222	787	177	1.65 (0.065)	11%	
155	27.9	4050	2792	405000	0.81	117	1201	270	1001	225	1.65 (0.065)	11%	

Property Requirements Common to all MDF

Properties	Tolerance Limits
Panel Length or Width \geq 0.61 m (2 feet)	\pm 2.0 mm (0.080 inch)
Panel Average from Specified Thickness ^{3,5}	\pm 0.125 mm (0.005 inch)
Variance from Panel Average Thickness ^{3,5}	\pm 0.125 mm (0.005 inch)
Linear Expansion (LE) ^{3,6}	\leq 0.33 percent
Formaldehyde Emissions	See below

Formaldehyde Emissions \leq 0.21 ppm or \leq 0.11 ppm for MDF with a minimum thickness greater than 8mm. Formaldehyde Emissions \leq 0.21 ppm or \leq 0.13 ppm for MDF with a maximum thickness \leq 8mm.

- 1) Grades shall also meet the requirements listed in Section 3 of this Standard.
- 2) Refer to Section 4, Identification, for grade, formaldehyde emission, moisture resistance and product identification.
- 3) Physical and mechanical property values represent a minimum or maximum value representing 5 (lower) or 95 (upper) percentile expressions, respectively.
- 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) Linear expansion shall be measured between 50% and 80% RH in accordance to ASTM D 1037-06a.

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

Table 2

**Physical and Mechanical Property Requirements for MDF (≤ 9.5 mm (0.375 inch) Thick)
When Determined in Accordance with ASTM D 1037-06a
Part B Test Methods for Hardboard^{1,2}**

Grades	Physical and Mechanical Properties ³					
	Modulus of Rupture (MOR) ⁴		Internal Bond (IB) ⁴		Maximum Thickness Swell (TS)	
	N/mm ²	(psi)	N/mm ²	(psi)	mm	(inch)
210	18.9	2741	0.32	46	2.2	(0.087)
220	28.9	4192	0.54	78	2.2	(0.087)
230	28.9	4192	0.90	131	2.2	(0.087)

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}	≤ 0.33 percent
Formaldehyde Emissions	See below

Formaldehyde Emissions ≤ 0.21 ppm or ≤ 0.11 ppm for MDF with a minimum thickness greater than 8mm. Formaldehyde Emissions ≤ 0.21 ppm or ≤ 0.13 ppm for MDF with a maximum thickness ≤ 8 mm.

- 1) Grades shall also meet the requirements listed in Section 3 of this Standard.
- 2) Refer to Section 4, Identification, for grade, formaldehyde emission, moisture resistance and product identification.
- 3) Physical and mechanical property values represent a minimum or maximum value representing 5 (lower) or 95 (upper) percentile expressions, respectively.
- 4) MOR and IB shall be tested in accordance with Part B of ASTM D 1037-06a.
- 5) Thickness tolerance values only apply to sanded panels.
- 6) Linear expansion shall be measured between 50% and 80% RH in accordance to ASTM D 1037-06a.

ANSI A208.2-2009 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.

ASTM¹ D 1037-06a, 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 D 6007-02, Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small Scale Chamber

ASTM E 1333-96(2002), 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)

California Code of Regulations, Title 17, Sections 93120-93120.12, *Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products*. <http://www.arb.ca.gov/toxics/compwood/compwood.htm>

ISO/IEC² Guide 7:1994 (E), Guidelines for drafting of standards suitable for use for conformity assessment

¹ American Society for Testing and Materials (ASTM)

² ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission)

ANSI A208.2-2009 Medium Density Fiberboard (MDF) For Interior Applications

Annex B (Informative)

The dimensional, physical and mechanical property requirements of this Standard are expressed in metric units with English units shown in parentheses for informational purposes. English values, in most circumstances, are rounded to a practical degree of precision.

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	= 0.2248089 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	= 145.0377 pounds per square inch (psi)
1 psi	= 0.0068948 N/mm ²

Metric Values

Conversions for:

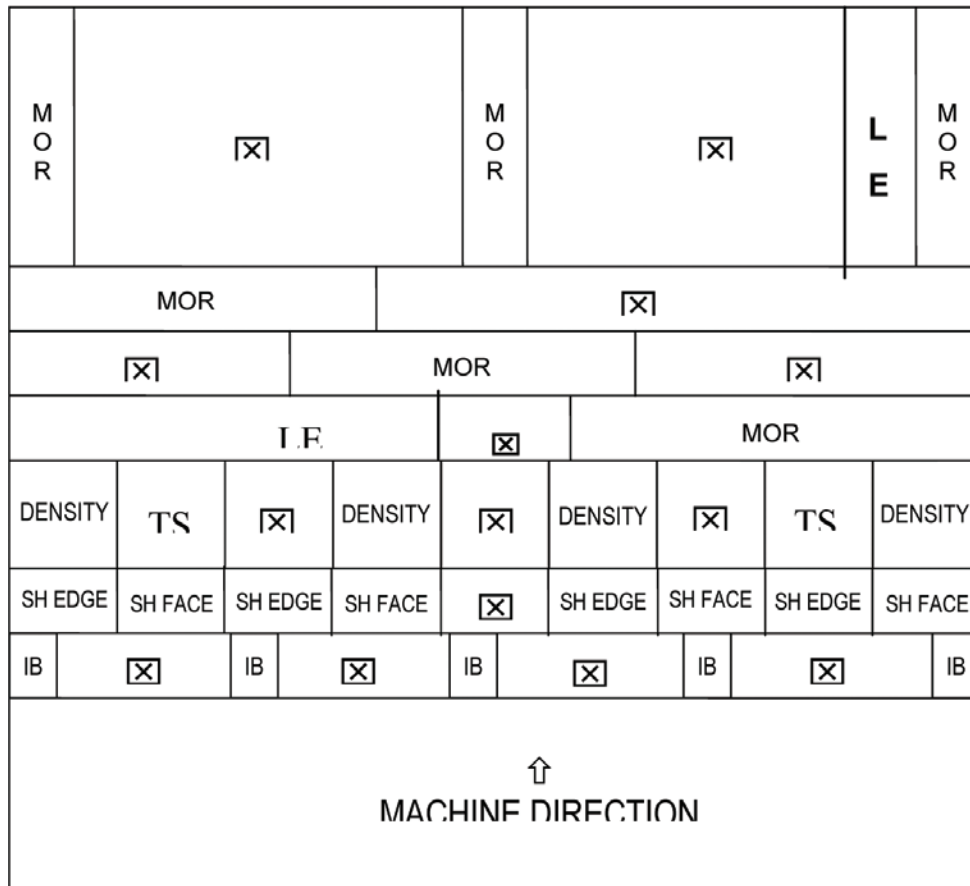
		Rounded to:
Dimensions	less than 50 mm	nearest 0.025 mm
	between 50 and 500 mm	nearest 0.1 mm
	greater than 500 mm	nearest 1 mm
Force (newtons)	less than 100 N	nearest 1 N
	greater than 100 N	nearest 10 N
Stress (force/area) (N/mm ²)	less than 2 N/mm ²	nearest 0.01 N/mm ²
	between 2 and 30 N/mm ²	nearest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

ANSI A208.2-2009 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
<input checked="" type="checkbox"/>	-	Discard/Extra

- 1) Refer to the appropriate ASTM D 1037-06a 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.

**Annex D
(Normative)**

Calculation of lower 5th percentile value (L5%) and upper 95th percentile (U95%). For use with Section 5.2 Sampling for acceptance.

D.1 Mean Value of each individual panel

$$\bar{x}_i = \sum x_n / n$$

n = number of test pieces cut from each individual panel

\bar{x}_i = panel mean (mean value of the n single test values)

x = single test value

D.2 Grand Mean

$$\bar{\bar{x}}_5 = \sum \bar{x}_i / 5$$

$\bar{\bar{x}}_5$ = 5-panel average (grand mean of panel means)

D.3 Standard Deviation of panel means

$$S\bar{x} = \sqrt{\sum (\bar{x}_i - \bar{\bar{x}}_5)^2 / 5 - 1}$$

$S\bar{x}$ = standard deviation between panel means

D.4 Lower 5th Percentile of a normally distributed panel property

$$L_{5\%} = \bar{\bar{x}}_5 - t_5(S\bar{x})$$

D.5 Upper 95th Percentile of a normally distributed panel property

$$U_{95\%} = \bar{\bar{x}}_5 + t_5(S\bar{x})$$

t_5 = single-sided 5% t-value of a normally distributed sample of 5 panels

= 2.13



COMPOSITE PANEL ASSOCIATION

Founded in 1960, the Composite Panel Association (CPA) is dedicated to advancing the North American wood-based panel and decorative surfacing industries. CPA represents both industries on technical, regulatory, quality assurance and product acceptance issues. CPA General Members include the leading manufacturers of particleboard, medium density fiberboard (MDF) and hardboard, representing about 95% of North American manufacturing capacity.

CPA Associate Members include manufacturers of decorative surfaces, furniture, cabinets, mouldings, doors and equipment, along with laminators, distributors, industry media and adhesive suppliers. All are committed to product advancement and industry competitiveness.