

Performance Requirements and Test Procedures for Labels Incorporating Linear Bar Code and Two-Dimensional (2D) Symbols — Part 1: Pressure-Sensitive Labels



Material Handling Committee (MHC) MHI 8720 Red Oak Blvd., Suite 201 Charlotte, NC 28217-3992 standards@mhi.org

© 2016 MHI All rights reserved.

Approval of an American National 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 standards developer.

Consensus is established when, in the judgment 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 he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes or procedures not conforming to the standards. The American National Standards Institute does not develop standards and will in no circumstances 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 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CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time.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.

Published by Material Handling Committees MHI 8720 Red Oak Blvd., Suite 201, Charlotte, NC, 28217-3992 Telephone: (704) 676-1190 Fax: (704) 676-1199 www.mhi.org/standards standards@mhi.org

© 2016 by MHI All rights reserved.

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

American National Standard

Performance Requirements and Test Procedures for Labels Incorporating Linear Bar Code and Two-Dimensional (2D) Symbols — Part 1: Pressure-Sensitive Labels

Standards Developer: Material Handling Committees MH10 Committee, Unit-Loads and Transport-Packages Subcommittee 8, Coding & Labelling of Unit-Loads

Approved May 12, 2016 American National Standards Institute, Inc.

pressure-sensitive labels incorporating linear bar code and two-dimensional (2D) symbols. It was developed by the MH10 Committee for Unit Loads and Transport Packages, Subcommittee 8, Coding and Labelling of Unit Loads. MH10 is promulgated under the Material Handling Committees (MHC) for which MHI is the Secretariat. This standard is intended to provide useful information and guidance for owners, users, designers, purchasers or specifiers of shipping label equipment. It is advisory only and should only be regarded as a simple tool that its intended audience may or may not choose to follow, adopt, modify, or reject. A standard may be part of, but does not constitute a comprehensive effectiveness program that cannot guard against pitfalls in operating, selecting and purchasing such a system, and should not be relied upon as such. Such a program should be developed by a qualified professional.

VOLUNTARY. The use of this document is completely voluntary. Its existence does not in any respect preclude anyone, whether it has approved this standard or not, from following procedures and assuming responsibilities not conforming to this standard.

DISCLAIMER OF LIABILITY. MHI, MH10 Subcommittee 8 and their members assume no responsibility and disclaim all liability of any kind, however arising, as a result of acceptance or use or alleged use of this standard. Anyone using this standard specifically understands and agrees that MH1, MH10 Subcommittee 8, their members, officers, agents, and employees shall not be liable under any legal theory of any kind for any action or failure to act with respect to the design, erection, installation, manufacture, and preparation for sale, sale, characteristics, features, or delivery of anything covered by this standard or any other activity covered by this standard. Any use of this information must be determined by the user to be in accordance with applicable federal, state, and local laws and regulations.

DISCLAIMER OF WARRANTY. MHI, MH10 Subcommittee 8 and their members make NO WARRANTIES of any kind, express or implied, in connection with the information in this brochure and SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR PARTICULAR PURPOSE.

INDEMNIFICATION. By referring to or otherwise employing this standard, its user agrees to defend, protect, indemnify, and hold MHI, MH10 Subcommittee 8, their members, officers, agents, and employees harmless from and against all claims, losses, expenses, damages, and liabilities, direct, incidental, or consequential, arising from acceptance or use or alleged use of this standard, including loss of profits and reasonable attorneys' fees which may arise out of the acceptance or use or alleged use of this document. The intent of this provision is to absolve and protect MHI, MH10 Subcommittee 8, their members, officers, agents, and employees from any and all loss relating in any way to this document, including those resulting from the user's own negligence.

dimensional symbol printed information for products, product packages, transport loads, returnable containers and freight containers. Tags are covered in Part 2; Radio Frequency Identification (RFID) tags are covered in Part 3.

This standard defines physical attributes and quality parameters to meet specified requirements in application standards for these labels. This standard stipulates the test procedures and requirements for performing the tests and references appropriate standards and guidelines to assist in producing labels that will meet national and global standards.

The international equivalent of this standard is ISO 28219, developed by ISO TC 122/WG 12.

At the time of approval, the MH10/SC 8 committee consisted of the following members:

AIAG (Automotive Industry Action Group)	Bill Hoffman	Monode Marking Products	J.T. Mackey
Boeing Corporation	John Engel	Motorola Solutions	Michelle Wang
CDO Technologies	Don Ertel	PackWise Consulting	Jan Gates
DoD Logistics AIT Office	Dan Kimball	Product Identification & Processing Systems (PIPS)	George Wright IV
Ericsson US / iconectiv	Bob Fox	RFIDTraxx LLC	Joe Lemieux
Evanhoe & Associates	Chuck Evanhoe	United Parcel Service	Mike Fountain
FedEx Services	David Grus	United States DoD Office of the Under Secretary of Defense (AT&L)/DPAP/PDI	Craig MacDougall
Fibre Box Association	David Carlson	United States Library of Congress	Michele Youket
FLEXcon	Jim Potter	Vossel LLC	Rich Vossel
GS1 GO	Frank Sharkey		•
Honeywell	Sprague Ackley		

The MH10/SC8 committee would like to acknowledge the contributions of the following subject matter experts who were not the voting members of the committee at the time of publication but contributed to its content:

Barbe Consulting	Lewis Barbe	Northrop Grumman	Heather Weier
Camcode	Rob Leibrandt	QED Systems	Craig Harmon
Ericsson	Mikael Hjalmarson	Reboulet & Associates LLC	Mark Reboulet
Fox IV	Rick Fox	Scientific Advisory Services	Carl Abraham
Honeywell	Glenn Aspenns	Underwriters Laboratories	Ryan Houle
Honeywell	Steven Showes	United States Army Materiel Command	Sarah Gedrich
Michigan Metrology, LLC	Donald Cohen	Vossel LLC	Rick Lafferty

Committee approval of this standard does not necessarily imply that all committee or subcommittee members voted for its approval.

AIM Global	International Safe Transit Association (ISTA)
American Trucking Associations	Material Handling Industry
American Wood Packaging Association	Material Handling Management Society
APA - The Engineered Wood Association	Millwood, Inc.
Association of American Railroads	National Wooden Pallet & Container Association
Assoc. of Professional Material Handling Consultants	Packaging Machinery Manufacturers Institute
American Society for Testing and Materials – International (ASTM)	Paper Shipping Sack Mfg. Association
Automotive Industry Action Group	Plastic Drum Institute

Fibre Box Association	Rack Manufacturers Institute
Flexible Intermediate Bulk Containers Association	Reusable Industrial Packaging Association
Glass Packaging Institute	Steel Shipping Container Institute
GS1 US	The Coca-Cola Company
IDEAlliance	The Soap & Detergent Association
Institute of Packaging Professionals (iOPP)	U.S. Air Force
Integrated Business Communications Alliance	U.S. Dept. of Agriculture
Intermec Technologies Corporation	U.S. Dept. of Defense AIT Office
International Association of Movers	U.S. Forest Products Laboratory
International Cargo Handling Coordination Association	United Parcel Service
International Foodservice Distributors Association	Virginia Tech – Center for Unit Load Design

Introdu	ction	ix
1	Scope	. 1
2	Normative References	. 2
3	Terms and Definitions	. 2
4	General Requirements and Information	. 3
4.1	Surface Roughness	. 4
4.2	Environmental Factors	. 4
5	Nature of Adhesive	. 4
6	Performance and Quality Requirements	. 4
6.1	Visual Quality Requirements	. 4
6.1.1	Initial Visual Quality	. 4
6.1.2	Visual Quality and Overall Adhesion After Testing	. 4
6.2	Requirements for Label Grade Based on Adhesion Strength	. 5
7	Standard Test Conditions	. 6
7.1	Standard Conditioning Atmosphere	. 6
7.2	Standard Laboratory Conditions	. 6
7.3	Special Atmosphere Conditions	. 6
8	Requirements for Determining Adhesive Strength	. 6
8.1	Test Label	. 6
8.2	Standard Test Panel	. 6
8.3	Label Test Panel Preparation	.7
8.4	Applying the Label to the Test Panel	. 7
8.5	Peel Test for Adhesion Strength	
9	Adhesion Tests	
9.1	Adhesion Strength Tests	. 8
9.1.1	15 Minute Dwell Adhesion Strength Test	
9.1.2	72 Hour Dwell Adhesion Strength Test	
9.1.3	Representative Peel Tester	
9.2	Adhesion and Print Quality Tests after Exposure to Elevated Temperature and Humidity	. 9
9.2.1	Sample Preparation and Conditioning	
9.2.2	Short Term Test at 212°F (100 Degrees Celsius)	. 9
9.2.3	Short Term Test at 120°F (49°C) 95% RH 1	
9.2.4	Long Term Test at 180°F (82°C)	
9.2.5	Long Term Test at 90°F (32°C) 95% RH	
9.2.6	Accelerated Aging	
10	Abrasion Test	
10.1	Abrasion Test – Rub (Sutherland)	

10.3	Abrasion Test - Teledyne Taber Abraser10
11	Sample Preparation and Conditioning for Conducting Immersion and Exposure Tests11
12	Immersion Tests11
12.1	Water Immersion Test11
12.2	Detergent Immersion Test12
12.3	Solvent Immersion Tests12
12.3.1	15 Minute Solvent Immersion Test12
12.3.2	Solvent Test for Electronic Industry Labels12
13	Requirements for Conducting Outdoor Environmental Exposure Tests
13.1	Sample Preparation
13.2	Evaluation After Exposure
14	Ultraviolet (UV) Light and Water Spray Test13
15	Ultraviolet (UV) Light and Condensation Test13
15.1	Required Exposure
16	Condensation Test
17	Rain and Blowing Rain Test14
18	Salt Fog Test14
19	Table of Tests Required for an Application14
Annex	A (Informative) Alternative Test Methods for Adhesion17
Annex	B (Informative) Special Atmospheric Conditions
Annex	C (Informative) Accelerated Aging by Heat 19
Annex	D (Informative) Material Surface Energies and Grade Performance
Annex	E (Informative) Additional Tests for Labels or Marks Required to Withstand Printed Circuit Board Processes
Bibliog	Jraphy

This part of ANSI MH10.8.13 was prepared by Subcommittee 8 of the MH10 (Unit-Loads and Transport-Packages) ANSI Accredited Standards Committee (ASC). This standard was established in response to a growing need for a single comprehensive label testing standard that could be referenced by multiple application standards.

This standard was developed using industry standards and specifications as primary references.

ANSI MH10.8.13 consists of the following parts, under the general title *Test Procedures for Media* Incorporating Linear Bar Code and Two-Dimensional (2D) Symbols

- Part 1: Pressure sensitive labels
- Part 2: Tags
- Part 3: Labels and tags incorporating RFID transponders

This is Part 1.

Labels Incorporating Linear Bar Code and Two-Dimensional (2D) Symbols — Part 1: Pressure-Sensitive Labels

1 Scope

This American National standard:

- Provides detailed test procedures and performance requirements for optically readable pressure sensitive labels used to identify products;
- Provides detailed test procedures and performance requirements for optically readable pressure sensitive labels used on product packages and shipping containers;
- Is intended for applications which include, but are not limited to, support of systems that automate the control of items during the processes of:
 - production,
 - inventory,
 - distribution,
 - field service,
 - point of sale and
 - repair
- Is intended to include, but it is not limited to, multiple industries including:
 - automotive,
 - aerospace,
 - chemical,
 - consumer items,
 - electronics,
 - health care,
 - marine,
 - rail, and
 - telecommunications

In this document, the word "shall" indicates a requirement and the word "should" indicates a recommendation. This standard does not supersede or replace any applicable safety or regulatory marking, labelling or testing requirements.

Intended applications include, but are not limited to, supply chain applications, e.g., inventory, distribution, manufacturing, quality control, acquisition, transportation, supply, repair, and disposal.

Label requirements and the resultant tests that are applicable for use environments from this standard should be agreed to between trading partners. Reference Section 19, Table 4 for industry-specific tests for the appropriate application environment.

The figures contained herein are illustrative and not necessarily to scale or to the quality requirements in this document.