NEMA Standards Publication TS 4-2005

Hardware Standards for Dynamic Message Signs (DMS)
With NTCIP Requirements

Published by:

National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, Virginia 22209

www.nema.org

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FOREWORD

This NEMA Standards Publication, TS 4-2004, *Hardware Standards for Dynamic Message Signs (DMS), with NTCIP Requirements*, was developed as a design and implementation guide for dynamic traffic messaging equipment that can be safely installed and provided to the end user with operational features based on current technology. Within the standard, any reference to a specific manufacturer is strictly for the purpose of defining interchangeability where there exists no nationally recognized standard covering all the requirements. The manufacturer references do not constitute a preference. The TS 4 Standards Publication is intended to reduce hazards to persons and property when traffic-messaging equipment is properly selected and installed in conformance with the requirements herein.

The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of any claims or of any patent rights in connection therewith.

In the preparation of this Standards Publication, input of users and other interested parties has been sought and evaluated. Inquiries, comments, and proposed or recommended revisions should be submitted to the concerned NEMA product Subdivision by contacting the:

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The Dynamic Message Sign Technical Committee developed this standard at the request of the NEMA Transportation Management Systems and Associated Control Devices Section of which it is a part. Section approval of the standard does not necessarily imply that all Section members voted for its approval or participated in its development. At the time it was approved, the Transportation Management Systems and Associated Control Devices Section was composed of the following members:

3M, Intelligent Transportation Systems
ADDCO, Inc.
American Signal Company
DAKTRONICS, Inc.
Eberle Design, Inc.
Econolite Control Products, Inc.
Fiberoptic Display Systems, Inc.
Image Sensing Systems, Inc.
Iteris, Inc.
McCain Traffic Supply, Inc.
P.B. Farradyne, a Division of Parsons Brinckerhoff Quade and Douglas, Inc.
Peek Traffic Corporation
Safetran Traffic Systems, Inc.
Siemens Intelligent Transportation Systems
Skyline Products, Inc.

HISTORY AND ACKNOWLEDGEMENTS

As the implementation of variable message signing and general light emitting technology increased in the United States during the late 1980s and early 1990s, various transportation departments tried a number of diverse technologies to meet their signing needs. This eventually led to a wide variety of specifications developed across the country, a number of opposing philosophies for implementation by the users, and some unsubstantiated claims by manufacturers. It also led to conflicting definitions and references from one agency to the next for what constituted a variable message sign (VMS) or its use.

In 1995, in response to a request by Mr. Crawley Parris of NEMA seeking VMS manufacturers to become members of the NEMA 3-TS Transportation Section, several companies joined NEMA. In August of that year, a proposal was made to the Transportation Section (now the Transportation Management Systems and Associated Control Devices Section) to create this hardware standard for signing. However, at that time, the NTCIP effort was expanding, and the FHWA was hoping for considerable input from NEMA companies to develop the NTCIP protocol.

Since the same companies would be involved in both efforts and resources were limited, it was decided within NEMA to table the work for the NEMA hardware standard until the NTCIP VMS object definitions were created. The NEMA Committee to work on the object definitions held its first meeting in September 1995 and eventually submitted draft version 1.14 of NEMA TS 3.6-1997 in March of 1997. With some minor editorial modification, this version of object definitions eventually became NTCIP 1203:1997, released in December 1999. This was the first combined standard to be approved by the three SDOs of NTCIP.

In August 1997, the VMS manufacturers formed a new committee of the NEMA Transportation Section and met for the first time to outline a plan for developing this hardware standard. The initial outline included plans to define the hardware requirements for all the various types of implementations of variable type signage that are used in the transportation industry, such as changeable message signs, blankout signs, etc. However, once actual work began, user requests became urgent to get a standard in use, so it was decided to initially work on the VMS parts of the hardware only, and to table the other parts for future versions.

The table below gives the schedule of meetings and attendance by the NEMA member companies and DMS manufacturers.

NEMA Member Co. (*)		*		*	*	*	*		*	*	*	*	
Attending Company (P) / Meeting Date	Location	ADDCO	Adaptive Micro Systems*	American Signal	3M – ITS	Daktronics	Fiberoptic Display Systems	Mark IV	McCain Traffic Supply	PB Farradyne	Skyline Products	Viggens/Iteris/Trevion	Vultron***
Aug. 6, 1997	Boston	P			P	P	P	P			P		P
Dec. 2-4, 1997	Tucson	P			P	P	P	P	P		P		P
Mar. 24-25, 1998	Las Vegas	P			P		P	P**			P		P
Jun. 2-3, 1998	Denver	P					P	P**					P
Aug. 11-12, 1998	Toronto	P			P	P	P	P**				P	
Dec. 9, 1998	Houston				P		P	P**					
Mar. 30-31, 1999	Las Vegas						P	P**					P
Jun. 15-16, 1999	Chicago	P			P	P	P						P
Oct. 19-20, 1999	Rhode Island	P					P	P**			P		
Jan. 11-12, 2000	NEMA	P		P	P		P						
Apr. 18-19, 2000	Seattle	P		P	P	P	P						
Jun. 13-14, 2000	St. Paul	P		P		P	P	P**					
Sep. 19-20, 2000	Las Vegas	P		P		P	P	P**			P		
Nov. 14-15, 2000	Atlanta			P			P	P**					
Feb. 6-7, 2001	Houston	P		P		P	P	P**					
May 21-23, 2001	NEMA			P		P	P	P**					
Jul. 16-18, 2001	Toronto	P		P	P	P		P**					
Sep. 13, 2001	Telecon	P		P	P	P	P			P			
Nov. 13-15, 2001	Rhode Island	P		P	P		P	P**			P		
Feb. 4-6, 2002	Las Vegas	P		P	P		P		P	P	P		
Apr. 17, 2002	Telecon	P		P	P	P	P		P		P		
May 21-23, 2002	Idaho	P	P	P	P		P		P				
Jun. 25, 2002	Telecon	P			P		P		P				
Jul. 22, 2002	Telecon	P		P			P		P		P		
Aug. 27, 2002	Telecon	P		P	P		P		P		P		
Sep. 24, 2002	Telecon	P		P	P		P		P		P		
Oct. 8, 2002	Telecon	P		P			P		P				
Oct. 10, 2002	Telecon	P			P		P		P				
Nov. 13, 2002	Telecon	P		P	P		P		P		P		
Jan. 13, 2002	Washington, DC	P			P		P			P			
Feb. 12, 2003	Telecon	P		P	P		P				P		
Apr. 3, 2003	Telecon			P	P		P						
Apr. 17, 2003	Telecon			P	P		P		P		P		
May 13, 2003	Telecon			P	P		P		P		P		
Jun. 10, 2003	Telecon						P		P		P		
Jun. 20, 2003	Telecon			P	P		P		P		P		
Aug. 20, 2003	Telecon	P			P	P	P		P		P		

NEMA Member Co. (✳)		✳		✳	✳	✳	✳		✳	✳	✳	✳	
Attending Company (P) / **Meeting Date**	**Location**	**ADDCO**	**Adaptive Micro Systems***	**American Signal**	**3M – ITS**	**Daktronics**	**Fiberoptic Display Systems**	**Mark IV**	**McCain Traffic Supply**	**PB Farradyne**	**Skyline Products**	**Viggens/Iteris/Trevion**	**Vultron*** **
Oct. 2, 2003	Telecon	P				P	P		P		P		
Oct. 14, 2003	Telecon	P				P	P		P		P		
Nov. 4, 2003	Telecon	P				P	P		P		P		
Nov. 6, 2003	Telecon	P			P	P	P		P		P		
Nov. 18, 2003	Telecon	P			P	P	P		P				
Dec. 19, 2003	Telecon	P			P	P	P		P		P		
Jan. 8, 2004	Telecon	P			P	P	P		P		P		
Jan. 20, 2004	Telecon	P			P	P	P		P		P		
Jun. 2, 2004	Telecon	P				P	P				P		
Jun. 15, 2004	Telecon	P					P						
Jun. 23, 2004	Telecon	P				P	P				P		
Nov. 9, 2004	Telecon	P					P						

NOTES—
* Non-member
** Paid to attend meeting.
*** NEMA membership lapsed

Section 1
GENERAL

1.1 SCOPE AND INTRODUCTION

The goal of this standard is to provide the user with safe, dependable, functional, and easily maintained Dynamic Message Sign (DMS) equipment.

The requirements of this standard were developed by industry consensus, taking into account current user needs, available commercial technologies, engineering research, traffic engineering applications, human factors engineering, and engineering judgment.

NEMA Bylaws require the periodic review and updating of this standard. Further updates should include the evaluation of new technologies and research.

Original quantitative research is not within the scope or resources of this committee. Said research by others is encouraged and should be considered by the reviewing committee in support of the updating process.

The scope of this document is to define the minimum hardware and functional characteristics of electronically controlled Dynamic Message Signs used for displaying messages to travelers.

The intent of this standard is to eventually accommodate all subsets of the DMS family. However, this initial version predominantly addresses the Variable Message Sign subset.

In preparing this standard, the committee began with a very comprehensive and encompassing scope of work that was later trimmed so the standard could be released at an earlier date. For almost every element described, arguments could be made to include additional information or less information.

Rather than debate these issues internally and eternally within the Committee, the consensus was that greater benefit would be served from end user input derived through a first implementation of a standard with a reduced scope. With this in mind, the committee anticipates that a second, market driven version of this standard will include further end user input discovered from implementations and other work on the items intentionally tabled from this version.

In all cases, the goal was to avoid, as much as possible, “specification” language that detailed how an item must be built, in favor of “standards language” that addresses functionality. At the same time, the committee realized its obligation to the end users to assure that requirements for safety, dependability, and maintenance are met, so details are often listed that were derived from many field implementations currently in use.

While the Committee also attempted to keep the language open enough for development of newer technology, because representation and input from any newer technologies was not received to date, the committee focused on existing technologies currently used. As new technologies emerge, this standard can still be used as a benchmark, whereby the developers of new technologies should be able to show either their compliance to the requirements of the standard, or how the newer technology exceeds the intent of this standard. Once a newer technology is tried, used and accepted by end users or other third party agencies, representatives of newer technology should participate in future revisions and versions of this standard through the NEMA standards development process.