NEMA ICS 1-2022

Industrial Control and Systems
General Requirements

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Foreword

This technical publication was prepared by a technical committee of the NEMA Industrial Automation Control Products and Systems Section. It was approved in accordance with the bylaws of NEMA and supersedes NEMA ICS 1-2000.

This technical publication provides practical information concerning ratings, construction, test, performance, and manufacture of industrial control equipment. These standards are used by the electrical industry to provide guidelines for the manufacture and proper application of reliable products and equipment and to promote the benefits of repetitive manufacturing and widespread product availability.

NEMA standards represent the result of many years of research, investigation, and experience by the members of NEMA, its predecessors, its sections, and its committees. They have been developed through continuing consultation among manufacturers, users, and national engineering societies and have resulted in improved serviceability of electrical products with economies to manufacturers and users.

One of the primary purposes of this technical publication is to encourage the production of reliable control equipment that, in itself, functions in accordance with these accepted standards. Some portions of these standards, such as electrical spacings and interrupting ratings, have a direct bearing on safety; almost all of the items in this publication, when applied properly, contribute to safety in one way or another.

Properly constructed industrial control equipment is, however, only one factor in minimizing the hazards that may be associated with the use of electricity. The reduction of hazard involves the joint efforts of the various equipment manufacturers, the system designer, the installer, and the user. Information is provided herein to assist users and others in the proper selection of control equipment.

The industrial control manufacturer has limited or no control over the following factors that are vital to a safe installation:

a. Environmental conditions
b. System design
c. Equipment selection and application
d. Installation
e. Operating practices
f. Maintenance

This publication is not intended to instruct the user of control equipment with regard to these factors except insofar as suitable equipment to meet needs can be recognized in this publication and some application guidance is given.

This technical publication is necessarily confined to defining the construction requirements for industrial control equipment and to providing recommendations for proper selection for use under normal or certain specific conditions. Since any piece of industrial control equipment can be installed, operated, and maintained in such a manner that hazardous conditions may result, conformance with this publication does not by itself ensure a safe installation. When, however, equipment conforming with these standards is properly selected and is installed in accordance with the *National Electrical Code*® (NEC) and properly maintained, the hazards to persons and property will be reduced.

To continue to serve the best interests of users of industrial control and systems equipment, the Industrial Control and Systems Section is actively cooperating with other standardization organizations in the development of simple and more universal metrology practices. In this publication, U.S. customary units are gradually being supplemented by those of the modernized metric system known as the International Systems of Units (SI). This transition involves no changes in standard dimensions, tolerances, or performance specifications.

NEMA technical publications are subject to periodic review. They are revised frequently to reflect user input and to meet changing conditions and technical progress.

Proposed revisions to this technical publication should be submitted to:

NEMA Technical and Industry Affairs Department
National Electrical Manufacturers Association
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Note: The user's attention is called to the possibility that compliance with this standard could 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 such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the Secretary.

This technical publication was developed by the Industrial Automation Control Products and Systems Section. 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 Industrial Automation Control Products and Systems Section consisted of the following members:

ABB, Inc.—Cary, NC
Applied Information, Inc.—Suwanee, GA
Carlo Gavazzi, Inc.—Buffalo Grove, IL
Cummins, Inc.—Minneapolis, MN
Danfoss Drives—Chambersburg, PA
Delta Electronics (Americas) Ltd.—Research Triangle Park, NC
Eaton—Milwaukee, WI
Electro Switch Corporation—Weymouth, MA
Elliott Control Company, Ltd.—Willis, TX
Emerson—St. Louis, MO
Exro Technologies—Calgary, AB Canada
Firetrol, Inc.—Apex, NC
Franklin Control Systems—Hillsboro, OR
Fuji Electric Corporation of America—Roanoke, VA
Generac Power Systems—Waukesha, WI
Hubbell Industrial Controls, Inc.—Archdale, NC
Hypertherm Incorporated—Hanover, NH
JIE USA, Inc.—Carol Stream, IL
Legrand, North America—Syracuse, NY
Lenze Americas Corporation—Uxbridge, MA
Master Controls Systems, Inc.—Lake Bluff, IL
Mitsubishi Electric Automation, Inc.—Vernon Hills, IL
Nidec Motor Corporation—St. Charles, MO
NORD Gear Corporation—Waunakee, WI
Phoenix Contact, Inc.—Middletown, PA
Post Glover Resistors, Inc.—Erlanger, KY
Reliance Controls Corporation—Racine, WI
Rockwell Automation—Milwaukee, WI
Schneider Electric—Lexington, KY
SEW-Eurodrive, Inc.—Lyman, SC
Siemens Industry, Inc.—Norcross, GA
Specialty Product Technologies—Elizabethtown, NC
TE Connectivity—Harrisburg, PA

TECO-Westinghouse Motor Corporation—Round Rock, TX
Tornatech, Inc.—Laval, QC, Canada
Toshiba International Corporation USA—Houston, TX
Turntide Technologies—Sunnyvale, CA
WAGO Corporation—Germantown, WI
WEG Electric Corporation—Duluth, GA
Weidmuller Inc.—Richmond, VA
Worldwide Electric Corporation—Rochester, NY
Yaskawa America, Inc. Drives and Motor Division—Waukegan, IL

Introduction

The standards pertaining to general requirements in NEMA ICS 1 are subdivided into the following clauses:

1 General
- Scope
- Referenced Standards
- Normative References

2 Definitions
- Terms that supplement the IEC International Electrical Vocabulary (IEV 441) or assist in clarifying the product standard.

3 Classification
- Product classifications where they have been established.

4 Characteristics and Ratings
- Descriptions of the kinds of ratings applicable to the product and tables of standard ratings for the product where they have been established.

5 Product Marking, Installation, and Maintenance Information
- Product information to be provided to assist the user in the installation, use, and maintenance of the devices.

6 Service and Storage Conditions
- A description of service and storage conditions for which the devices are intended.

7 Construction
- Marking, color coding, and similar production requirements to be incorporated into the product as manufactured, as well as production test requirements where they have been established, i.e., the rules that the manufacturer follows in producing the product.

8 Performance Requirements and Tests
- The performance required to pass each design test specified for the product.

This technical publication contains general requirements that are applicable to the majority of products with the scope of the Industrial Automation Control Products and Systems Section. The product standards that make reference to these general requirements include:

NEMA Standards Title Publication No.

ICS 1 Industrial Control and Systems—General Requirements
ICS 2 Industrial Control and Systems—Controllers, Contactors, and Overload Relays Rated 600 Volts
ICS 5 Industrial Control and Systems—Control Circuit and Pilot Devices
ICS 6 Industrial Control and Systems—Enclosures
ICS 7 Industrial Control and Systems—Adjustable Speed Drives
ICS 8 Industrial Control and Systems—Crane and Hoist Controllers
ICS 10 Industrial Control and Systems—AC Transfer Switch Equipment

Industrial Control and Systems
General Requirements

1 General

1.1 Scope

The scope of this publication is the scope of the Industrial Automation Control Products and Systems Section. The purpose of this publication is to consolidate all standards of a general nature in order to obtain uniform application of requirements throughout the range of industrial control and systems equipment.

1.2 Referenced Standards

The following standards contain provisions that, through reference in this text, constitute provisions of this NEMA technical publication. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

American National Standards Institute
25 West 43rd Street, 4th Floor
New York, NY 10036

C84.1-2020 *Electric Power Systems And Equipment - Voltage Ratings (60 Hz)*

Z535.4-2011 *Product Safety Signs and Labels*

Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

ANSI/IEEE 100-2000 *The Authoritative Dictionary of IEEE Standards Terms (ANSI C42-100)*

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169

ANSI/NFPA 70-2020 *National Electrical Code*

ANSI/NFPA 70E-2021 *Standard for Electrical Safety in the Workplace*

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NEMA ICS 1.3-1986 (R2001, R2009, R2015, R2020) *Preventive Maintenance of Industrial Control and Systems Equipment*

NEMA ICS 5-2017 *Industrial Control and Systems: Control-Circuit and Pilot Devices*

NEMA ICS 6-1993 (R2001, R2006, R2011, R2016) *Industrial Control and Systems: Enclosures*