Report of the Committee on

Electrical Equipment of Industrial Machinery

Michael I. Callanan, Chair
National Joint Apprentice & Training Committee, MD [L]
Rep. International Brotherhood of Electrical Workers

John F. Bloodgood, JFJ Enterprises, WI [SE]
Dick Bromstad, Commonwealth Electric of Minnesota, MN [IM]
Rep. National Electrical Contractors Association
Frank C. DeFelice, Jr., Cytec Industries, Incorporated, CT [U]
Paul Dobrowsky, Eastman Kodak Company, NY [U]
Drake A. Drobnick, Visteon Corporation, MI [U]
Craig J. Fabbo, Speedline Technologies, Inc., MA [M]
Bruce Faust, Earth Tech Microelectronics, CA [RT]
Rep. National Electrical Manufacturers Association
John Freudenberg, Teradyne, MA [M]
Glyn R. Garside, TUV Rheinland of North America, Inc., IL [RT]
Rep. International Association of Electrical Inspectors
George Golding, Underwriters Laboratories Inc., IL [RT]
Thomas J. Kiihr, Jr., Delphi Automotive Systems, MS [U]
John Knecht, Intertek Testing Services, NA Inc., IL [RT]
Gary J. Locke, Lockheed Martin Systems Integration, NY [U]
Robert C. Monteith, Milacron Incorporated, OH [M]
Rep. Society of the Plastics Industry Inc.
Larry D. Munson, Universal Instruments Corporation, NY [M]
Carl E. Padgett, Jr., Milford, OH [M]
Rep. The Association for Manufacturing Technology
Thomas Pilz, Pilz Automation Safety L.P., MI [M]
Marvin A. Salzenstein, Polytechnic Incorporated, FL [SE]
Melvin K. Sanders, Things Electrical Co., Inc. (TECo., Inc), IA [U]
Lynn F. Saunders, General Motors WFG – Utilities Services, MI [U]
Wayman L. Withrow, Cincinnati Inc., OH [M]

Alternates

James C. Carroll, Square D Company, TN [M]
(Alt. to D. S. Fisher)
Pat Hodge, Canton, MI [U]
(Alt. to D. A. Drobnick)
Loren Mills, Van Dorn Demag Corporation, OH [M]
(Alt. to R. C. Monteith)
Jim F. Pierce, Intertek Testing Services NA Inc., OR [RT]
(Alt. to J. Knecht)
Warren Stanford, General Motors Corporation, MI [U]
(Alt. to L. F. Saunders)
Paul R. Warndorf, Association For Manufacturing Technology (AMT), VA [M]
(Alt. to C. E. Padgett)
Marvin J. Winrich, Underwriters Laboratories Inc., NY [RT]
(Alt. to G. Golding)

Staff Liaison: Joseph V. Sheehan

Committee Scope: This Committee shall have primary responsibility for documents intended to minimize the potential hazard of electric shock and electrical fire hazards of industrial metalworking machine tools, woodworking machinery, plastics machinery and mass production equipment, not portable by hand. Reports to the Association through the Technical Correlating Committee of the National Electrical Code Committee.

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of this book.

This portion of the Technical Committee Report of the Committee on Electrical Equipment of Industrial Machinery is presented for adoption.


This Report on Comments has been submitted to letter ballot of the Technical Committee on Electrical Equipment of Industrial Machinery, which consists of 25 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.

This Report on Comments has also been submitted to letter ballot of the National Electrical Code Technical Correlating Committee which consists of 10 voting members, of whom 10 voted affirmatively.
COMMITTEE ACTION: Reject

COMMENT ON PROPOSAL NO 79-7 & 79-8
RECOMMENDATION: Add a new paragraph at the end of the Standard’s Forward that states: Recognizing the impossibility of immediate updating of design and manufacturing methods, this standard shall become effective two years after the effective date of this standard.

SUBSTANTIATION: The Effective Date of this standard (per PART V REGULATIONS ANNS PROCEDURES of the Regulations Governing Committee Projects 4-7.2) is 20 days after Council action. This does not give users of this standard adequate time to become aware and get a copy of the standard to change or update their machines to meet the standards requirements. The standard is in effect before this standard can be printed. Therefore, if we follow Part V 4-7.2 and the standard comes into effect in 20 days of Council action and also give a “grace period” of two years in the Forward body of the standard we will satisfy the Part V 4-7.2 requirement and have a two year grace period for manufacturers and users to meet the requirements of the standard. Please see examples that I have provided of ANSI standards that follow this format.

NOTE: Supporting material is available for review at NFPA Headquarters.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See Comment 79-1a-(Log #CC1) which addresses the concerns of the submitter.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-2-(1.4) (New) :

TCC NOTE: See Technical Correlating Committee Note on Committee Projects 79-1a.


COMMENT ON PROPOSAL NO 79-7 & 79-8
RECOMMENDATION: Remove “5” from the appropriate section.

COMMITTEE ACTION: Accept

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-3-(1.5) : Accept

SUBMITTER: Jim Carroll, Square D

COMMENT ON PROPOSAL NO 79-8
RECOMMENDATION: Revise text to read as follows: Delete the parenthetical phrase (e.g., some requirements for the application of Design E Motors)

SUBSTANTIATION: The example is not necessary plus NEMA has rescinded the standard on Design E Motors thereby eliminating the category of Design E.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NFPA 79 — May 2002 ROC — Copyright, NFPA

79-4-(1.5) : Accept in Principle

SUBMITTER: Vince Baclawski, National Electrical Manufacturers Association

COMMENT ON PROPOSAL NO: 79-8

RECOMMENDATION: Revise proposed 1.5 as shown below:
1.5* On any point for which specific provisions are not made in this standard (e.g., requirements for the application of Design Factors) the provisions of NFPA 70, National Electrical Code, shall be observed.

SUBSTANTIATION: The Design E motor standard was rescinded by NEMA in February, 2000 and deleted from NEMA Standards Publication MG 1-1998.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: See committee action on Comment 79-3 (Log #131).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-5-(Chapter 2) : Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

COMMENT ON PROPOSAL NO: 79-10

RECOMMENDATION: The Technical Correlating Committee directs the committee to review the Normative Reference list and remove references that are not referenced for mandatory compliance. Definitions accepted in NFPA 79 that are similar or identical to a definition in another document, does not make that document a mandatory reference. The following standards from the list do not appear to be mandatory references in NFPA 79:

This action will be considered by the committee as a public comment.

SUBSTANTIATION: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The committee notes that the ASTM deletion may be inadvertent since it is a footnote to a mandatory table according to the NFPA Manual of Style.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-6-(2.1.3 and 15.3 and A.3.1 and A.6.3.1 (2)) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-10, 79-149, & 79-162

RECOMMENDATION: There are many references to IEC and CEN standards. This is ultimately going to be unacceptable to most US builders of machine tools. The US is not a member of the EU and does not wish to be. This is a serious change of scope from previous versions of NFPA 79 and must not be allowed to occur.

SUBSTANTIATION: The removal of these references will keep this US standard from becoming subservient to EU standards. Note: Supporting material is available for review at NFPA headquarters.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee does not comply with the NFPA Regulations Governing Committee Projects, Section 4.4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-7-(2.1.2.6) : Accept

SUBMITTER: Jim Carroll, Square D

COMMENT ON PROPOSAL NO: 79-10

RECOMMENDATION: Revise the title for UL 870 to read “Wireways, Auxiliary gutters and Associated Fittings:

SUBSTANTIATION: Wireways is one word in the title of the UL document.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-9-(3.3.3 Labeled) : Accept

SUBMITTER: Technical Correlating Committee National Electrical Code

COMMENT ON PROPOSAL NO: 79-13

RECOMMENDATION: Add the following definition and note to Section 3.3.X:
3.X Star Circuit Overcurrent Protective Device
A general use overcurrent protective device or combination of devices that are listed and are intended to provide protection of service, feeder, or branch circuit conductors and electrical equipment, under standard test conditions.

NOTE: A3.XX Branch circuit overcurrent protective devices are general use devices, unlike supplementary overcurrent protective devices which are application limited. Supplementary protective devices cannot be used where branch circuit overcurrent protective devices are required. However, branch circuit protective devices can be used where supplementary protective devices are permitted.

The criteria for branch circuit overcurrent protective devices are typically more stringent than for supplementary overcurrent protective devices. A branch circuit rated circuit breaker or branch circuit rated fuses in the appropriate fuse holder or disconnect has minimal creepage and clearance distances which are adequate for main, feeder, and branch circuits without additional protection upstream or line side overcurrent protective devices. For example, the minimum spacing requirements, creepage and clearance, may be considerably more for branch circuit overcurrent protective devices versus supplementary overcurrent protective devices.

Example:
- A branch circuit rated UL 489 molded case circuit breaker has spacing that are 3/4 inch through air and 1 1/4 inch over surface.
- A supplemental protector, UL 1077, has spacings that are 3/8 inch through air and 1/2 inch over surface.

Another example is that branch circuit overcurrent protective devices have standard overload characteristics established to protect branch, feeder, and main conductors. Supplementary overcurrent protective devices do not have standard overload characteristics and may differ from the standard overload characteristics of branch circuit overcurrent protective devices.

Examples of branch circuit overcurrent protective devices include but are not limited to the following:
- Fuses
  UL 248-4 Class CC
  UL 248-6 Class D
  UL 248-8 Class F
  UL 248-10 Class L
  UL 248-12 Class R
  UL 248-15 Class T
- Circuit Breakers
  UL 489 Molded Case Circuit Breakers
UL 489 Insulated Case Circuit Breakers
Examples of equipment, as referred to in the definition, include, but are not limited to the following:
- Transformers
- Panelboards
- HVAC
- Machines
- Motors
- etc.

**SUBSTANTIATION:** The addition of this definition will provide a description of branch circuit overcurrent protective devices. The need to define these devices, which had been in use for many years, however, has become important recently due to the increase of supplemental devices that are on the market. Providing a definition of branch circuit overcurrent protective devices will provide the public an understanding of what these devices are and provide an additional tool for proper selection of overcurrent protective devices.

**COMMITTEE ACTION:** Rejet

**COMMITTEE STATEMENT:** The proposed definition contains mandatory language which is not in accordance with the NFPA Manual of Style Section 2.3.2.2 that states that definitions shall not contain requirements.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-10a-(3.3.xx Color Graphic Interface Device) : Accept

**SUBMITTER:** Technical Committee on Electrical Equipment of Industrial Machinery,

**COMMENT ON PROPOSAL NO:** 79-99

**RECOMMENDATION:** Insert the following definition & re-number as required:

3.3.3X Color Graphic Interface Device: an interface between the operator and the machine, where a color video display and either a touch screen or touch pad or keyboard or mouse are used to initiate machine action by the selection of on-screen icons. (This does not include monochrome or black and white displays).

**SUBSTANTIATION:** To assist the user in applying the provisions of Chapter 10. (This definition has been previously published in the May 2002 ROP for public consideration).

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-11-(3.3.15 Conduit) : Accept in Part

**SUBMITTER:** Michael F. Crampton, General Motors - Controls, Robotics, & Welding

**COMMENT ON PROPOSAL NO:** 79-5

**RECOMMENDATION:** Revise text to read as follows:

3.3.15 Conduit

3.3.15.1 Intermediate metal Conduit. A listed steel raceway of circular cross-section with integral or associated couplings, connectors, and fittings approved for the installation of electrical conductors and used with listed fittings to provide electrical continuity. [70:342.2]

3.3.15.2 Rigid Metal Conduit. Rigid metal conduit is a listed metal raceway of circular cross section with integral or associated couplings, approved for the installation of electrical conductors and used with listed fittings to provide electrical continuity. [70:344.2]

3.3.15.3 Rigid Nonmetallic Conduit. A type of conduit and fittings of suitable nonmetallic material that is resistant to moisture and chemical atmospheres, flame retardant, resistant to impact and crushing, and resistant to distortion from heat or low temperatures under conditions likely to be encountered in service. [70:352.2]

3.3.15.4 Flexible Metal Conduit. A raceway of circular cross section made of helical wound, formed, and interlocked metal strip.

3.3.15.5 Liquidtight Flexible Metal Conduit. A raceway of circular cross section having an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core with associated couplings, connectors, and fittings approved for the installation of electrical conductors.

3.3.15.6 Liquidtight Flexible Nonmetallic Conduit. A nonmetallic raceway of circular cross section of oil-, water-, and flame-resistant construction and fittings approved for the installation of electrical conductors.

**SUBSTANTIATION:** Problem: Inconsistent organization of definitions of “Conduit” in Chapter 3.

Organization in ROP “draft document” as a result of Proposal 79-5 (Log #CC8) to implement Manual of Style changes, might lead reader to conclude that section 3.3.15 contains all the definitions for conduit, when in fact, there are additional definitions for flexible conduit in 3.3.45.1, 3.3.45.1.1, and 3.3.66.

**COMMITTEE ACTION:** Accept in Part

The committee accepts only the reorganization that the submitter proposes. This action does not modify any definitions.

**COMMITTEE STATEMENT:** The committee agrees with the submitter that the definitions would be better organized and located under the definition of conduit. If any changes are made to these definitions, the changes will appear elsewhere in the report.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-12-(3.3.15.1 Intermediate Metal Conduit): Accept in Principle

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-11

**RECOMMENDATION:** Replace the definition of Intermediate Metal Conduit in the NFPA 79 draft (3.3.15.1) with that in 342.2 of the 2002 NEC.

**SUBSTANTIATION:** To be consistent with the language used in the NEC.

**COMMITTEE ACTION:** Accept in Principle

The definition to read as follows:

3.3.xxx Intermediate Metal Conduit (IMC). A steel threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables when installed with its integral or associated coupling and appropriate fittings.

**COMMITTEE STATEMENT:** The committee agrees with the submitter’s intent to make definitions consistent with the language used in the NEC. However, the NEC definition was revised to remove the provision for use as an equipment grounding conductor which would conflict with 8.2.3.5.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-13-(3.3.15.2 Rigid Metal Conduit): Accept in Principle

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-11

**RECOMMENDATION:** Replace the definition of Rigid Metal Conduit in the NFPA 79 draft (3.3.15.2) with that in 344.2 of the 2002 NEC.

**SUBSTANTIATION:** To be consistent with the language used in the NEC.

**COMMITTEE ACTION:** Accept in Principle

Revise the definition as follows:

3.3.xxx Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables when installed with its integral or associated coupling and appropriate fittings. RMC is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous). Special use types are silicon bronze and stainless steel.

**COMMITTEE STATEMENT:** The committee agrees with the submitter’s intent to make definitions consistent with the language used in the NEC. However, the NEC definition was revised to remove the provision for use as an equipment grounding conductor which would conflict with 8.2.3.5.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-14-(3.3.15.3 Rigid Nonmetallic Conduit): Accept

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-11

**RECOMMENDATION:** Replace the definition of Rigid Nonmetallic Conduit in the NFPA 79 draft (3.3.15.3) with that in 352.2 of the 2002 NEC.

**SUBSTANTIATION:** To be consistent with the language used in the NEC.

**COMMITTEE ACTION:** Accept

Revise definition as follows:

3.3.xxx Rigid Nonmetallic Conduit (RNC). A nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

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79-15-(3.3.23 Cord (Flexible)): Accept

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-11

**RECOMMENDATION:** Replace the definition of Cord (Flexible) in the NFPA 79 draft with the following:

Cord: One or a group of flexible insulated conductors, enclosed in a flexible insulating covering.

**SUBSTANTIATION:** The existing definition does not comply with the NFPA Style Manual. The proposed definition is based in part on the defini-
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
NEGATIVE: 1
EXPLANATION OF NEGATIVE:
SAUNDERS: The comment should be “Accept in Principle” - and the definition should be deleted.

The definition in the proposed text as modified by this comment, as well as the definition provided in theROP texts are both incorrect.

“Electromechanical” as defined by Webster’s Dictionary is as follows: “electromechanical adj. of or relating to or involving an electrically operated mechanical device.”

The proposed definition in the NFPA 79 Draft and the comment “attempt” to define a noun - by saying “any component in which electrical energy is used to magnetically cause mechanical movement.”

This definition should be deleted, with the definition being obtained from the dictionary, when required.

COMMENT ON AFFIRMATIVE:
ANDERSON: I agree with the committee’s rejection in not addressing the problem with the term “device” with only the changes suggested. My agreement is based on the fact that the term “device” is used throughout this standard in a slightly inconsistent manner and that making the necessary corrections in the entire standard should become a subject of future work by the committee. Making correction to only the three times mentioned in Comment 79-18, would not add clarity to the overall document.

The NEC and NFPA 70 definition of Device: “A unit of an electrical system that is intended to carry but not utilize electric energy.” Further, please note the NEC definition of Utilization Equipment: “Equipment that utilizes electrical energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.” By considering both definitions one could lead to a stricter understanding of the term “device” that excludes some typical electromechanical and other control components. By using both of these definitions, it is suggested that only the more narrow usage of the term “device” would be appropriate. Webster’s Dictionary definition of device is “a piece of equipment or a mechanism designed to serve a specific purpose or perform a special function”, this definition presents a more unrestricted meaning than is generally intended.

An example of a strict application of the term “device” would be when referring to a manual mechanical switch, or a thermal operated switch. An example of a liberal application of the term “device” would be when referring to relays, contacts, color graphics interface devices, and other such items. Generally, where the term device occurs, the context of the sentence or paragraph makes it reasonably clear whether the more liberal [towards the Webster] or strict [towards the NEC] definitions of the term device should be applied.

As a point of future work by the committee the various usages of the term “device” should be reviewed and only the strict applications retain the term “device” and the present liberal interpretation of the term “device” be changed by using a more suitable term such as component, as suggested by Mr. Dobrowsky’s comment. In a brief survey of the ROP draft, there were approximately sixty uses of device where the strict interpretation would be correct and more than one hundred twenty uses of device that probably should be changed to another term such as component and another twenty uses of device that neither the term device nor component would be appropriate.

SAUNDERS: The comment should be “Accept in Principle” - and the definition should be deleted.

The definition in the proposed text as modified by this comment, as well as the definition provided in theROP texts are both incorrect.

“Electromechanical” as defined by Webster’s Dictionary is as follows: “electromechanical adj. of or relating to or involving an electrically operated mechanical device.”

The proposed definition in the NFPA 79 Draft and the comment “attempt” to define a noun - by saying “any component in which electrical energy is used to magnetically cause mechanical movement.”

This definition should be deleted, with the definition being obtained from the dictionary, when required.

COMMENT ON AFFIRMATIVE:
ANDERSON: I agree with the committee’s rejection in not addressing the problem with the term “device” with only the changes suggested. My agreement is based on the fact that the term “device” is used throughout this standard in a slightly inconsistent manner and that making the necessary corrections in the entire standard should become a subject of future work by the committee. Making correction to only the three times mentioned in Comment 79-18, would not add clarity to the overall document.

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As a point of future work by the committee the various usages of the term “device” should be reviewed and only the strict applications retain the term “device” and the present liberal interpretation of the term “device” be changed by using a more suitable term such as component, as suggested by Mr. Dobrowsky’s comment. In a brief survey of the ROP draft, there were approximately sixty uses of device where the strict interpretation would be correct and more than one hundred twenty uses of device that probably should be changed to another term such as component and another twenty uses of device that neither the term device nor component would be appropriate.
NFPA 79 — May 2002 ROC — Copyright, NFPA

R.O.P. Draft.) The exact interpretation of each of its uses may be subject to debate, however:

- 31 times it is used as the term “control enclosure” (13 additional times in near similarities such as “control cabinet enclosure” or “electrical component enclosure”).
- 49 times “enclosure” is used alone but the adjective control could be implied, and,
- 39 additional times the use of “enclosure” alone is in part of a subsection or sub-item essentially titled “…control enclosure…”.

However, some confusion can arise from the 34 other times that the word “enclosure” appears alone, and means something in addition to an electrical control enclosure (typically raceway, conductor enclosure, etc.).

The R.O.P. Draft version for the definition of “enclosure” best fits the use of this word in this document (machine industry). The proposed NEC definition only adds to the misinterpretation by including the terms “or the fence or walls surrounding an installation” which are machine guards and do not relate to the use of the word “enclosure” in the machine industry.

I do not think that this new definition adds any clarity to the issue. In fact, in some cases, it may even add to greater confusion. I am, therefore, voting against the acceptance of comment 79-20.

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<td>Paul Dobrowsky, Holley, NY</td>
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97-28-(3.3.xx IP20 (New)) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO: 79-32
RECOMMENDATION: 3.2x IP20. International Protection code classification, per IEC 60529, that offers protection against access with a finger to live electrical parts and hazardous mechanical parts of electrical devices and equipment.
SUBSTANTIATION: The concept of “IP” ratings, per IEC 60529 Degrees of Protection Provided by Enclosures (IP Code), may be new to many users of NFPA 79, and a definition of IP20 is specifically warranted so as to provide greater clarity and serviceability relative to the requirements identified in proposed Section 12.5.1.1 Exception 4.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: This would create a mandatory reference to a standard that has not been adopted as an ANSI standard for use with the North American Safety System. The appropriate action would have been to add the language outlining the requirement to this standard permitting appropriate review of the material during the adoption process.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Paul Dobrowsky, Holley, NY
COMMENT ON PROPOSAL NO: 79-11
RECOMMENDATION: Replace the definition of Overcurrent and A.3.3.73 to appear in Annex A.
COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: Due to the limited number of times the term Neutral is used and the confusion caused by the term, the committee eliminated the definition and corrected the use within the document.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics, & Welding
COMMENT ON PROPOSAL NO: 79-11
RECOMMENDATION: Insert the FPN from the definition of Overcurrent in the 2002 NEC as a note to the definition of Overcurrent in the 2002 NFPA 79 ROP draft 3.3.73 to appear in Annex A.
SUBSTANTIATION: Adding the note will improve the usability of NFPA 79 and be consistent with the language used in the NEC.
COMMITTEE ACTION: Accept
Add Annex text to read as follows:
A.3.3.73 A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore the rules for overcurrent protection are specific for particular situations.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO: 79-32
RECOMMENDATION: Neutral Conductor: A conductor of a circuit where the vectorial sum of the nominal voltages from all other conductors within the circuit with respect to it is zero.
AN ALTERNATIVE IS: Neutral Conductor: A conductor of a circuit that vectorially sums to zero for all conductors within the circuit with respect to it is zero.
SUBSTANTIATION: The existing definition is technically not correct.
These comments are based on definitions received from David Dini of Underwriters Laboratories, Inc.
COMMITTEE ACTION: Accept in Principle
Eliminate the definition of “neutral conductor” and make the following corrections:
1. In Table 7.3.3 of the ROP draft, change the term ‘grounded neutral’ to ‘one conductor grounded’
2. In Annex B of the ROP draft, item No. 14 on page 1882 - Change ‘neutral’ to ‘grounded’
3. In Annex B of the ROP draft, item No. 16 on page 1882 - Change ‘neutral’ to ‘grounded’ in both instances.

79-33-(3.3.73 Overcurrent and A.3.3.73) : Accept
SUBMITTER: Paul Dobrowsky, Holley, NY
COMMENT ON PROPOSAL NO: 79-11
RECOMMENDATION: Insert the FPN from the definition of Overcurrent in the 2002 NEC as a note to the definition of Overcurrent in the 2002 NFPA 79 ROP draft 3.3.73 to appear in Annex A.
SUBSTANTIATION: The existing definition is technically not correct.
These comments are based on definitions received from David Dini of Underwriters Laboratories, Inc.
COMMITTEE ACTION: Accept
Add Annex text to read as follows:
A.3.3.73 A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore the rules for overcurrent protection are specific for particular situations.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

COMMITTEE ON AFFIRMATIVE:
ANDERSON: In this case, I agree with the committee’s action to delete the existing definition of “panel” because alone it does add confusion with the current usages of the term and associated terms.
After reviewing IEEE Standard Dictionary of Electrical and Electronic Terms (Standard 100-1996), Webster’s Dictionary, the NEC, NFPA 79, UL Standard 508a and the general usages of the terms in question, I believe the committee, as a subject of future work, should set out to clarify by differentiating the definitions for the following related and often confused terms: Panel, sub-panel, sub-panel, enclosure, control panel, control enclosure, controller.
Because these terms listed above are generally used in the requirements within this standard, the committee should make an effort to align the chosen definitions of the terms in question with the usage of the terms in test labotatory standards, other NFPA standards and other ANSI standards. This work is
necessary because there are, in fact, common misunderstandings of what the terms are describing and create confusion in applying the requirements where the terms in question are used. In a brief review of the ROP draft, there were more than thirty instances that a clear meaning of the terms listed above was essential to understanding the requirement.

**COMMITTEE STATEMENT:** The committee believes that the note enhances the clarity and use of the term throughout the standard and does not need to be defined in Chapter 3 because of the parenthetical use in the standard.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**COMMITTEE STATEMENT:** The committee agrees that the deletion of the acronym "PES" removes useful information to users of this standard and has reinserted in following the definition of Programmable Electronic System.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**COMMITTEE STATEMENT:** The committee recommends the definition of "risk assessment." The term "risk assessment" is used without defining the term anywhere in the document. Recommend adding the following definition to Chapter 3.

"Risk assessment: The process by which the intended use of the machine, the tasks and hazards, and the level of risk are determined." A reference to risk assessment can be given as ANSI TR3:2000, Risk assessment and risk reduction - A guide to estimate, evaluate and reduce risks associated with machine tools. (The Association For Manufacturing Technology)

**SUBSTANTIATION:** This will help provide clarity and provide a source for further information on what a risk assessment is.

**COMMITTEE ACTION:** Accept in Principle in Part

1.) The committee does not accept the definition itself.

2.) Add a note to Annex A to read as follows: A-3.3.89 One reference to risk assessment is ANSI B11 TR3:2000, Risk assessment and risk reduction - A guide to estimate, evaluate and reduce risks associated with machine tools.

**COMMITTEE STATEMENT:** The proposed definition is not a definition for risk assessment. The intended use of the machine, and the tasks and hazards are not determined by the risk assessment. The note was added to address the submitters concern that additional information was necessary to define what a risk assessment is.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**COMMITTEE STATEMENT:** The proposed definition does not add clarity or aid in the useability of the document.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

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**EXPLANATION OF NEGATIVE:**

**PILZ:** During the standard writing meetings in the past year it became obvious, that guidance for the design of control circuitry, that controls the functional hazards of a machine, is needed in NFPA 79.

The ANSI B11 Standards do not provide such guidance, but refer to NFPA 79 for the Emergency Stop Function. Since the Emergency Stop Function is provided by a control circuit rather than by a device, a definition of this "system" is a necessary part of this standard. Therefore, the committee's decision to take the definition out of the standard and also is a compromise against putting the proposed section 9.1.5 on hold.

**COMMITTEE STATEMENT:** The ANSI B11 Standards do not provide such guidance, but refer to NFPA 79 for the Emergency Stop Function. Since the Emergency Stop Function is provided by a control circuit rather than by a device, a definition of this "system" is a necessary part of this standard. Therefore, the committee's decision to take the definition out of the standard and also is a compromise against putting the proposed section 9.1.5 on hold.
Example: A supplemental protector, UL 1077, has spacing that are 3/8 inch through air and 1 1/4 inches over surface.

Another example of differences and limitations is that branch circuit overcurrent protective devices have standard overload characteristics to protect branch circuits and feeder conductors. Supplementary overcurrent protective devices do not have standard overload characteristics and may differ from the standard branch circuit overload characteristics. Also, supplementary overcurrent protective devices have interrupting ratings that can range from 32 amps to 100,000 amps. When supplementary overcurrent protective devices are used, it is important to be sure that the device’s interrupting rating equals or exceeds the available short-circuit current and that the device has the proper voltage rating for the installation (including compliance with splash voltage rating requirements, if applicable).

Examples of supplemental overcurrent protective devices include, but are not limited to the following:
- UL248.14 Supplemental Fuses
- UL1077 Supplemental Protectors (Mini Circuit Breakers)

COMMITTEE ACTION: Accept in Principle

Revise the proposed definition from the comment to read as follows:

3.3.102* Supplementary Overcurrent Protective Device. A device that provides overcurrent protection that is limited in application, due to the wide range of permissible ratings and performance, and is only used where specifically permitted in this standard. Such a device is not suitable for, and is not used where branch circuit protection is required.

A3.3.102 Supplementary overcurrent protective devices are not general use devices as are branch circuit overcurrent protective devices, and must be evaluated for appropriate application in every instance where they are used. Supplementary overcurrent protective devices are extremely application oriented and prior to applying the devices, the differences and limitations for these devices must be investigated. Such a device is allowed to be incomplete in construction or restricted in performance. Such a device is not suitable for, and is not used where branch circuit protection is required.

One example of the difference and limitations is that a supplementary overcurrent protective device may have spacing, creepage and clearance, that are considerably less than that of a branch circuit overcurrent protective device. Example: A supplemental protector, UL 1077, has spacing that are 3/8 inch through air and 1 1/4 inch over surface.

A branch circuit rated UL489 molded case circuit breaker has spacing that are 3/4 inch through air and 1 1/4 inches over surface.

Another example of differences and limitations is that branch circuit overcurrent protective devices have standard overload characteristics to protect branch circuits and feeder conductors. Supplementary overcurrent protective devices do not have standard overload characteristics and may differ from the standard branch circuit overload characteristics. Also, supplementary overcurrent protective devices have interrupting ratings that can range from 32 amps to 100,000 amps. When supplementary overcurrent protective devices are considered for proper use, it is important to be sure that the device’s interrupting rating equals or exceeds the available short-circuit current and that the device has the proper voltage rating for the installation (including compliance with splash voltage rating requirements, if applicable).

Examples of supplemental overcurrent protective devices include, but are not limited to the following:
- UL248.14 Supplemental Fuses
- UL1077 Supplemental Protectors (Mini Circuit Breakers)

COMMITTEE STATEMENT: Part of the proposed definition was not acceptable because it constituted a requirement. The committee moved the sentences to the note to help clarify the appropriate uses of supplementary overcurrent device.
The electrical equipment shall be designed to operate correctly where neither the voltage of the negative sequence component nor the voltage of the zero sequence component in 3-phase supplies exceeds 2 percent of the voltage of the positive sequence component.

4.3.2.5 Voltage Impulses. The electrical equipment shall be designed to operate correctly where the supply voltage impulse shall not exceed 20 percent of the rated supply voltage (rms value).

4.3.2.6 Voltage Interruption. The electrical equipment shall be designed to operate correctly where the supply voltage is interrupted at zero voltage for not more than 3 milliseconds at any random time in the supply cycle. The time interval between successive voltage interruptions shall be more than 1 second.

4.3.2.7 Voltage Dips. The electrical equipment shall be designed to operate correctly where the supply voltage dips do not exceed 20 percent of the peak voltage of the supply for more than one cycle. The time interval between successive dips shall be more than 1 second.

4.3.3 Direct Current (dc) Supplies from Batteries. 4.3.3.1 Voltage. The electrical equipment shall be designed to operate correctly where the dc supply voltage of batteries is from 85 percent to 115 percent of the nominal voltage. A supply voltage from 70 percent to 120 percent of the nominal voltage shall be permitted for dc supplies to battery-operated vehicles.

4.3.3.2 Voltage Interruption. The electrical equipment shall be designed to operate correctly where the dc supply voltage of batteries is interrupted for a time interval not exceeding 5 milliseconds.

4.3.4 Direct Current (dc) Supplies from Converting Equipment. 4.3.4.1 Voltage. The electrical equipment shall be designed to operate correctly where the voltage of converting equipment is from 90 percent to 110 percent of the nominal voltage.

4.3.4.2 Voltage Interruption. The electrical equipment shall be designed to operate correctly where the supply voltage interruption shall be more than 1 second.

4.3.4.3 Ripple (Peak-to-Peak). The electrical equipment shall be designed to operate correctly where the dc supply voltage ripple (peak-to-peak value) of converting equipment does not exceed 0.05 percent of the nominal voltage.

4.4* Physical Environment and Operating Conditions. 4.4.1* General. The electrical equipment shall be suitable for use in the physical environment and operating conditions specified in 4.4.3 to 4.4.6 and 4.4.8 to 4.4.10. The physical environment or the operating condition outside those specified, an agreement between the supplier and the user shall be considered.

4.4.2* Electromagnetic Compatibility (EMC). 4.4.3* Ambient Operating Temperature. Electrical equipment shall be capable of operating correctly in the intended ambient air temperature. The ambient operating temperatures for correct operation of the electrical equipment shall be between air temperatures of 5 degrees C and 40 degrees C (41 degrees F to 104 degrees F). [For very hot environments (e.g., hot climates, steel mills, paper mills) and for cold environments, extra requirements may be necessary.]

4.4.4* Relative Humidity. The electrical equipment shall be capable of operating within a relative humidity range of 20 to 95 percent (noncondensing). Failing to operate correctly outside humidity outside the permitted range shall be avoided by proper design of the equipment or, where necessary, by proper aditional measures (e.g., built-in heaters, air conditioners, humidifiers.).

4.4.5* Altitude. Electrical equipment shall be capable of operating correctly at altitudes up to 15000 feet (4572 meters) above mean sea level.

4.4.6* Contaminants. Electrical equipment shall be adequately protected against the ingress of solid bodies and liquids (see Section 12.3). Equipment shall be suitable for the environment where contaminants (e.g., dust, acids, corrosive gases, salt) are present.

4.4.7* Nonionizing Radiation. 4.4.8 Vibration, Shock, and Bump. Undesirable effects of vibration, shock, and bump, including those generated by the machine and its associated equipment and those created by the physical environment shall be avoided by the selection of suitable equipment, by mounting it away from the machine, or by the use of antivibration mountings.

4.5 Transportation and Storage. The electrical equipment shall be designed to withstand storage and transportation temperatures within the range of -25 degrees C to 55 degrees C (-13 degrees F to 131 degrees F) and up to 65 degrees C (149 degrees F) for short periods not exceeding 24 hours. Suitable means shall be provided to prevent damage from excessive moisture, vibration, stress, and mechanical shock during shipment.

4.6 Provisions for Handling. Heavy and bulky electrical equipment that has to be removed from the machine for transport or that is independent of the machine shall be provided with suitable means for handling by cranes or similar equipment.

4.7 Installation and Operating Conditions. The electrical equipment shall be installed and operated in accordance with the manufacturer’s instructions. Any conditions that are outside the operating conditions specified in Chapter 4 shall be permitted if acceptable to both the manufacturer and user.

SUBSTANTIATION: The text accepted by the panel in Proposal 79-24 has been editorially revised to comply with the NFPA Style Manual. (Note: ROP draft text already uses new style. This comment endorses the existing text in the ROP draft.)

COMMITTEE ACTION: Accept in Principle
1. Within 4.3.2.5, last sentence, editorially correct to read:

affirmative: 25

COMMITTEE STATEMENT: Editorial correction.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE: SANDERS: In Section 4.5, the first sentence, parenthetical phrase, delete the “+” sign before “131 degrees F” to be consistent with the remainder of Section 4.5. Values are assumed to be positive unless preceded by a “-” sign.

AFFIRMATIVE: 25

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The assumption that all of the hazards have been identified is not correct. Therefore, the statement about hazards resulting from deviations from this standard is inappropriate.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The term “risk assessment” is used in a few places in this standard (most importantly in the main clause 4.1) and is not defined nor considered. Hazards resulting from deviations from this standard should require a separate risk assessment to show the deviation is not less than the standard.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects. Section 4-4.5(c), since it does not offer specific proposed text. See committee action and statement on Comment 79-38 (Log #79).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: An additional proposal 4.7(a) through 4.4.5. Join.

AFFIRMATIVE: 25

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects. Section 4-4.5(c), since it does not offer specific proposed text. See committee action and statement on Comment 79-38 (Log #79).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: Changing the term “operate safely” would not improve the understanding. The term “operate correctly” would be determined by what the machine manufacturer intends the correct operation to be. NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
97-48-(4.3.2.2) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: In the second sentence, the term “short periods of time” must be defined either in the clause or in the definitions.
SUBSTANTIATION: The term “short periods of time” is very ambiguous and vague.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-49-(4.3.2.3) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Revise text to read as follows: “An additional two percent of the voltage...”.
SUBSTANTIATION: The value of “two” was in the reference indicated below.
COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: See committee action and statement on Comment 79-44 (Log #166).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-50-(4.4.2) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Add text as indicated in 4.4.2 of Log #60 of NFPA 79-May 2002 ROP.
SUBSTANTIATION: There currently is no requirement listed for this clause.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not intend to include mandatory electromagnetic compatibility requirements. All text in the ROP draft section 4.4.2 will appear as a note in Annex A to comply with the NFPA Manual of Style.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-51-(4.4.2) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Add text as indicated in 4.4.7 of Log #60 of NFPA 79-May 2002 ROP.
SUBSTANTIATION: There currently is no requirement listed for this clause.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not intend to include a mandatory nonionizing radiation requirement. All text in the ROP draft section 4.4.7 appears as a note in Annex A to comply with the NFPA Manual of Style.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-52-(4.4.4) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Revise text to read as follows: “The electrical equipment shall be capable of operating safely within a relative...”
SUBSTANTIATION: The word “safely” was added to this clause to be consistent with its usage throughout 4.3 and 4.4 as a result of the revision indicated in Log #377 of this packet.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee action and statement on Comment 79-47 (Log #380).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-53-(4.4.5) : Reject
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Current proposal: Altitude. Electrical equipment shall be capable of operating correctly at altitudes up to 1000 m (3300 ft) above mean sea level.
SUBSTANTIATION: This paragraph indicates that NFPA 79 is not intended for all parts of these United States. E.g., it would not apply to Denver, CO (the mile high city).
Certain industries have lots of the same machines that are used throughout the United States. One certainly wants all of them to operate correctly at any altitude throughout the country including inside tall buildings located there.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text. It is the responsibility of the purchaser to specify details of the industrial machine including where operating above 3,300 feet. See Annex B question 4.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
COMMITTEE STATEMENT: On affirmative:
SANDERS: Machines are expected to function satisfactorily based upon the normal cooling effect of atmospheric pressure and circulation if it is located at heights not over 1000 m (3300 ft).
At higher altitudes, reduced cooling effect must be taken into account by providing artificial refrigeration, forced air movement, reduced operating current if possible, reduced circuit resistance and reactance, or by dissipation of heat energy by radiation, convection or direct contact, etc. Any combination can be utilized to allow the machine to function without overheating as long as the machine integrity is not compromised.

97-54-(4.4.9) : Accept
SUBMITTER: Technical Correlating Committee National Electrical Code
COMMENT ON PROPOSAL NO: 79-32
RECOMMENDATION: The Technical Correlating Committee directs the committee to reconsider the panel action text for 12.5.1.1 Exception 4 and either reword the action or define IP 20 since it appears in mandatory text.
This action will be considered by the committee as a public comment.
SUBSTANTIATION: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.
COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: See the committee action and statement on Comment 79-291 (Log #322).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-47 (Log #380).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-47 (Log #380).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
79-55-(4.5) : Accept
SUBMITTER: Nick Momiclovic, QTI
COMMENT ON PROPOSAL NO: 79-24
RECOMMENDATION: Revise text to read as follows:
"The electrical equipment...and up to 155°F (70°C) for short periods...".

SUBSTANTIATION: It is suggested that the temperature is changed to be in harmony with IEC 604-1 (1997).

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: Comment on proposal No: 79-33
COMMITTEE ACTION: Reject
RECOMMENDATION: Revise text to read as follows:
"Connections to guarded (finger safe) terminal blocks or other devices ahead of the disconnecting means shall be permitted for either excepted circuits according to 5.3.5 or when it is not practicable to connect directly to the disconnecting device."

SUBSTANTIATION: Depending on the location of the disconnect, it may not be practicable to first connect to the disconnecting means. Additionally, 28 of UL 508A (4/2001) requires that if the incoming supply is wired directly to the disconnect, that the terminals must be rated for field wiring. Not all disconnects have field rated terminals.

COMMITTEE STATEMENT: Rejected circuit are defined as those circuits that do not have to be disconnected by the main disconnect and others cannot be connected for convenience.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Reject
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-56-(5.1.2) : Reject
SUBMITTER: Nick Momiclovic, QTI
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise text to read as follows:
"Connections to guarded (finger safe) terminal blocks or other devices ahead of the disconnecting means shall be permitted for either excepted circuits according to 5.3.5 or when it is not practicable to connect directly to the disconnecting device."

SUBSTANTIATION: Depending on the location of the disconnect, it may not be practicable to first connect to the disconnecting means. Additionally, 28 of UL 508A (4/2001) requires that if the incoming supply is wired directly to the disconnect, that the terminals must be rated for field wiring. Not all disconnects have field rated terminals.

COMMITTEE STATEMENT: Rejected circuit are defined as those circuits that do not have to be disconnected by the main disconnect and others cannot be connected for convenience.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Reject
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-57-(5.1.3) : Reject
SUBMITTER: Kurt Zierhaut, Haas Automation
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: The sentence “A separate insulated terminal shall be provided for the grounded conductor,” does not make sense in the context. The word “insulated” should be removed. The paragraph should read:
5.1.3 Where a grounded conductor is used it shall be clearly indicated in the technical documentation of the machine, such as in the installation diagram and in the circuit diagram. A separate insulated terminal shall be provided for the grounded conductor.

SUBSTANTIATION: This will remove any possible contradiction between the requirement to connect the ground wire to the chassis and use of the word “insulated”.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: It is not intended that the grounded conductor be connected to the machine “chassis” except for separately derived systems. See 8.1,2 for more information.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-58-(5.3.1) : Accept
SUBMITTER: Paul R. Warndorf, AMT-The Association For Manufacturing Technology
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Add the following sentence to 5.3.1:
5.3.1 General. The following general requirements apply to 5.3.2 through 5.3.5.

SUBSTANTIATION: This will help the reader understand the paragraphs that are covered by the general requirements.

It should be noted that it is sometimes confusing in general statements as to their application, therefore, each general requirement should identify where they apply (e.g., 4.3.1, 4.4.1).

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Reject
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: Marking the disconnecting means enhances safety in the event it has to be located or operated quickly such as by emergency response personnel. See also the committee statement for Comment 79-61 (Log# 183).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-59-(5.3.1.1.1) : Reject
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Proposed: Each disconnecting means required by 5.3.1.1 shall be legibly marked to indicate its purpose.
Recommendation: When a machine has two or more incoming supply circuits or has two or more disconnecting means, e.g., before and after excepted circuits, each disconnecting means required by 5.3.1.1 shall be legibly marked to indicate its purpose.

SUBSTANTIATION: When there is a single power supply circuit to a machine, the purpose of the disconnecting means is clear. Instead of having multiple supply circuits for machines with excepted circuits (5.3.5.1), a common method is to have a disconnecting means before and after the branch(es) for these circuits as permitted in 5.5.3.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Many machines (with only one supply circuit) have more than one device that can function to disconnect the machine or a portion of the machine. Even if only one disconnecting means is present, marking does not have a significant economic impact and will enhance safety by allowing the device(s) to be referenced in hazardous energy control procedures.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-60-(5.3.1.1.1 and 5.3.1.1.2) : Reject
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Delete 5.3.1.1.1 and move text to 5.3.1.1.2.
SUBSTANTIATION: When a machine only has one disconnect, it is not clear as to the value of marking its purpose. However, as addressed in 5.3.1.1.2, for a machine with multiple disconnects, it makes sense to identify the purpose of each disconnect.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Marking the disconnecting means enhances safety in the event it has to be located or operated quickly such as by emergency response personnel. See also the committee statement for Comment 79-61 (Log# 183).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-61-(5.3.1.2) : Reject
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise as follows:
"...including all control circuits..." to "...including all control circuits that are a potential hazard and originate from within the machine...".

SUBSTANTIATION: Today, it is common to use 5 and 24 volt control...
circuits. Such circuits are not considered to be potentially hazardous. 120 volt control circuits are still being used in some applications. In both cases, the source of the control voltage may be from outside sources besides the immediate machine. It can, e.g., come from another machine or a central control room.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee is unsure of the submiter's intent to the revision of 5.3.1.2. The assumption that voltage levels are not the only criteria when evaluating the safety aspect against electrical hazard is not correct.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**79-62-(5.3.1.3) : Accept**

**SUBMITTER:** Jim Carroll, Square D

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Revise text to read as follows:

Supply circuit disconnecting means mounted within or adjacent to the control enclosure shall be interlocked with the control enclosure in accordance with 6.2.3. Where the supply circuit disconnecting means is not adjacent to the control enclosure, or where the supply disconnecting means is an attachment plug and receptacle, a tool shall be required to open the control enclosure door and a label shall be attached to that door warning of dangerous voltage inside and advising disconnection of the power before opening.

**SUBSTANTIATION:** The "and" is added to clarify that a label is only required when interlocking is not provided.

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**79-64-(5.3.1.4) : Accept**

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Delete first sentence of last paragraph as follows:

"Supply disconnecting means mounted within or adjacent to the control enclosure shall be interlocked within the control enclosure in accordance with 6.2.3.1 and also stated more clearly.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The statement is redundant. It is already stated in 6.2.3.1 and also stated more clearly.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**79-66-(5.3.1.5) : Reject**

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Revise text to read as follows:

Where two or more disconnecting means are provided within the control enclosure for multiple supply circuits, they shall be grouped in one location where practicable. Protective interlocks for their correct operation shall be provided where a hazardous condition or damage to the machine or to the work in progress can occur.

**SUBSTANTIATION:** Last sentence is redundant and already covered in 6.3.2.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee disagrees with the submitter's proposal. The committee understands that the section reference is 6.2.3 rather than 6.3.2. Section 5.3.1.6 addresses interlocks between multiple disconnecting means. This is not the issue addressed by 6.3.2.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**79-68-(5.3.1.7) : Reject**

**SUBMITTER:** George Schreck, Komatsu America Industries LLC

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Add new text to read as follows:

5.3.1.7 Use of disconnecting means in separate enclosures shall be supplied from the "Main Disconnect" and shall de-energize all of the current carrying conductors within that enclosure when placed in "Off" position and be able to be lockable. Conductors and terminals located within the enclosure that will remain energized or controlled from a remote location, the conductors shall be colored yellow, and terminals shall be covered with insulating material, with a "Warning" label attached.

**SUBSTANTIATION:** With larger systems, multiple control enclosures are used and distributed around the perimeter of the equipment. Isolation of the sections of the control would be allowed if the remaining energized portions would not allow exposure of the personnel to hazard. Example would be a multi-slide transfer press system, and allowing the servo transfer system be de-energized to work within its control enclosure and leaving the remainder of the press energized (allowing the lube pumps to continue without allowing hazardous motion to occur).

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** This is already covered in Chapter 5. Chapter 5 is for incoming supply conductors. Section 5.5.3 provides for additional disconnecting means. Section 5.3.1.1 requires marking of additional disconnects. Section 5.3.1.2 covers the conductor disconnecting means. Section 5.3.5 covers excepted circuits that remain energized. In addition, Section 14.2 covers identification of conductors.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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**79-69-(5.3.1.3) : Rejected**

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-171

**RECOMMENDATION:** In the last paragraph, does the last sentence of that paragraph apply to the first sentence, the second sentence or both scenarios where applicable?

**SUBSTANTIATION:** The last sentence of the last paragraph is worded in a way that the user reading this paragraph will not know if this requirement (last sentence) applies to either the first sentence or the second sentence of the last paragraph.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25
The device should be operable by whoever needs to operate it and not be operated nor are they evaluated with the door open. This is a concern the disconnect ahead or the equipment being worked on should be locked-out to assure safety. The committee did not provide any technical substantiation for adding the words “by qualified persons” as part of the action to accept in principle. The disconnect should only be operable by a qualified person. See definition of qualified persons in 3.3.83. See committee action and statement on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

RECOMMENDATION: In (3) and (5) delete the indicated wording:
(3) Be provided with a permanent means permitting it to be locked in the open (off) (isolated) position only (e.g., by padlocks) independent of the door position. When so locked, remote as well as local closing shall be prevented.
(5) Be operable by qualified persons, independent of the door position without the use of accessory tools or devices.
SUBSTANTIATION: This requirement is too restrictive for industrial machine design and availability of component. Only two types of components can meet this requirement and disallowing many of the readily available others.
NOTE: Supporting material is available for review at NFPA Headquarters.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The existing requirement provides greater safety by minimizing exposure to trades other than electrical such as when multiple Lifts are performing separate tasks on a machine. If electrical work is being performed at the same time as a mechanical activity, the mechanical person would have to reach into the electrical cabinet to apply a padlock. The opening or closing of the door shall not defeat the lockout capability. The committee does not agree that there are only two types of components that can meet the present requirement.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25
NEGATIVE: 4
ABSTENTION: 1

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee disagrees with the submitters intention to remove the qualified person. The disconnect should only be operated by a qualified person. See definition of qualified persons in 3.3.83. See committee action and statement on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 21
NEGATIVE: 4
ABSTENTION: 0

COMMITTEE ACTION: Adopt

COMMITTEE STATEMENT: See committee action and statement on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 20
NEGATIVE: 4
ABSTENTION: 1

EXPLANATION OF NEGATIVE:
FISHER: NEMA restates that disconnect devices evaluated to US product standards are NOT evaluated to make or break current with the door of the disconnecting device in the open position. To operate a disconnect under these conditions creates an unsafe condition. The committee action on Proposal 79-28: “ Disconnects are not tested for, nor are they intended for, operation with the door in the open position.” Specific to subclause (5) The device should be operable by all personnel, not just by a qualified person. The committee did not provide any technical substantiation for adding the words “by qualified persons” as part of the action to accept in principle. The committee did not provide any technical substantiation for adding the words “by qualified persons” as part of the action to accept in principle. The committee did not provide any technical substantiation for adding the words “by qualified persons” as part of the action to accept in principle.
COMMITTEE ACTION: Adopt
COMMITTEE STATEMENT: See committee action and statement on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 20
NEGATIVE: 4
ABSTENTION: 1

EXPLANATION OF NEGATIVE:
FISHER: NEMA restates that disconnect devices evaluated to US product standards are NOT evaluated to make or break current with the door of the disconnecting device in the open position.
disconnecting device in the open position, therefore, it is not necessary to operate a device independent of the door position. OSHA and NFPA 70E outline situations where employers through proper work practices and appropriate protective gear do permit the operation of electrical equipment in an energized state.

GOLDING: UL does not evaluate disconnect devices to make or break current with the panel door in the open position. Insufficient substantiation has been provided to actuate this requirement and enhance the safety of dis- connect mechanisms allowed by the resulting text have a means to circumvent the interlock and allow equipment inside the enclosure to be energized with the door open.

MONTBETH: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.

PADGETT: AMT agrees with the Submitter’s Comment 79-72 requested changes and especially with the third paragraph of the substantiation: “The committee did not provide any technical substantiation for adding the words “independent of the door position.” “The Committee Statement provided in Comment 79-70 states that the “existing requirement provides greater safety by minimizing exposure to trades other than electrical such as when multiple crafts are performing tasks on a machine.” This statement in itself, however, does not substantiate the need for the added requirement since there are other means for providing the additional safety if desired by users of the equipment. This could be accomplished by the locking of a disconnect mounted before the machine (at the incoming supply) as mentioned in the Substantiation of Comment 79-71.

As stated in the Substantiation of Comment 79-87, the Committee Statement of Proposal 79-28 clearly notes that “Disconnects are not tested for, nor are they intended for, operation with the door in the open position.” Comment 79-87 continues with “...operation of the disconnect with the door open should only be limited to instances where the user has determined the safe work prac- tices and procedures necessary to access energized parts.”

I have asked a number of companies (AMT members) if the unsubstantiated requirement would cause significant redesign of product. Those companies supplying commodity product machines replies that it would. They all added that they have not been informed of the need for the added requirement since no company has been notified of any safety related issues with their current designs (domestically or internationally).

It should be noted that cabinets using these devices, supplied with industrial equipment, are currently labeled under the UL 508 program. Internationally, cabinets using these devices have been approved by NRTLs and carry the CE mark and that this requirement is not part of ISO 60204-1.

Similar to Comment 79-70, third paragraph relating to customer specifications, equipment manufacturers do provide equipment purchased through company specifications, to meet this type of added requirement, or may even provide this type of capability if desired, but have not been informed of its universal need. Nationally and internationally, this has not been shown as an overall design requirement, and, therefore, appropriate justification for this requirement has not been provided.

EXPLANATION OF ABSTENTION

LOCKE: I wish to abstain on this Comment. There is no probable section of the proposed NFPA 79-2002 of which the committee can be less proud. Thoughts on this issue have not been well articulated, the committee has debated at cross purposes, and there are - generally speaking - substantial thought process barriers to any effective dialog on the issue. Relative to this comment, I have these specific observations:

5.3.3 (5): A qualified person, relative to operating a disconnect with the door open, is one who is aware of the disconnect and its relationship to the machine. A disconnect should be operable by such a qualified person with the door closed. The general population may not be so qualified. I cannot envision when or under what circumstance that someone other than a qualified person would seek to operate a disconnect. A qualified person, relative to operating a disconnect with the door open, is one who is aware of the disconnect’s feature attributes and the associated hazards. Given that there are no disconnects evaluated for operation with the door open, I find it logical to conclude that a qualified person would not so actuate a disconnect. Therefore, making a disconnect operable independent of the door position becomes unnecessary, and something to discourage, not encourage. I further believe, however, that provisions of NFPA 79-70 may inhibit the actuation of the disconnect with the door open, thereby providing a safe means by which a disconnect may be so actuated. I am unsure, however, to what practical extent such provisions of NFPA 70-E are employed.

These issues have been debated by committee, but not to the degree neces- sary for effective resolution. A comprehensive consensus understanding of what we are doing here, and why, has not availed itself. No empirical data has been provided to effectively substantiate committee action. Regardless of what happens with this text, the committee will not find itself elated with the results. The committee cannot articulate its intent to the standard’s user community unless it can first articulate its intent clearly to its own membership.

This section needs work.

79-73-(5.3.3.1 (1) and (3)): Accept
SUBMITTER: Kurt Zierhut, Haas Automation
COMMITTEE STATEMENT: See committee action and statement on Comment 79-70 (Log #144).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
RECOMMENDATION: Revise text to read as follows: The requirement for lockable disconnect with door open or closed is new to NFPA-79 and not required. This will have serious impact on numerous machine designs that have been in use for many years. Recommend reverting to the original requirement of NFPA 79.

79-33-(5.3.3.1 (5)): Reject
SUBMITTER: Kurt Zierhut, Haas Automation
COMMITTEE STATEMENT: See committee action and statement on Comment 79-70 (Log #144).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
NEGATIVE: 1
EXPLANATION OF NEGATIVE: MONTBETH: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.
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AFFIRMATIVE: 24
NEGATIVE: 1

EXPLANATION OF NEGATIVE:
PADGETT: See my Explanation of Negative Vote on Comment 79-72.

79-77-(5.3.3.1(3) Exception) : Reject
SUBMITTER: David Fisher, Rockwell Automation/Allen Bradley
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Revise text to read as follows:
(3) Be provided with a permanent means permitting it to be locked in the
open (off) (isolated) position only (e.g., by padlocks) independent of the
door position. When so locked, remote as well as local closing shall be prevented.
Exception: A listed self-protected combination controller limited to single
motor applications rated for 50 hp or less shall be permitted to be lockable in
the off position with the door in the closed position only.

SUBSTANTIATION: These controllers are generally simple in construc-
tion and are unlikely to require frequent or lengthy maintenance which would
require the enclosure door to be open. Therefore, there is no compelling need
for the disconnect to be locked with the door in the open position.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee statement and action on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 24
NEGATIVE: 1

EXPLANATION OF NEGATIVE:
FISHER: NEMA notes that the first part of Chapter 5 deals primarily with
the requirements for the main disconnect. While the self-protected combina-
tion starter limited to a single motor application implicitly includes a “main”
disconnect, it is significantly different from the main disconnect of a multi-
motor controller. The self-protected combination starters limited to a single
motor applications are small integrated combination starters which require
comparatively limited access and during that access the likelihood of working
live in these devices is even more limited. Therefore, there is no need to have
these devices comply with the requirements of typical “main” disconnects
used for multi-motor applications.

79-78-(5.3.3.1(5)) : Reject
SUBMITTER: David J. Crump, Lockheed Martin Systems Integration -
Owego/Rep. Product Safety
COMMENT ON PROPOSAL NO: 79-41 & 79-33
RECOMMENDATION: Revise text to read as follows:
(5) Be operable placed in the open (OFF) position independent of the door
position without the use of accessory tools or devices.

SUBSTANTIATION: Many disconnects also serve as enclosure interlocks
(Ref. NFPA 79 May 2002 ROP 6.2.3.1.2) and cannot be placed in the closed
(ON) position when the door is open without the use of a tool. It may be help-
ful to reference 6.2.3.1.3 in this paragraph.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee statement and action on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-79-(5.3.3.1(5) Exception) : Reject
SUBMITTER: David Fisher, Rockwell Automation/Allen Bradley
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Revise text to read as follows:
(5) Be operable, by qualified persons, independent of the door position with-
out the use of accessory tools or devices.

Exception: A listed self-protected combination controller limited to single
motor applications rated for 50 hp or less shall be permitted to be exempt from
this requirement.

SUBSTANTIATION: These controllers are generally simple in construc-
tion and are unlikely to require frequent or lengthy maintenance that would require
the enclosure door to be open. Therefore, there is no compelling need
to impose additional requirements for operation of the disconnect with the enclo-
sure door in the open position.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee statement and action on Comment 79-70 (Log #144) and Comment 79-71 (Log #160).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMITTEE STATEMENT

A permanent operating... changing the machine on and off.

SUBSTANTIATION: This should not be a separate clause. This is a requirement specifically related to plugs/socket used as disconnects.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See committee action on Comment 79-83 (Log #115).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25


COMMENT ON PROPOSAL NO: 79-33

RECOMMENDATION: Revise text to read as follows:

shall not be more than 2.0 m (6 ft, 7 in.) above the floor. A permanent operating...

SUBSTANTIATION: Small females would be unable to reach a 2.0 m disconnect.

180 CM is from Source 1 below from measurements of small women (2.5 percent). There are other ergonomic references that have slightly different values and also have data for the 5 percent female (185-188 cm), 5 percent probably is a better reference.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The limitation of the two meters is a maximum. The present requirement correlates with the NEC.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

(COMMITTEE ACTION) 79-85-(5.3.4.1): Reject

SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,

COMMENT ON PROPOSAL NO: 79-84 and 79-33

RECOMMENDATION: In 5.3.4.1, continue to keep the soft conversion of 2.0 m (6 ft, 7 in).

In 12.5.1.2, change 762 mm to 750 mm.

In 12.5.1.3, change 1.98 m to 2.0 m.

In 12.5.1.3, change 153 mm to 150 mm.

SUBSTANTIATION: Soft metric conversions are required in these situations to correlate with the NEC.

Section 110.26(A)2, which correlates with 12.5.1.2, has 2-1/2 feet converted to 750 mm.

Section 110.26(A)3, which correlates with the first number in 12.5.1.3, has 6-1/2 feet converted to 2.0 m.

Section 110.26(A)3, which correlates with the second number in 12.5.1.3, has 6 inches converted to 150 mm.

Section 404.8, which correlates with 5.3.4.1, has 6 ft 7 in converted to 2.0 m.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comment 79-84 and 79-33.

SUBMITTER: John W. Young, Siemens Energy & Automation

COMMENT ON PROPOSAL NO: 79-33

RECOMMENDATION: Revise wording as follows:

5.3.4.2 An operating handle of the disconnecting means shall meet the following criteria:

(1) Be readily accessible with doors in the open or closed position

(2) Maintain the environmental rating of the enclosure

(3) Not be restricted by the enclosure door when the door is in the open position.

SUBSTANTIATION: (1) Door mounted rotary operators have been safely used for many years and no technical substantiation was submitted and nor safety issues identified for this significant change that would do away with these devices. There is no indication of any problems with these designs.

(2) If the door of an enclosure is opened, it is for the purpose of working on the equipment inside and it is not necessary to retain operability of that equipment with the door open.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comment 79-70 (Log #144) and Comment 79-71 (Log #160). The committee disagrees with the submitter’s substantiation for item 3. Qualified persons following appropriate safety related work practices may be permitted to test the machine by operating the disconnecting means with the door open.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 21

NEGATIVE: 4

EXPLANATION OF NEGATIVE:

FISHER: See my Explanation of Negative Vote on Comment 79-72.

GOLDING: See my Explanation of Negative Vote on Comment 79-72.

MONTEITH: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.

PADGETT: See my Explanation of Negative Vote on Comment 79-72.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comments 79-70 (Log #144), 79-71 (Log #160) and 79-86 (Log #161).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 21

NEGATIVE: 4

EXPLANATION OF NEGATIVE:

FISHER: See my Explanation of Negative Vote on Comment 79-72.

GOLDING: See my Explanation of Negative Vote on Comment 79-72.

MONTEITH: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.

PADGETT: See my Explanation of Negative Vote on Comment 79-72.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comments 79-84 (Log #144), 79-71 (Log #160) and 79-86 (Log #161).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

NEGATIVE: 5

EXPLANATION OF NEGATIVE:

FISHER: See my Explanation of Negative Vote on Comment 79-72.

GOLDING: See my Explanation of Negative Vote on Comment 79-72.

MONTEITH: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.

PADGETT: See my Explanation of Negative Vote on Comment 79-72.
(1) Be readily accessible with doors in the open or closed position

**COMMITTEE ACTION:** Retain the NFPA 79-1997 wording. This new requirement is too restrictive for industrial machine design and availability of component. Only two types of components can meet this requirement and disallowing many of the readily available others.

**NOTE:** Supporting Material is available for review at NFPA Headquarters.

**COMMITTEE ACTION** Reject

**COMMITTEE STATEMENT:** See committee action and statement on Comment 79-70 (Log #144) and 79-71 (Log #160).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**COMMITTEE STATEMENT** AFFIRMATIVE: 23 NEGATIVE: 2

**EXPLANATION OF NEGATIVE:** MONTHTHEI: There is insufficient technical substantiation from the Committee to justify the rejection of this comment.

**PADGETT:** See my Explanation of Negative Vote on Comment 79-72.

79-90-(5.3.4.2(2)) : Accept in Principle

**SUBMITTER:** Gordon C. Davis, Moeller Electric Corp.

**RECOMMENDATION:** Revise text to read as follows:

Maintain the environmental rating of the installation.

**COMMITTEE STATEMENT:** It is common practice in industry to use enclosures that have an environmental type rating that is greater than required for the installation. For example a Type 4X enclosure may be used in a Type 12 installation. This practice is allowed by UL 508A. As the assembly is being built, some Type 12 operators might be installed in the Type 4X enclosure, reducing the overall assembly to a Type 12 rating (suitable for the installation).

Again, the procedure found above is allowed by UL and by NFPA 79 at this time. It meets the intent of the Degree of Protection Standard. Changing the wording as seen in the comment will allow the practice to continue. Not changing the wording will be unduly restrictive without providing additional safety.

**COMMITTEE ACTION:** Accept in Principle

Revise item (2) of the ROP draft to read as follows:

(2) Maintain the environmental rating of the enclosure to the degree necessary for the application.

**COMMITTEE STATEMENT:** The intent is that the final assembly be suitable for the environment in which it will be placed and the proper rating of an enclosure includes all devices installed including an operating handle.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**COMMITTEE STATEMENT** AFFIRMATIVE: 25

79-91-(5.3.5.1) : Reject

**SUBMITTER:** David Lee, U.S. Postal Service

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Add new subparagraphs:

( ) Computers and other diagnostic tools that are also used for maintenance applications.

( ) Circuits that are used to provide low voltage power for electronic sensors other devices that can aid in performing maintenance diagnostics.

**SUBSTANTIATION:** The U.S. Postal Service have deployed many machines with integrated diagnostic programs in operating computers for maintenance use when needed. Running separate supply circuits complicates design and creates other potential physical safety hazards. These machines have low voltage sensors that are used in conjunction with computer diagnostic application programs to determine deficiencies. The low voltage circuits source of supply power is not disconnected when the motors are deenergized.

**COMMITTEE ACTION** Reject

**COMMITTEE STATEMENT:** The applications noted in the recommended new text are currently covered in 5.3.5.1(4). It is not the intent of (4) to be an all inclusive list.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**COMMITTEE STATEMENT** AFFIRMATIVE: 25

79-92-(5.3.5.1) : Reject

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Add requirement from 5.3.5.3 to this clause: (5). Control circuits for interlocking. These circuits shall be capable of being disconnected at the control panel from which they are sourced.

**SUBSTANTIATION:** Control circuits for interlocking should be added to the list of excepted circuits given in 5.3.5.1 to be in harmonization with 5.3.5 of IEC 60204-1 (1997).

**COMMITTEE ACTION** Reject

**COMMITTEE STATEMENT:** This section covers circuits and devices that are not intended to be disconnected by the supply disconnecting means.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-93-(5.3.5.2(1)) : Accept

**SUBMITTER:** Michael F. Crampton, General Motors - Controls, Robotics, & Welding

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Revise text to read as follows:

5.3.5.2 Supply circuits for excepted circuits shall comply with all of the following conditions:

(1) Be a separate primary disconnecting means, isolating transformer, and secondary overcurrent protection furnished in an enclosure and mounted adjacent to the main disconnecting means.

**COMMITTEE STATEMENT:** Problem: This rule presently is in the Lighting section (14.2.2(1)) of 1997 NFPA 79. In the new draft, it is positioned to cover the supply circuits for all excepted circuits, including equipment required to remain energized. Would the isolation transformer enclosure and its disconnect not be allowed to be mounted to the outside of the main control enclosure for the application of equipment required to remain energized, if proper mounting and wiring methods were employed?

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**COMMITTEE STATEMENT** AFFIRMATIVE: 25

79-94-(5.3.5.3) : Reject


**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Revise text as follows:

5.3.5.3 The control interlocking circuits supply circuits shall be capable of being disconnected at the control panel from which they are sourced.

**SUBSTANTIATION:** This clause deals with excepted circuits and their sources. The use of the words “control interlocking circuits” make this clause unclear.

**COMMITTEE ACTION** Reject

**COMMITTEE STATEMENT:** Section 5.3.5 is concerned with excepted circuits. Supply circuits can originate at other than control panels. Also, see the committee action and statement on Comment 79-92 (Log #396).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-95-(5.3.5.4) : Accept

**SUBMITTER:** Paul R. Warnodorf, AMT-The Association For Manufacturing Technology

**COMMENT ON PROPOSAL NO:** 79-33

**RECOMMENDATION:** Revise 5.3.5.4 to read:

Where circuits are not disconnected by the supply circuit disconnecting means, all of the following requirements shall be met:

(1) Permanent warning label(s) shall be placed adjacent to the supply circuit disconnecting means indicating that it does not deenergize all exposed live parts when it is in the open (off) (isolated) position.

(2) A corresponding statement shall be included in the maintenance manual machine documentation.

(3) A permanent warning label shall be placed in proximity to each excepted circuit, or the excepted circuit shall be separated from other circuits or shall be identified by color as defined in 14.2.4. Delete the note since it is incorporated into (3).

**SUBSTANTIATION:** The revisions add clarity to the requirements. The phrase in (3) “or the excepted circuit shall be separated from other circuits” is deleted since separation does not by itself indicate if there are live parts, a warning label should still be required. Separation of the circuit is a design preference.

The reference to 14.2.4 was taken from the note and added to (3) to provide clarity to what colors are permitted.

**COMMITTEE ACTION** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25
79-96-(5.3.5.4) : Reject
SUBMITTER: Paul Dobrowsky, Holley, NY
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.3.5.4 as follows:
Where circuits operating at 50 volts or more are not disconnected by the supply circuit disconnecting means, the following requirements shall be met:
SUBSTANTIATION: The assumption that voltage levels are the only criteria when evaluating the safety aspect against electrical hazard is not correct. The committee believes it is still possible for a hazardous condition to be present at circuits operating at less than 50 volts. 
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee wants to clarify that all of the individual portions of the electrical circuit.

AFFIRMATIVE: 25
NEGATIVE: 1
EXPLANATION OF NEGATIVE: DOBROWSKY: The comment and concept should be accepted. I agree that voltage is not the only concern related to electrical hazards but the voltage level provided is what is presently used in the NEC and NFPA 70E.

79-97-(5.3.5.4 Exception) : Reject
SUBMITTER: Nick Momcillovic, QTI
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Add the following exception after (3) to apply to all excepted circuits: Exception: Excepted circuits which are categorized as "PELV" as described in 5.3. 
SUBSTANTIATION: Without this exception, it would force a manufacturer to apply labels as indicated in 5.3.5.4(1) through (3) to a circuit which might only be 24 VDC @ 0.5 A which according to 6.3 is not hazardous energy. 
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee action and statement on Comment 79-96 (Log #262).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-98-(5.3.5.4 (2)) : Accept in Principle
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise text as follows: 5.3.5.4
(2) A corresponding statement shall be included in the maintenance manual documentation
SUBSTANTIATION: The change of words still provides the same information, but is a more flexible method in meeting the requirements for non-standard "one-of-a-kind" machines. 
COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: See committee action and statement on Comment 79-95 (Log #199).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-99-(5.4.1) : Accept in Principle
SUBMITTER: Paul R. Warndorf, AMT-The Association For Manufacturing Technology
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.4.1 second sentence to read:
"Such means shall be as follows":
SUBSTANTIATION: The use of the words "as follows" gives the reader the indication that there would be a list of devices for use not statements of the application of the devices. The device list is still identified in 5.4.2. 
COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: Revise text to read as follows: 
"Such means shall include all of the following":
COMMITTEE STATEMENT: The committee wants to clarify that all of the conditions must be complied with.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-101-(5.4.4) : Accept
SUBMITTER: Paul R. Warndorf, AMT-The Association For Manufacturing Technology
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.4.4 sentences to read:
(1) Routine exchange of work pieces, fixtures, and tools requiring no significant dismantling of the machine.
(2) Work on the electrical equipment where all of the following conditions exist:
a. There is no hazard arising from electric shock (See Chapter 6) and burn.
b. The switching off means cannot be negated by the work.
c. The work is of a minor nature (e.g., replacement of plug-in devices without disturbing existing wiring).
d. There is no hazard arising from the unexpected energizing or de-energizing of circuits.
SUBSTANTIATION: The changing of the word "parts" with "work pieces" reduces misunderstanding that the exchange is of manufacturing materials.
The adding of (d) is to help protect the "replacement of plug-in devices," stated in (c), from causing a hazard.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-102-(5.5) : Accept
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise the title of Clause 5.5 to read:
Devices for Disconnecting (Isolating) Electrical Equipment
SUBSTANTIATION: This is a companion comment to comments on Clauses 5.4.2, 5.5.3, 5.4.4 and 5.5.5. This editorial change is required to establish the equivalency, for the purposes of this standard, of the terms Disconnecting Means and Isolating Means. The product standards in the US require testing of disconnects such that they function in thecapacity of the IEC standards term of isolator. The intent is to harmonize with the IEC standards while maintaining the terms utilized in the US safety system.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-103-(5.5.2) : Accept
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.5.2 to read as follows:
The supply circuit disconnecting device (see Section 5.3) shall be permitted to fulfill this requirement where there is no need for disconnecting isolating individual portions of the electrical circuit. 
SUBSTANTIATION: This is a companion comment to comments on Clauses 5.5, 5.5.3, 5.5.4 and 5.5.5. The editorial change is required to establish the equivalency, for the purposes of this Standard, of the terms Disconnecting Means and Isolating Means. The product standards in the US require testing of disconnects such that they function in the capacity of the IEC standards term of isolator. The intent is to harmonize with the IEC standards while maintaining the terms utilized in the US safety system.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

(Log #397)
(Log #147)
(Log #148)
(Log #201)
(Log #300)
(Log #301)
testing of disconnects such that they function in the capacity of the IEC
necting Means and Isolating Means. The product standards in the US require
lish the equivalency, for the purposes of this standard, of the terms Discon

SUBSTANTIATION: This is a companion comment to comments on
Clauses 5.5, 5.5.2, 5.5.4, and 5.5.5. The editorial change is required to estab-
lish the equivalency, for the purposes of this standard, of the terms Discon-
necting Means and Isolating Means. The product standards in the US require
testing of disconnects such that they function in the capacity of the IEC
standards term of isolator. The intent is to harmonize with the IEC standards
while maintaining the terms utilized in the US safety system.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-105-(5.5.4(3)): Accept
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.5.4(3) to read:
(3) Redundantly monitored, remotely operated contractor isolating system
while maintaining the terms utilized in the US safety system.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-107-(5.5.5(2)): Accept
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO: 79-33
RECOMMENDATION: Revise 5.5.5(2) to read:
(2) Within sight of the part of the machine requiring disconnection isolation.

6.2.1 Protection by Insulation of Live Parts. Live parts protected by insula-
tion shall be completely covered with insulation that can only be removed by
destruction. Such insulation shall be capable of withstanding the mechanical,
chemical, electrical, and thermal stresses to which it can be subjected under
normal operating conditions.

Fraziers, varnishes, lacquers, and similar products are inadequate for protection
against electric shock under normal operating conditions.

6.2.2 Protection by Enclosures.

6.2.2.1 Direct Contact from Outside an Enclosure. Live parts shall be
located inside enclosures such that there cannot be any direct contact to live
parts from the outside of an enclosure when using the test finger. The deter-
mination of the suitability of an enclosure as protection from electrical shock
shall be determined by using a test finger as described in Figure 6.2.1. The
test finger shall be applied, with appreciable force, in every opening in the
enclosure after removal of all parts of the enclosure that can be removed with-
out the use of a tool.

Figure 6.2.2.1 Jointed Test Finger

6.2.3 Enclosure Interlocking. Enclosure interlocking as described in 6.2.3.1
through 6.2.3.4 shall be provided.

6.2.3.1 Each disconnecting means mounted within or adjacent to a control
enclosure that contains live parts operating at 50 volts ac (rms value) or 60
vols dc or more shall be mechanically or electrically interlocked, or both,
with the control enclosure doors so that none of the doors can be opened un-
less the power is disconnected. Interlocking shall be reactivated automatically
when all the doors are closed.

Exception No. 1: A disconnecting means used only for maintenance lighting
circuits within control enclosures shall not be required to be interlocked with
the control enclosure. A safety sign shall be provided that meets the require-
ments of 17.2.5.

Exception No. 2: A disconnecting means used for power supply circuits
within control enclosures to memory elements and their support logic requiring
power at all times to maintain information storage shall not be required to be
interlocked with the control enclosure doors. A safety sign shall be provided
that meets the requirements of 17.2.5.

6.2.3.1.1 Means shall be permitted to be provided for qualified persons, us-
ing appropriate work practices, to gain access without removing power.

6.2.3.1.2 The interlocking means shall meet the following requirements:
(1) Utilize a device or tool as specified by the manufacturer of the interlock
to allow qualified persons to defeat the interlock.
(2) Be reactivated automatically when the door(s) is closed, and
(3) Prevent closing of the disconnecting means while the enclosure door is
open, unless an interlock is operated by deliberate action.

6.2.3.2 Where a qualified (skilled) person, using appropriate work practices,
needs to enter an enclosure that does not have a disconnect, one of the follow-
ing conditions shall be met:
(1) The use of a key or tool shall be required for opening the enclosure.
(2) An enclosure door shall be permitted to be opened without the use of a
key or a tool and without disconnection of live parts only when all live parts
inside are separately enclosed or guarded such that there cannot be any direct
contact with live parts by a test finger.

6.2.3.3 Where the equipment has two or more sources of power or two or
more independent disconnecting means, power wiring from each disconnect-
ing means source shall be run in separate raceways and shall not terminate in
or pass through common junction (terminal) boxes.

6.2.3.4 Where the equipment has two or more independent disconnecting
means, power wiring from each disconnecting means shall be run in a separate
raceway and shall not terminate in or pass through common junction (termi-
nal) boxes.

6.3 Protection by the Use of Protective Extra Low Voltage (PELV).

6.3.1 General Requirements. The use of PELV is to protect persons
against electric shock from indirect contact and limited area direct contact as
permitted by 14.4.5.3 and 16.1.1. Where PELV circuits are used as control
circuits, they shall also fulfill the relevant requirements of Chapter 5.

PELV circuits shall satisfy all of the following conditions:
(1) The nominal voltage shall not exceed the following:
   a. 30 volts ac (rms value) or 60 volts dc (ripple free) when the equipment
      is used in normally dry locations and when large area contact of live parts
      with the human body is not expected.
b. 6 volts ac (rms value) or 15 volts dc ripple free in all other cases.

(2)* One side of the circuit or one point of the source of the supply of that circuit shall be connected to the equipment grounding (protective bonding) circuit.

(3) Live parts of PELV circuits shall be electrically separated from other live circuits. Electrical separation shall be not less than that required between the primary and secondary circuits of a safety isolating transformer.

(4) Conductors of each PELV circuit shall be physically separated from those of any other circuit. When this requirement is impracticable, the insulation provisions of 14.1.3 shall apply.

(5) Attachment plugs and receptacles (plugs and socket combinations) for a PELV circuit shall conform to the following:

a. Attachment plugs (plugs) shall not be able to enter receptacles (socket-outlets) of other voltage systems.

b. Receptacles (socket-outlets) shall not admit plugs of other voltage systems.

6.3.2 Sources for PELV. The source for PELV shall be one of the following:

(1) A safety isolating transformer.

(2) A source of current providing a degree of safety equivalent to that of the safety isolating transformer (e.g., a motor generator with winding providing equivalent isolation.

(3) An electrochemical source (e.g., a battery) or another source independent of a higher voltage circuit (e.g., a diesel-driven generator).

(4) An identified electronic power supply conforming to appropriate standards specifying measures to be taken to ensure that even in the case of an internal fault, the voltage at the outgoing terminals cannot exceed the values specified in 6.3.1(1).

6.4 Protection Against Residual Voltages.

6.4.1 Live parts having a residual voltage greater than 60 volts after the supply has been disconnected shall be reduced to 60 volts or less within 5 seconds after disconnection of the supply voltage.

Exception No. 1: Exempted from this requirement are components having a stored charge of 60 microcoulombs or less.

Exception No. 2: Where such a provision would interfere with the proper functioning of the equipment, a durable warning notice drawing attention to the hazard and stating the delay required before entry to the enclosure is allowed, shall be displayed at an easily visible location on or immediately adjacent to the enclosure containing the capacitance.

6.4.2 The withdrawal of plugs or similar devices, which results in the exposure of conductors (e.g., pins), shall have a discharge time that does not exceed 1 second.

Exception No. 1: Exempted from this requirement are components having a stored charge of 60 microcoulombs or less.

Exception No. 2: Exempted from this requirement are conductors that are protected against direct contact.

SUBSTANTIATION: The text accepted by the panel in Proposal 79-25 has been editorially revised to comply with the NFPA Style Manual. (Note: The NOP draft text already uses new style. This comment endorses the existing text in the NOP draft). (Also, this comment includes proposed new text from other proposals related to 6.2.3.3 and 6.3.1).

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comment 79-128 (Log #244) and Comment 79-131 (Log #167). The committee understands that this action is to only reject the proposed revisions in 6.2.3.3, 6.2.3.4 and 6.3.1. Chapter 6 is as appears in the NOP draft and as modified by other comments.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NEGATIVE: 2

EXPLANATION OF NEGATIVE: FREUDENBERG: First of all the reference to ROP 79-26 is an incorrect reference and at first I couldn’t find out what the submitter or committee was attempting to do. I found ROP 79-29 that changes ishock to hazard. If this is what was intended, I still reject this change. I do agree with the submitter that there are two basic electrical hazards: Electrical Shock and Electrical Energy (arc flash). However, all the specific proposals to address Electrical Energy (arc flash) in Section 6 or elsewhere in the standard were voted down by the committee.

At this late date in the NFPA 79-2002 cycle, it would be in my opinion both confusing and misleading to change the title Electric Shock to Electrical Hazard when Electrical Energy (arc-flash) is not defined, explained or addressed anywhere in the requirements of section 6 or elsewhere in the standard.

It is a common work practice to remove rings and watches during servicing or troubleshooting energized equipment. Even when PWB swapping in areas of the machine with only 5VDC or 12VDC circuits, if there is more than 240 VA capability between live parts, it is still a good work practice to remove rings and watches to avoid the possibility of the secondary injury or burns should the ring or watch heat up or melt due to high currents when the ring or watch inadvertently causes a short between two live parts.

5VDC and 12VDC power supplies are commonly rated with nominal 200 Amp, 500 Amp, 1000 Amp or higher current outputs. Even though electric shock at 5VDC or 12VDC is not possible under dry conditions, this same VA output level when shorted by a metal object such as a ring, watch or a tool such as a screwdriver can be technologically equivalent to a commercial grade welder.

I believe this change should have been held for the next cycle so the Electrical Energy (arc-flash) can be properly defined, explained and addressed in Section 6 or elsewhere in the standard.

SANDERS: This change to require the equipment to provide the hazard protection for personnel against possible injury or damage to health under any and all conditions of use during normal or fault conditions based on the definition in Chapter 3 is both impractical and impracticable.

Protection from electrical shock during normal and fault conditions is a matter of guarding, separation or barrier to enable personnel to avoid energized components. Protection against electrical hazards greatly expands the responsibility of the machine tool builder. While many hazards that arise during normal operations can be anticipated, there is no assurance that it is truly the case, and those that may be encountered during operating conditions are so varied as to render this new requirement impossible.

Testing of arcing and blast effects of electrical fault show the energy involved is a dynamic, moving condition that varies based upon the voltage and current. In addition, the cycle-time duration, the physical shape of the enclosure, and the energy absorption or release of enclosure components as they may or may not melt are also items to consider, and this is just a partial list.

Overcurrent protection devices are designed to not self-destruct when operating within their design limits, with some reducing the total let-through energy during downstream fault events. However, unless the energy through a protective device is large enough to cause them to open in a current-limiting manner, the point of fault energy release may run until the arc gap opens sufficiently and the arc goes out on its own, or the overcurrent protective device opens. That may take several cycles.

Many of these faults occur when the machine is undergoing testing or examination with circuits or components energized. The machine provided protection may not be effective or present because this often takes place with
doors open, covers off, guards removed, etc. At that time, employees must rely upon personnel protection equipment for the degree of hazard anticipated. NFPA 70E provides a systematic approach to determine the possible degree of hazard and possible personnel protection measures.

Although the intent of the proposal and comment is laudatory, to require the machine and related equipment to provide the ultimate degree of protection this change represents is beyond the scope of this standard and introduces unlimited liability exposure.

Machine design can minimize the personnel exposure, but it cannot eliminate the exposure, as this would require.

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**COMMITTEE STATEMENT**

**COMMITTEE ACTION**

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**COMMITTEE STATEMENT**

The deleted text is not redundant. If this comment is accepted, there will no negative consequence.

**COMMITTEE ACTION**

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**COMMITTEE STATEMENT**

The requirement for listed cable when it is multi-conductor outside a cabinet causes a severe constraint on designs. This is true because many machines are filled with custom-designed multi-conductor cable. The requirement should be removed.

6.2 Protection from Electric Shock During Normal Operation. Live parts operating at 50 volts rms ac or 60 volts dc or more shall be guarded against accidental contact by an enclosure or shall be a listed multiconductor cable or flexible cord. The requirement should be removed.

**COMMITTEE STATEMENT**

This will remove unnecessary complications from machine design.

**COMMITTEE ACTION**

Accept in Principle

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**COMMITTEE STATEMENT**

The wording requiring listed cable in the applicable situation should not be forced to evaluate the equivalency of non-listed cables and cords to a comparable listed product. This will delay the acceptance process. In areas where there are no Authorities Having Jurisdiction, inferior and possibly hazardous products will be employed because they cost less.

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**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment must be rejected.

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**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

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**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

The proposal restricts access to PELV only, which the committee believes is unduly restrictive. Accepting this change would not permit an NEC Article 725 Class 2 circuit.

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**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

It is not the intent of Section 6.2.1 to describe what parts should be protected by insulation. Rather, it is stipulating the low voltage circuits, would have to either use a tool to access or have all PELV circuits.

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**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This is a significant hole in our electrical safety net. Up to the ROC meeting, the committee intended that individuals be protected from shock hazards by placing live parts in enclosures or alternatively by a system of listed insulation. The committee’s action on this comment has changed the intent of this section. Bare or covered conductors will be permitted outside of enclosures. Authorities Having Jurisdiction will be forced to evaluate the equivalency of non-listed cables and cords to a comparable listed product. This will delay the acceptance process. In areas where there are no Authorities Having Jurisdiction, inferior and possibly hazardous products will be employed because they cost less.

---

**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

---

**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

---

**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

---

**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

---

**COMMITTEE ACTION**

Reject

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**COMMITTEE STATEMENT**

This comment was circulated has raised questions in my mind relative to the appropriateness of the committee’s action, and I would be more comfortable, in light of those arguments, remaining with the ROP text.

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applied, without appreciable force, in every opening in the enclosure after
removal of all parts of the enclosure that can be removed without the use of a
tool.

**SUBSTANTIATION:** The test finger should not be required for rated enclo-
sure or component.

**COMMITTEE ACTION:** Accept in Principle

Revise text to read as follows:

6.2.2.1 Direct Contact from Outside an Enclosure. In the absence of a rated
enclosure, the determination of the suitability of an enclosure as protection
from electrical shock shall be determined by using a test finger as described in
Figure 6.2.2.1. The test finger shall be applied, without appreciable force, in
every opening in the enclosure after removal of all parts of the enclosure that
can be removed without the use of a tool.

**COMMITTEE STATEMENT:** The focus of Section 6.2.2.1 should be on
the enclosure rather than on the location of the devices within the enclosure.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

**EXPLANATION OF NEGATIVE:**

**GARVEY:** The comment should be rejected. The use of “rated” enclosures
or “rated” devices does not ensure protection from electrical shock. This sec-
tion, Section 6.2.2.1, is concerned with protecting people from shock hazards.
“Rated” is not a defined term in NFPA 79 or NFPA 70. “Ratings”, when used to
describe an enclosure, is a term used by NEMA to address suitability for a
particular set of environmental conditions. “Ratings”, when used in conjunc-
tion with a device, indicates limits of electrical properties for which the device
has been tested. Devices may have voltage, current, interrupting, or short-cir-
cuit ratings. Devices do not have “protection from shock” ratings. I can sup-
port the concept that a listed enclosure or device may not need to be tested
with the “finger”. I cannot support the comment as written. The intent of the
section has been obscured. The Authority Having Jurisdiction cannot enforce
intent, only the text as written.

79-115-(6.2.2.1) : Reject

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-25

**RECOMMENDATION:** Revise 6.2.2.1 as follows:

Direct Contact from Outside an Enclosure. Live parts operating at 50 volts
or more shall be located inside enclosures such that there cannot be any direct
contact to those live parts from the outside of an enclosure when using the test
finger.

**SUBSTANTIATION:** To correspond with the new definition and add clarity
for which live parts need to be guarded.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** See the committee action and statement on
Comment 79-114 (Log #149).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

79-116-(6.2.2.1) : Reject

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-25

**RECOMMENDATION:** Revise 6.2.2.1 as follows:

Direct Contact from Outside an Enclosure. Live parts shall be located inside
enclosures such that there cannot be any direct contact to live parts from
outside of an enclosure when using the test finger. The determination of the
suitability of an enclosure as protection from electrical shock shall be deter-
minded by using a test finger as described in Figure 6.2.2.1. The test finger
shall be applied, without appreciable force, in every opening in the enclosure
after removal of all parts of the enclosure that can be removed without the use
of a tool.

Insert a Note in Annex A as follows: A test finger may be used to determine
the suitability of an enclosure for providing protection from electrical shock.

Include the figure (6.2.2.1) in the Annex.

**SUBSTANTIATION:** It is not necessary to require the use of a test finger for
all enclosures. The NEC does not contain a requirement for using a test fing-
ner. Many machines are fabricated in place or shipped in pieces, which could
be interpreted as requiring all electrical inspectors to use a test finger in the
final approval of the equipment.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The comment moves Figure 6.2.2.1 to the
Annex and removes the requirements for a test finger. Acceptance of this
comment would make enforceability of this requirement difficult.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

**EXPLANATION OF NEGATIVE:**

**DOBROWSKY:** The comment should be accepted. Section 6.6.6.1, as re-
vised by accepting 79-114 in principle, still requires the use of a test finger for
non-rated enclosures.

79-117-(6.2.3) : Accept in Part

**SUBMITTER:** Vince Baclawski, National Electrical Manufacturers Associa-
tion

**COMMENT ON PROPOSAL NO:** 79-25

**RECOMMENDATION:** 6.2.3 Enclosure Interlocking. Enclosure interlock-
ing as described in 6.2.3.1 through 6.2.3.2 shall be provided. In those instances
where access is required for testing and troubleshooting, the test and
troubleshooting is expected to be limited to qualified (skilled) persons using
appropriate work practices.

**SUBSTANTIATION:** Add is not a Section 6.2.3.4. The addition of the sec-
ond sentence is related to our comments to 6.2.3.1 and 6.2.3.2. The objective
is to place the “qualified person” language in the opening of this sub-clause
instead of in the individual section. Placement here will cover all of the sub-
classes in 6.2.3.

**COMMITTEE ACTION:** Accept in Part

The committee accepts the change in reference from 6.2.3.4 to 6.2.3.3.

**COMMITTEE STATEMENT:** The committee rejects the addition of sec-
ond sentence because it is unenforceable text and it contains nonmandatory
language.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

79-118-(6.2.3) : Accept in Principle

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-25

**RECOMMENDATION:** Revise text to read as follows:

Enclosure interlocking as described in 6.2.3.1 through 6.2.3.2 shall
be provided.

**SUBSTANTIATION:** 6.2.3.4 does not exist.

**COMMITTEE ACTION:** Accept in Principle

**COMMITTEE STATEMENT:** See committee action and statement on
Comment 79-117 (Log #230).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

79-119-(6.2.3.1 Exception No. 3 (New) ) : Reject

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-25

**RECOMMENDATION:** Add new text to read as follows:

Exception No. 3: A disconnecting means shall not be required to be inter-
locked with the control enclosure if a tool or key is required to enter the en-
closure and if all live parts inside are separately enclosed or guarded such
that there cannot be any direct contact with live parts by a test finger. A safety sign
shall be provided that meets the requirements of 17.2.5.

**SUBSTANTIATION:** This resolves the problem of when a manufacturer uti-
izes a stand-alone disconnect switch that is not mechanically connected to the
panel, a breaker, etc. (i.e., a rotary playschool type switch). This exception we
propose, is in concert with the rationale of IEC 60204-1 (1997) - if everything
in the enclosure is fingersafe, no hazard exists. This exception is needed for
better harmonization of the two standards.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** This language is already in 6.2.3.2, except
for the requirements for the sign. This is not the requirement for the proper
sign.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

**EXPLANATION OF NEGATIVE:**

**KIIHR:** The substantiation for the committee’s action to reject this comment
is not correct. The Committee Statements state that the language is already in
6.2.3.2, this is incorrect.

Section 6.2.3.2 deals with enclosures that do not have disconnects. The
original comment 79-119 deals specifically with the interlocking between
disconnects and enclosures. The submitter’s intent was not addressed by section
6.2.3.2, and the substantiation as given in the Committee Statement does not
justify the rejection of this comment.

I am, therefore, voting against the rejection of comment 79-119.

79-120-(6.2.3.1) : Accept

**SUBMITTER:** Gordon C. Davis, Moeller Electric Corp.
COMMENT ON PROPOSAL NO:79-38
RECOMMENDATION: Add fine print note: “See NFPA 70E for additional information on work practices.”

SUBSTANTIATION: Committee comments to proposal recommended revisions found in comments.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The committee understands that this action adds fine print text with the correct title (NFPA 70E: Standard for Electrical Safety Requirements for Employee Workplaces) to annex A as a new section A-6.2.3.1.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

VOTE ON COMMITTEE ACTION:

79-121-(6.2.3.1.1) : Reject
SUBMITTER: Vincent Balcavage, National Electrical Manufacturers Association

COMMENT ON PROPOSAL NO:79-25
RECOMMENDATION: Change the wording as follows: 6.2.3.1.1 Means shall be permitted to be used to prevent the deflection of the disconnecting means in order for qualified persons, using appropriate work practices, to gain access without removing power.

SUBSTANTIATION: The focus is to provide a defeat means for the interlock. See the comment on Paragraph 6.2.3 that adds a general statement on qualified persons and is a more appropriate location for a general statement.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not encourage unsafe work practices or work such as this by persons that are not qualified. The text “defeat the interlock” is not required in this section since it is found in subsequent sections.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-122-(6.2.3.1.1.1) : Hold
SUBMITTER: Gordon C. Davis, Moeller Electric Corp.

COMMENT ON PROPOSAL NO:79-28
RECOMMENDATION: Add new text: 6.2.3.1.1.1 Live parts on the inside of the door of an enclosure shall be protected against unintentional direct contact by the backside of personnel’s hands. Live parts which are likely to be touched when resetting or adjusting devices while the equipment is energized shall additionally be protected against unintentional direct contact by personnel’s fingers.

The following methods shall be permitted to be used to prevent unintentional contact with live parts:
1. Insulated covering, such as thermal plastic;
2. The placement of devices not complying with the finger safe requirements six (6) in. or as far as practicable from the devices to be adjusted or maintained;
3. The use of devices that comply with the finger safe or back of hand safe requirements;
4. Other approved means.

SUBSTANTIATION: Based on the committee statement that no disconnecting means has been evaluated with the door open, such language should be removed from the proposal. Based on the committee statement, the proposal should have mandatory language.

Based on Mr. Freundenberg’s statement, means other than back of hand or finger safe methods shall be permitted for protection of service personnel.

The other methods that shall be permitted are the covering of live parts or the placement of live parts a safe distance from the components needing maintenance or adjustment or other approved means.

In regards to Mr. Sanders’ statement, the requirements found in the proposal are construction requirements used in enclosures with defects. They are, therefore, inappropriate for NFPA 79. It is also appropriate and compelling that NFPA 79 provide guidance to industry on this critical safety issue.

NFPA 79 requirements that enclosures shall be permitted to have a defeat mechanism means that any assembly can be opened with the equipment energized. As seen in OSHA statistics most accidents involving electricity are unintentional contact with live components (usually with the door of an enclosure opened). There exists IEC safety standards for construction of assemblies which are intended to be serviced live with the door open. The original Proposal 79-28 reflects those safety standards.

The Committee is asked to reconsider the proposal as revised in the comment to Proposal 79-28.

COMMITTEE ACTION: Hold
COMMITTEE STATEMENT: This comment introduces a new concept that is considered new material that has not received public review. In accordance with the Regulations Governing Committee Projects, 4-8.6.2.2(a), the committee desires to place this comment on Hold for the next revision cycle. The committee does not desire to Hold any associated proposals.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
The assumption that voltage levels are the only criteria when evaluating the safety aspect against electrical hazard is not correct. The committee believes it is still possible for a hazardous condition to be present at circuits operating at less than 50 volts.

Number of Committee Members Eligible to Vote: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 24
NEGATIVE: 1

EXPLANATION OF NEGATIVE:
DOBROWSKY: The comment should be accepted. See my Explanation of Negative Vote on Comment 79-96.

79-129-(6.2.3.3) : Reject
SUBMITTER: Nick Momiclovic, QTI
COMMENT ON PROPOSAL NO: 79-25
RECOMMENDATION: Switch the text of 6.2.3.3 with 5.3.1.6 and vice versa.

STANDBY: Clauses 6.2.3.3 and 5.3.1.6 currently do not seem to fit under their respective clauses 6.2.3.1 and 5.3.1. Switching these clauses allows each of the clauses to flow better and be more clear.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee disagrees that the proposed revision to 6.2.3.3 adds additional clarity or usability to this section.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

9-72-9-(6.2.3.5) : Accept
RECOMMENDATION: The Technical Correlating Committee directs the committee to consider the comments expressed in the voting. This action will be considered by the committee as a public comment.
SUBSTANTIATION: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the NFPA Regulations Governing Committee Projects.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The concerns of the comments expressed in the voting have been reviewed by the committee, and have been met. “Exception No. 5” as added in Proposal 79-90 for clause 11.8 and then moved to Section 6.2.3.5 as the committee action. This action was modified in Proposal 79-25 when Section 6.2.3.5 was rewritten to new 6.2.3.1 and then the relocated Exception was subsequently deleted. This action removed the reference “Where an electrical enclosure is not the main enclosure”—and “permitting the disconnect means interlocking to be different then the main enclosure”.

This was the basis for the comment referred to by the Technical Correlating Committee and has been resolved.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

AFFIRMATIVE: 25 (Log #167)

97-131-(6.3.1) : Reject

SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: The use of PELV is to protect persons against electric shock from indirect contact and limited area direct contact as permitted by 14.4.5.3 and 16.1.1 Where PELV circuits are used as control circuits, they shall also fulfill the relevant requirements of Chapter 5.

SUBSTANTIATION: Editorial change to explain the reason for the existence of 6.3.1. The existing text is mandatory and complies with the style manual.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that this change would not add additional clarity.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

AFFIRMATIVE: 25 (Log #204)

97-132-(6.3.1) : Accept in Principle

SUBMITTER: Paul R. Warndorf, AMT-The Association For Manufacturing Technology

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: Change 6.3.1 as follows and number the second paragraph adding a title, then renumber the section.

6.3.1 General Requirements. The use of PELV, as defined in 6.3, is to protect persons against electric shock from indirect contact and limited area direct contact. Where PELV circuits are used as control circuits, they shall also fulfill the relevant requirements of Chapter 5.

SUBSTANTIATION: This change is to help clarify the section. What is not clear is the second sentence of 6.3.1 second sentence stating, “...fulfill the relevant requirements of Chapter 5.” This is vague and subject to different interpretations. The specific parts of Chapter 5 should be identified or the entire chapter should apply. The authors of this statement should clarify the requirements.

COMMITTEE ACTION: Accept in Principle

Replace the term “defined” with “described.”

COMMITTEE STATEMENT: The term “defined” with “described” was replaced because it is not a definition.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

AFFIRMATIVE: 25 (Log #401)

97-133-(6.3.1) : Accept in Principle

SUBMITTER: Nick Momcilovic, QTI

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: Revise text to read as follows:

...principal discharge time where technical justification exists.

SUBSTANTIATION: This will remove unnecessary complications from machine design.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comment 79-137 (Log # 150).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

AFFIRMATIVE: 25 (Log #150)

97-137-(6.4.1) : Reject


COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: Revise text as follows:

The requirement for reduction of residual voltage in 5 seconds or less is a new requirement that is not well founded. Existing requirement is for 60 seconds and includes warnings, visible indicators, and protection from accidental contact. With those existing protections, there is no reason to reduce the discharge time by a factor of six. Note that existing state-of-the-art designs use as much as 3000000 micro-coulombs of charge and it would be very inefficient to discharge this energy in 5 seconds. Recommend reverting to original requirement of 60 seconds.

6.4.1 Live parts having a residual voltage greater than 60 volts after the supply has been disconnected shall be reduced to 60 volts or less within 50 seconds after disconnection of the supply voltage.

SUBSTANTIATION: This remove unnecessary complications from machine design.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Section 6.4.1, Exception No. 2 permits a longer discharge time where technical justification exists.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

AFFIRMATIVE: 25 (Log #366)

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: The 5s is acceptable.

SUBSTANTIATION: However, UL 1950 2.10 requires 1s for pluggable type A equipment and 10s for permanently connected equipment and pluggable type B equipment. Should not industrial equipment and information technology equipment (ITE) have the same or similar criteria for residual voltages? If anything, one would think that industrial equipment would have a longer discharge time than ITE. It would be ideal if UL 1950/IEC 950 were changed to lower values.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

SUBMITTER: Joe Schomaker, St. Louis, MO

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Add the following text to Section 7.2.1:

- All protective devices shall be selected and applied with proper consideration being given to, but not limited to the following:
  - a) System maximum available fault current at the point of application.
  - b) Interrupting rating of the protective device.
  - c) Voltage rating of the system.
  - d) Load and circuit characteristics.
  - 1) Normal operating current
  - 2) Inrush characteristics
  - 3) Thermal withstand capability (I)
  - 4) Magnetic withstand capability (I)
  - e) Current-limiting ability of the protective device.
  - f) Coordination of the protective devices to each other.

SUBSTANTIATION: This was eliminated from the May 2002 ROP Draft, but there was no substantiation for the deletion of this text. The clause numbers given to replace the 8.1.2 in NFPA 79-1997 in the proposed NFPA 79-2002 do not contain all of the bullet items in Clause 8.1.2 that were removed. Only points a) and b) are covered in the May NFPA 79 2002 ROP Draft in Clause 7.2.9.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

SUBMITTER: Endell Mell, Husky Injection Molding Systems Ltd

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: Exception No. 2. Where such a provision would interfere with the proper functioning of the equipment, or where meeting such a provision would require additional equipment to be connected to listed equipment that is not available from the equipment vendor, a durable warning notice drawing attention to the hazard and stating the delay required before the enclosure may be entered shall be displayed at an easily visible location on or immediately adjacent to the enclosure containing the capacitance.

SUBSTANTIATION: The text in the existing draft aligns well with EN60204. However, “interfere with the proper functioning of equipment” is difficult to interpret and to defend. Equipment listed to UL508C (such as inverters and servo drives) do not necessarily meet the 60V in 5s criteria, nor the older 50V in 60s criteria: UL508C allows labeling as an alternative. Machinery manufacturers should not be placed in a position of modifying servo equipment circuits to meet a safety requirement when the equipment itself has been listed. Those modifications would typically involve switching some sort of resistance across a capacitor bank, and would not be fail safe. That could create a false sense of safety.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Listed UL 508C type equipment does not meet the need for five second discharge time. Section 11.1.3 addresses the submitter’s concern of modified listed electronic equipment.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE:

SANDERS: The committee statement could have stated: “Listed UL 508C type equipment meeting the conditions expressed in the exception does not have to comply with the five second discharge time of the main rule.”

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise wording of section 7.2.1 to include requirements for branch circuit overcurrent protection.

7.2.1* General. Overcurrent protection shall be provided where the current in a machine circuit can exceed either the rating of any component in the circuit or the current carrying capacity of the conductors in the circuit, whichever is the lesser value. Each circuit shall be protected by a branch circuit overcurrent protective device unless otherwise permitted in this standard.

SUBSTANTIATION: The addition of this sentence will clarify, for the public, that branch circuit protective devices and branch circuit protection requirements are to be utilized for circuits within a machine electrical panel unless otherwise permitted in this standard. The current wording of section 7 leaves this open to interpretation and possible misapplication of devices.

COMMITTEE ACTION: Accept in Principle

Add a new last sentence to 7.2.1 to read as follows: Supplementary overcurrent protective devices shall not be used as a substitute for branch circuit overcurrent protective devices.

COMMITTEE STATEMENT: This language clarifies the use of supplementary overcurrent protective devices in the standard.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25


COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: Revise text to read as follows:

6.4.2 The withdrawal of plugs or similar devices, which results in the exposure of conductors (e.g., pins) that can be contacted with the test finger (Figure 6.2.2.1), shall have a discharge time that does not exceed 27 seconds.

SUBSTANTIATION: UL 1950 2.10 requires 1s for pluggable type A equipment and 10s for permanently connected equipment and pluggable type B equipment. I would think most pluggable type industrial equipment would have type B plugs (industrial style). Should not industrial equipment and information technology equipment (ITE) have the same or similar criteria for residual voltages? If anything, one would think that industrial equipment would have a longer discharge time than ITE.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer a specific discharge time. In addition, the submitter’s substantiation does not address the addition of new text. Section 14.4.5.1 already address the test finger issue of the comment.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

SUBMITTER: Endell Mell, Husky Injection Molding Systems Ltd

COMMENT ON PROPOSAL NO: 79-25

RECOMMENDATION: The change clarifies the requirements for all types of circuits. By this modification the reference to 7.2.10 is maintained as it was deleted by the action on 79-47 (but still was printed in the draft.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25


COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise text as follows:

7.2.5 Maintenance Receptacle (Socket) Outlets and Their Associated Conductors.
SUBSTANTIATION: Sub-clause 7.2.5.1 indicates that this clause is dealing with maintenance outlets. This should also be made clear in the title. Outlets that are not for maintenance purposes may not be limited to 15 amps as specified in 7.2.5.2.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed addition of the word “maintenance” would overly restrict the application of 7.2.5. Language already current exists in Chapter 16 that references 7.2.5 for overcurrent protection.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery.

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise 7.2.8(1)(e) of the ROP draft to read as follows:

(e) The conductor terminates in a branch circuit rated circuit breaker, or a branch circuit rated set of fuses or a listed self-protected combination controller.

SUBSTANTIATION: A self-protected combination controller is recognized as a suitable main supply disconnect in Clause 5.3.3 of this standard. Additionally, they are recognized in Article 430 of the NEC as suitable short-circuit and ground fault protection for motors plus they are suitable as a motor disconnect. For machine applications, this device should be added to the list as a suitable terminating device for tap conductors. A self-protected combination controller is being added to the list of devices suitable for this application.

COMMITTEE ACTION: Reject

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Wilson Benosa, Applied Materials

COMMENT ON PROPOSAL NO: 79-43

RECOMMENDATION: Revise the first sentence of the subclause to read as follows:

“The short-circuit interrupting rating shall be at least equal to the available fault current at the point of application based on the fault current the equipment is designed to interrupt.”

SUBSTANTIATION: As written, the first sentence of this subclause may be interpreted as requiring the manufacturer to design equipment to be rated for the available fault at every possible facility or location. Equipment are designed for certain ratings or conditions, e.g., maximum interrupting rating, minimum voltage, maximum ambient temperature. The equipment user is responsible for ensuring the proper use and installation of the equipment in accordance with the manufacturer’s instructions or conditions of use. NEC 110-3 addresses the issue of proper use and installation of equipment.

With the proposed revision, the manufacturer is still responsible for ensuring that overcurrent protective devices (that are parts of the equipment) are properly rated in accordance with the maximum available fault current at equipment supply for which the equipment is designed.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Section 7.2.9 does not assign the responsibility for meeting this requirement. See Section 5.3.3.2 for the interrupting rating for the supply disconnecting means.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise proposed 7.2.10.1 as shown below:

7.2.10.1 Each motor controller and its associated wiring shall be protected as an individual branch circuit by a short-circuit protective device (SCPĐ) as specified by the controller manufacturer. The maximum rating of the designated SCPĐ shall be as shown in Table 7.2.10.1.

Exception: Table 7.2.10.1 shall not apply to Design E motor circuits. The provision of NFPA 70, National Electrical Code, shall be observed for Design E motor circuits.

SUBSTANTIATION: The Design E motor standard was rescinded by NEMA in February, 2000 and deleted from NEMA Standards Publication MG 1-1998.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Modify the exception to read:

Exception: Table 7.2.10.1 shall not apply to Design B energy efficient motor circuits. The provisions of NFPA 70, National Electrical Code, shall be observed for Design B energy efficient motor circuits.

SUBSTANTIATION: The Design B energy efficient motors has been added to be consistent with the requirements in the NEC. The term Design E has been deleted due to the elimination of this motor designation in the NEMA MG-1 standard for motors.

COMMITTEE ACTION: Accept in Principle

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Jim Carroll, Square D

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).

79-146-(7.2.9) : Reject

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Add the following wording as new Section 7.2.9.2, renumber 7.2.9 to 7.2.9.1 to correlate with this change. Add section title 7.2.9 per NFPA Manual of Style.

7.2.9 Overcurrent Protective Device Ratings

7.2.9.1 Short Circuit Interrupting Rating

7.2.9.2 Voltage Rating. An overcurrent protective device with a straight voltage rating, such as 240V or 480V, shall be permitted to be applied in a circuit in which the nominal voltage between any two conductors does not exceed the overcurrent protective device’s voltage rating. A two-pole circuit breaker shall not be used for protecting a 3-phase, corner-grounded delta circuit unless the circuit breaker is marked 1 0 3 O to indicate such suitability. An overcurrent protective device with a slash rating, such as 120/240V or 480V/277V, shall be permitted to be applied in a solidly grounded circuit where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the circuit breaker’s voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker’s voltage rating.

SUBSTANTIATION: The present text does not address the proper selection relative to voltage ratings. This requirement correlates with requirements existing in NEC 240.85 and NEC 430.83(E). The term “overcurrent protective device” was used to combine the requirements in NEC 240.85 and NEC 430.83(E). The placement in section 7.2.9 seems to be the logical place to contain special considerations when applying/selecting overcurrent protective devices as existing 7.2.9 relates to short circuit interrupting rating.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This information is included with the UL guidance card information plus is in the NEC (240.85). It is not necessary to repeat all available information in this standard.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMITTEE STATEMENT: Add the following note to existing section 7.2.9 of the 2002 NFPA 79 draft.

NOTE: Proper application of molded case circuit breakers on 3-phase systems, other than solidly grounded wye, particularly on corner grounded delta systems, considers the circuit breakers’ individual pole interrupting capability.

COMMITTEE ACTION: Accept in Principle

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON AFFIRMATIVE: SANDERS: NFPA 79 Section 1.5 directs attention to the parent NFPA 70 document for conditions not specifically covered within the standard.

79-147-(7.2.9) : Accept

SUBMITTER: Jim Carroll, Square D

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-148-(7.2.10.1 Exception) : Accept in Principle

SUBMITTER: Vince Baclawski, National Electrical Manufacturers Association

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise proposed 7.2.10.1 as shown below:

7.2.10.1 Each motor controller and its associated wiring shall be protected as an individual branch circuit by a short-circuit protective device (SCPĐ) as specified by the controller manufacturer. The maximum rating of the designated SCPĐ shall be as shown in Table 7.2.10.1.

Exception: Table 7.2.10.1 shall not apply to Design E motor circuits. The provision of NFPA 70, National Electrical Code, shall be observed for Design E motor circuits.

SUBSTANTIATION: The Design E motor standard was rescinded by NEMA in February, 2000 and deleted from NEMA Standards Publication MG 1-1998.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Todd F. Lottmann, Washington, MO

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

SUBMITTER: Jim Carroll, Square D

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).

79-150-(7.2.11.3) : Accept in Principle

SUBMITTER: Jim Carroll, Square D

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See committee action and statement on Comment 79-149 (log # 305).
COMMENT ON PROPOSAL NO: 79-44
RECOMMENDATION: Revise text to read as follows:
7.2.11.3 The supplementary overcurrent protective device shall be as follows:

SUBSTANTIATION: The change will remove any confusion that these devices are permitted to be “Supplementary Protectors” as covered in UL Standard 1077. It is clear from sub-item 3 that branch-circuit rated devices are required, but the primary sentence leads to confusion as presently written.

COMMITTEE ACTION: Accept in Principle

Revise text to read as follows:
7.2.11.3 The additional overcurrent protective devices shall include all of the following:

COMMITTEE STATEMENT: This revision meets the NFPA Manual of style to clarify that all three conditions must be met.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-151-(7.2.11.3) : Accept in Principle
SUBMITTER: Joe Schomaker, St. Louis, MO

79-153-(7.3.1.11.4): Accept in Part
SUBMITTER: Thomas Plz, Plz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-44
RECOMMENDATION: Revise to read as follows:
7.3 Overload Protection of Motors.
7.3.1 General. Overload devices shall be provided to protect each motor, motor controller, and branch-circuit conductor against excessive heating due to motor overloads or failure to start.
7.3.1.1 Motors. Motor overload protection shall be provided as follows:

SUBSTANTIATION: The term “supplementary overcurrent protective device” directly conflicts with the third requirement listed in the paragraph. The intent is that branch-circuit overcurrent protective devices shall be required. Therefore, the word “supplementary” should be deleted.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See committee action and statement on Comment 79-150 (Log # 136).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-152-(7.2.11.3)(3): Accept in Principle
SUBMITTER: Nick Momicovic, QTI

DOCUMENT ON PROPOSAL NO: 79-44
RECOMMENDATION: Delete text as follows:

SUBSTANTIATION: 31.1.6 (a) of UL 508A specifically indicates that a supplementary protector shall not be relied upon to provide branch circuit protection. Keeping this requirement would directly conflict with UL 508A.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: The committee does not intend to delete any text. The action on Comment 79-150 (Log # 136) meets the intent of the submitter.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-153-(7.3.1 and 11.4): Accept in Part
SUBMITTER: Thomas Plz, Plz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-155

RECOMMENDATION: Revise to read as follows:
7.3 Overload Protection of Motors.
7.3.1 General. Overload of devices shall be provided to protect each motor, motor controller, and branch-circuit conductor against excessive heating due to motor overloads or failure to start.
7.3.1.1 Motors. Motor overload protection shall be provided as follows:

SUBSTANTIATION: The committee in accordance with Article 430, Part III of NFPA 70, National Electrical Code.

7.3.1.2(b) Adjustable speed drives (electronic drives). |

Where load conditions or reduced speeds can cause motor overheating, embedded motor thermal protection (effective over the motor speed range) shall be provided and interlocked with the adjustable speed drive system.

Exception: In accordance with Article 430.2 of NFPA 70, National Electrical Code where adjustable speed drive is marked to indicate that overload protection is included (preventing overheating due to load conditions or reduced speed), additional overload protection shall not be required.

SUBSTANTIATION: Editorial change for clarity: move new 11.4 in ROP proposal to existing 7.3.1. Move the text of the NEC reference into the body of NFPA 79, showing it as an exception (which we believe is consistent with the intent and effect of the original reference.) For reference, NEC (1999) states: “430-2. Adjustable-Speed Drive Systems. The incoming branch circuit or feeder to power conversion equipment included as a part of an adjustable-speed drive system shall be based on the rated input to the power conversion equipment. Where the power conversion equipment is marked to indicate that overload protection is included, additional overload protection shall not be required.

The disconnecting means shall be permitted to be in the incoming line to the conversion equipment and rated not less than 115 percent of the rated input current of the conversion unit.

FPN: Electrical resonance can result from the interaction of the nonsinusoidal currents from this type of load with power factor correction capacitors.”

COMMITTEE ACTION: Accept in Part
1. Revise 7.3 of the ROP Draft to read as follows:
7.3 Overload Protection of Motors.
7.3.1 General. Overload devices shall be provided to protect each motor, motor controller, and branch-circuit conductor against excessive heating due to motor overloads or failure to start.
7.3.1.1 Motors. Motor overload protection shall be provided in accordance with Article 430, Part III of NFPA 70, National Electrical Code.

7.3.1.2(b) Adjustable Speed Drives (electronic drives). Where load conditions or reduced speeds can cause motor overheating, embedded motor thermal protection (effective over the motor speed range) shall be provided and interlocked with the adjustable speed drive system.

Exception: In accordance with Section 430.2 of NFPA 70, National Electrical Code where adjustable speed drives are marked to indicate that overload protection is included, additional overload protection shall not be required.
7.3.2 and following sections to remain.
2.) Delete 11.4 and A.11.4.
3.) Add Annex material for 7.3.1.2 to read as follows:
A7.3.1.2 See Section 7.3.2 concerning automatic resetting.

COMMITTEE STATEMENT: The parenthetical expression was not substantiated and therefore was eliminated.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-154-(7.3.3): Accept in Principle
SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Revise 7.3.3 to read:
7.3.3 Number of Overloads. The minimum number and location of running overload protective devices shall be determined from Table 7.3.3.b

SUBSTANTIATION: The proper term in this clause is overload rather than overcurrent. The protection described is solely for motor overload protection while short circuit protection requirements are outlined elsewhere in this Chapter.

COMMITTEE ACTION: Accept in Principle

Revise 7.3.3 to read:
7.3.3 Number of Overloads. The minimum number and location of running overload units shall be determined from Table 7.3.3.b

1.) Correct the table to read “Table 7.3.3 Running Overload Units”
2.) Correct Table 3 heading to read “Number and Location of Overload Units (such as Trip Coils, Relays, or Thermal Cutouts)

COMMITTEE STATEMENT: The committee accepts the change from overcurrent to overload. The committee editorially corrected the Table reference to read 7.3.3. In addition, the committee additionally changed the title of Table 7.3.3 and the column three heading to correlate with the action taken on this comment.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-155-(7.5.3): Reject
SUBMITTER: Nick Momicovic, QTI

COMMENT ON PROPOSAL NO: 79-44

RECOMMENDATION: Define the term “short time period” either in the clause or in the definitions.

SUBSTANTIATION: Without specifying, what is meant by “short time period” this allows the user to imply an interpretation that can vary anywhere from a few milliseconds to several seconds.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE: SANDERS: IEEE 1100 - 1992, “Recommended Practice for Powering and Grounding Sensitive Electronic Equipment”, provides information that an...
undervoltaget condition is a result of a RMS decrease in AC voltage, at the power frequency, for duration greater than a few seconds. In addition, IEEE 510 - 1992, “Recommended Practices for Harmonic Control in Electrical Power Systems”, considers a worst case situation where the undervoltage exists for more than 60 minutes, and events experienced during motor startups would be a short time period.

79-156-(7.5.3) : Accept in Principle
SUBMITTER: Nick Moncicovic, QTI
COMMENT ON PROPOSAL NO:79-44
RECOMMENDATION: Move text of second paragraph “Where only...ensure coordination,” after the first paragraph under clause 7.5.2.
SUBSTANTIATION: This paragraph is more clear under 7.5.2.

COMMITTEE ACTION: Accept in Principle
Move text of second paragraph of 7.5.3 to Section 7.5.1 as a new second paragraph.

COMMITTEE STATEMENT: The committee agrees that the location in Section 7.5.3 is inappropriate but believes that Section 7.5.1 rather than 7.5.2 is a more appropriate location for the requirement.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-157-(7.6.1) : Accept in Principle
SUBMITTER: Nick Moncicovic, QTI
COMMENT ON PROPOSAL NO:79-44
RECOMMENDATION: Revise text to read as follows:
Unless the inherent...against motor overspeed can cause a hazardous condition.

SUBSTANTIATION: If motor overspeed does not create a hazardous condition, than adding protection for it becomes a performance requirement and not a safety requirement, which then falls outside the scope of this safety standard.

COMMITTEE ACTION: Accept in Principle
Revise text as follows:
Unless the inherent...against motor overspeed results in a hazardous condition.

COMMITTEE STATEMENT: The committee action meet the submitter’s intent and complies with the NFPA Manual of Style by avoiding the use of the word “can”.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-158-(7.9.2) : Accept in Principle
SUBMITTER: Kurt Zierhut, Haas Automation
COMMENT ON PROPOSAL NO:79-44
RECOMMENDATION: Revise text to read as follows:
The requirement for over voltage suppression device to be on the “incoming terminals” is incorrect. It does not take into account the fact that a sustained over voltage condition exists in high currents that must be interrupted by the combined circuit breaker/disconnecting device.

7.9.2 Where provided, devices for the suppression of overvoltages due to lightning shall be connected to the incoming-outgoing terminals of the supply disconnecting device.

SUBSTANTIATION: This will provide for a much more reasonable requirement that is, in fact, safer.

COMMITTEE ACTION: Accept in Principle
Revise Section 7.9.2 to read as follows:
Where provided devices for the suppression for over voltages shall be connected in accordance with product markings and installation instructions.

COMMITTEE STATEMENT: The committee believes that the location of these devices varies with the application and therefore should be in accordance with the product markings and installation.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE:
DROBNICK: Delete 7.9.3.
Covered by 7.9.2: “Where provided, devices for the suppression of over voltages shall be connected in accordance with product markings and installation instructions.”
The committee believes that the location of these devices varies with the application and, therefore, should be in accordance with the product markings and installation.

79-159-(7.10.2.1) : Reject
COMMENT ON PROPOSAL NO:79-44
RECOMMENDATION: This conflicts with NFPA 79 May 2002 ROP 6.4 Protection Against Residual Voltages that requires 5 seconds.
SUBSTANTIATION: If, the 1 minute criteria remains, a safety sign needs to be added to Section 17.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See the committee action and statement on 79-137 (Log # 150).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-159-(8.1.1) : Accept
SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,
COMMENT ON PROPOSAL NO:79-151
RECOMMENDATION: Revise 8.1.2 to read as follows:
8.1.1 This chapter shall provide for grounding, bonding, and grounded conductor requirements.

SUBSTANTIATION: Editorially corrects the language to improve clarity.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-160-(8.1.2) : Accept
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO:79-151
RECOMMENDATION: Revise 8.1.2 to read:
8.1.2 Connections. Grounded conductors shall not be connected to the equipment grounding (protective bonding) circuit, except for separately derived systems.

SUBSTANTIATION: This conflicts with NFPA 79 May 2002 ROP 6.4 Protection Against Residual Voltages that requires 5 seconds.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Some circuits and systems less than 50 volts are required to be grounded. Hazardous voltage levels are not defined.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-151-(8.2.1) : Accept
COMMENT ON PROPOSAL NO:79-151
RECOMMENDATION: Revise text to read as follows:
8.2.1 Exposed conductive parts of the electrical equipment and the machine(s) that might assume a hazardous voltage shall be connected to the equipment grounding (protective bonding) circuit. Exceptions: Small parts of the...

SUBSTANTIATION: 8.2.1 requires “All” exposed conductive parts be connected to the equipment grounding circuit. UL 1950 (which the suggested text was derived from), UL 508 and 508A all state that only those parts likely to be energized need to be connected to ground.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Some machine and accessible conductive parts of the machine (all exposed, noncurrent carrying conductive parts, material and equipment, that might assume a hazardous voltage is likely to be energized) shall be effectively grounded.

SUBSTANTIATION: The text is modified to help clarity that “accessible
The term “hazardous voltage” is preferred verses “energized” so that enclosures with only low voltage parts (5V, 13V, 24V, etc.) do not need to be grounded. If there is no risk of shock, then the part should not need to be grounded.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The defined term “accessible” would exclude some equipment, such as that located behind a locked door, from being required to be grounded. The committee disagrees with the substantiation that enclosures with only low voltage parts do not need to be grounded.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-163-(8.2.1.2) : Accept in Principle

**SUBMITTER:** Melvin K. Sanders, TECO, Inc.

**COMMENT ON PROPOSAL NO:** 79-151

**RECOMMENDATION:** Add a new item (4).

8.2.1.2 Equipment grounding terminal

(1) For each incoming supply, an equipment grounding (external protective) conductor terminal shall be provided in the vicinity of the associated phase conductor terminals.

(2) All of the items in 8.2.1.1 shall be interconnected to this terminal.

(3) The terminal shall accommodate an equipment grounding conductor sized in accordance with Table XX

(4) The terminal shall accommodate supplemental equipment grounding electrode conductors where used.

**SUBSTANTIATION:** This will provide installers and designers with a designated termination point for the EGC supplemental electrode conductor when such an electrode is specified. This supplemental equipment grounding path is also referred to as a "quiet ground" in some standards.

**COMMITTEE ACTION:** Accept in Principle

Add a new Section 8.2.1.2.5 to read as follows:

8.2.1.2.5 Where a supplementary electrode is specified, the terminal shall accommodate this additional grounding conductor.

**COMMITTEE STATEMENT:** The committee action meets the submitter’s intent and removes the use of the term “grounding electrode conductor” which is not defined in this standard. The committee has designated a new section to correlate with style changes in the ROP draft.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-164-(8.2.1.2) : Accept

**SUBMITTER:** David Fisher, Rockwell Automation

**COMMENT ON PROPOSAL NO:** 79-151

**RECOMMENDATION:** Revise 8.2.1.2.2 to read:

All of the items in 8.2.1.1 shall be interconnected to the equipment grounding conductor terminal.

**COMMITTEE STATEMENT:** For consistency of the term usage within the Chapter.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-165-(8.2.1.2.1) : Accept in Principle

**SUBMITTER:** David Fisher, Rockwell Automation

**COMMENT ON PROPOSAL NO:** 79-151

**RECOMMENDATION:** Revise 8.2.1.2.1 to read:

For each incoming supply circuit, an equipment grounding (protective) conductor terminal shall be provided in the vicinity of the associated phase conductor terminals.

**COMMITTEE STATEMENT:** For consistency of the term usage within the Chapter.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25
cord grounding wire (and receptacle wire or solder connection) attaches to the
terminal shall be the bonding means provided any painted or nonconductive
cover it is not likely that the item will become energized. The hinge or mount-
hinges shall be the bonding means provided any painted or nonconductive
cover it is not likely that the item will become energized. The hinge or mount-
substrate. The terminal for equipment grounding and the acronym PE.

**COMMITTEE STATEMENT:**

For consistency of the term usage within the
terminology of the terms Protective Conductor and Grounding Conductor. The intent is
to harmonize with the IEC standards while maintaining the terms utilized
in the Chapter. The committee has added the word conductor, retained the word
protective and deleted the acronym PE.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:**

**RECOMMENDATION:**

*Add the following values to Table 8.2.2.3:* 7 A - 18 AWG; 5 A - 20 AWG

**RECOMMENDATION:**

*Revise 8.2.1(1) to read:* 
(1) Equipment grounding (protective) conductor (PE) terminal(s).

**COMMITTEE STATEMENT:**

For consistency of the term usage within the
Chapter. The committee has added the word conductor, retained the word
protective and deleted the acronym PE.

**COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

**EXPLANATION OF NEGATIVE:**

**SAUNDERS:** I do not agree with the committee action to delete the acro-
nym (PE) only in this location. The “PE” reference remains in the following locations in the new text: 8.2.1.2.4, 19.2(2), A..8.2.1.2.4, A.8.2.5.2 and An-
ex B, Section 9.

The action should be Accept in Principle with the following action:
Revise 8.2.1(1) to read as follows:
(1) Equipment grounding (protective) conductor (PE) terminal(s).

**COMMITTEE ACTION:**

**Accept in Principle**

**SUBMITTER:** Paul R. Warndorf, AMT-The Association For Manufacturing
Technology

**COMMENT ON AFFIRMATIVE:**

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

**COMMENT ON AFFIRMATIVE:**

**SAUNDERS:** Protection devices (OCPD) rated less than 15 am-
peres can only be used with wire sizes 18 AWG and 16 AWG if the circuit
meets the conditions of Section 13.6.1.

OCPD suitable for feeder or branch circuit duty must employ a minimum
wire size of 14 AWG for any type load whether the rating is less than 15 am-
peres or not.

Those OCPD having smaller terminals that cannot accommodate 14 AWG
and used with smaller wire sizes, are evaluated as supplementary overcurrent
protection and restricted in application.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

**COMMENT ON AFFIRMATIVE:**

**SAUNDERS:** Overcurrent protective devices (OCPD) rated less than 15 am-
peres can only be used with wire sizes 18 AWG and 16 AWG if the circuit
meets the conditions of Section 13.6.1.

OCPD suitable for feeder or branch circuit duty must employ a minimum
wire size of 14 AWG for any type load whether the rating is less than 15 am-
peres or not.

Those OCPD having smaller terminals that cannot accommodate 14 AWG
and used with smaller wire sizes, are evaluated as supplementary overcurrent
protection and restricted in application.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25
79-176-(8.2.3.6.2) : Accept in Principle

SUBMITTER: Jim Carroll, Square D

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise text to read as follows:

8.2.3.6.2 When required, an equipment (protective) bonding jumper shall connect the conductive door or cover to the equipment enclosure of to an equipment grounding (protective bonding) terminal within the enclosure.

SUBSTANTIATION: This clause is intended as a modified to clause 8.2.3.6.1 but as written could be wrongly interpreted to require a bonding jumper on all doors and covers. The change clarifies that these provisions are only necessary if a bonding jumper is required by the previous clause.

COMMITTEE ACTION: Accept in Principle

Revise text to read as follows:

8.2.3.6.2 Where required, an equipment (protective) bonding jumper shall connect the conductive door or cover to the equipment enclosure or to an equipment grounding (protective bonding) terminal within the enclosure.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE:

SANDERS: The committee statement should also acknowledge editorially changing “of” to “or”.

79-180-(8.3) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.2.3.8 to read:

Where equipment grounding conductors are subject to physical damage they shall be protected or monitored to ensure continuity.

SUBSTANTIATION: Periodic monitoring of the equipment grounding conductors without means of shutting off a machine is not considered as adequate protection of the conductor.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-182-(8.4.2) : Accept in Principle

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.4.2 to read:

Exclusion of Switching Devices. The equipment grounding (protective bonding) circuit shall not contain any switches or overcurrent protective devices. Links or plugs in the grounding circuit shall be permitted if properly labeled or interlocked with the control circuit. Separable connections such as those provided in drawout equipment or attachment plugs and mating connectors and receptacles shall provide for first-make, last-break of the equipment grounding conductor. First-make, last-break shall not be required where interlocked equipment, plugs, receptacles, and connectors preclude energization without grounding continuity. For additional information see 4.4.5.3.

SUBSTANTIATION: Change (protective) to (protection) bonding) for consistency with other parts of this section. Replace the second sentence with words from the NEC section 250-124 to ensure compatibility and consistency with the NEC. Also, add a reference to Clause 14 to aid in user clarity.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-183-(8.5 and 8.5.1) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.5 to read as follows:

Where the lighting circuit is supplied by a separate isolation transformer, the grounding shall occur at the transformer. The secondary of the transformer shall be directly connected to the equipment grounding circuit. Where the equipment maintenance lighting circuit is supplied directly from the main lighting circuit, there shall be directly connected to the equipment grounding circuit. Where the lighting circuit is supplied by a separate isolation transformer, one terminal of the secondary of the transformer shall be directly connected to the equipment grounding circuit.

SUBSTANTIATION: The committee added the term “(protective bonding)” for consistency.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-177-(8.2.3.8) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.2.3.8 to read:

Links or plugs in the grounding circuit shall be permitted if properly labeled or interlocked with the control circuit. Separable connections such as those provided in drawout equipment or attachment plugs and mating connectors and receptacles shall provide for first-made, last-break of the equipment grounding conductor. First-make, last-break shall not be required where interlocked equipment, plugs, receptacles, and connectors preclude energization without grounding continuity. For additional information see 4.4.5.3.

SUBSTANTIATION: Periodic monitoring of the equipment grounding conductors without means of shutting off a machine is not considered as adequate protection of the conductor.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-178-(8.2.4) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.2.4 to read:

Exclusion of Switching Devices. The equipment grounding (protective bonding) circuit shall not contain any switches or overcurrent protective devices. Links or plugs in the grounding circuit shall be permitted if properly labeled or interlocked with the control circuit. Separable connections such as those provided in drawout equipment or attachment plugs and mating connectors and receptacles shall provide for first-make, last-break of the equipment grounding conductor. First-make, last-break shall not be required where interlocked equipment, plugs, receptacles, and connectors preclude energization without grounding continuity. For additional information see 4.4.5.3.

SUBSTANTIATION: Change (protective) to (protection) bonding) for consistency with other parts of this section. Replace the second sentence with words from the NEC section 250-124 to ensure compatibility and consistency with the NEC. Also, add a reference to Clause 14 to aid in user clarity.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-179-(8.2.5.2) : Accept

SUBMITTER: Nick Municio, OTI

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise text to read as follows:

...the color Green, the bicolor combination of Green and Yellow or the symbol in Figure 8.2.1.2,4.

SUBSTANTIATION: Bicolor (green/yellow) terminals are commonly used both domestically and internationally. Having this in Annex A is okay as an informative reference, but needs to be included in the standard to be normative. Inspectors will most likely not pay attention to informative annexes and go by what is in the standard.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: Change “...the bicolor combination of Green and Yellow...” to “...the bicolor combination of GREEN-AND-YELLOW...”

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-181-(8.4) : Accept

SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics, & Welding

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise text to read as follows:

8.44 Lighting circuits

8.4.1

SUBSTANTIATION: Section 8.5 is partially misnumbered. Rename as appropriate.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-180-(8.3) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Relocate: Exceptions No. 1 and No. 2 should be immediately after the first paragraph. Rename “Exception No. 3” to “Exception” and locate after the second paragraph.

SUBSTANTIATION: Existing Exceptions No. 1 and No. 2 are only applicable to the requirements in the first paragraph while the existing Exception No. 3 is only applicable to the requirement in the second paragraph. Relocation will ensure proper interpretation by the user of the standard.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-179-(8.2.3.6.2) : Accept in Principle

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.4.2 to read as follows:

Where the lighting circuit is supplied by a separate isolation transformer, the grounding shall occur at the transformer. The secondary of the transformer shall be directly connected to the equipment grounding circuit. Where the lighting circuit is supplied by a separate isolation transformer, one terminal of the secondary of the transformer shall be directly connected to the equipment grounding (protective bonding) circuit.

COMMITTEE ACTION: Accept in Principle

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-177-(8.2.3.8) : Accept

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.2.3.8 to read:

Where equipment grounding conductors are subject to physical damage they shall be protected or monitored to ensure continuity.

SUBSTANTIATION: Periodic monitoring of the equipment grounding conductors without means of shutting off a machine is not considered as adequate protection of the conductor.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-182-(8.4.2) : Accept in Principle

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-151

RECOMMENDATION: Revise 8.4.2 to read as follows:

Where the lighting circuit is supplied by a separate isolation transformer, the grounding shall occur at the transformer. The secondary of the transformer shall be directly connected to the equipment grounding circuit. Where the equipment maintenance lighting circuit is supplied directly from the main lighting circuit, there shall be directly connected to the equipment grounding circuit. Where the lighting circuit is supplied by a separate isolation transformer, one terminal of the secondary of the transformer shall be directly connected to the equipment grounding (protective bonding) circuit.

COMMITTEE ACTION: Accept in Principle

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

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Exception No. 2: Contacts of multipole control circuit switching devices connected on either side of the coil does not extend beyond the control enclosure.

Exception No. 8: "Run" pushbuttons for two-hand operation, such as for two processes, shall be permitted to be connected on either side of the device provided that the circuit has "run" pushbutton control circuits.

Exception No. 4: Solenoid test switching device contacts in ungrounded circuits shall be permitted to be connected on either side of the device.

Exception No. 6: Coils contacts used in electronic control circuits where the wiring to these coils or contacts does not extend beyond the control enclosure shall be permitted to be connected on either side of the device.

Exception No. 5: Overload relay contacts where the wiring to these contacts does not extend beyond the control enclosure shall be permitted to be connected on either side of the coil.

Exception No. 2: Contacts of multipole control circuit switching devices that shall be permitted to be connected simultaneously on both sides of the control circuit.
machine. By introducing the concept of safety circuits as suggested in the proposal, the risk of loss of the safety function can be reduced significantly. By pointing the user towards a risk assessment for the design of the safety circuit, the user is given a tool to determine the complexity needed for the design of the safety circuit. In the note, the user is guided towards American as well as International Standards describing a method for conducting such a risk assessment as well as performance criteria for the safety circuit design.

COMMITTEE ACTION: Hold

COMMITTEE STATEMENT: This comment introduces a concept that would propose something that could not be properly handled within the time frame for processing the report. In accordance with the NFPA Regulations Governing Committees Projects, 4.4.6.2(c), the committee desires to place this comment on Hold for the next revision cycle. The committee does not desire to Hold any associated proposals.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 24
NEGATIVE: 1

EXPLANATION OF NEGATIVE:

PILZ: As the Committee Statement acknowledges, there is a need for guidance in the design of “Safety Circuit”. Such circuitry is designed to control the functional safety of the machine, not the electrical safety.

The wording of proposed Section 9.1.5 was created in discussions during the writing cycle of this document. Discussions during the official meetings and “off-line” discussions, resulted in the proposed wording. I, therefore, disagree, that the material was not thoroughly discussed. I personally feel, that by holding it for next cycle, we do not serve the American public right. The proposed wording should be added to the 2002 version of NFPA 79, together with the definition of “Safety Function”. By doing so, guidance is given on the expected performance of such a circuitry. This is done without restricting the solution to a specific technology. The design engineer is free to use any technology that they feel is suitable to meet the performance criteria outlined in NFPA 79, Sections 9.1.5, 9.2.5.4, 9.4, and 11.3.4.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Adding this sentence would require that the mode selection switch(s) always be located in the safety circuit of the machine even when their position does not have any adverse effect.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 23
NEGATIVE: 2

EXPLANATION OF NEGATIVE:

PILZ: I agree with the committee statement, that this wording does include the mode select switch into the safety circuit of the machine. In contrast to the committee’s opinion, I strongly do feel, that this is necessary. The change of mode always changes the functional hazard of the equipment (e.g., change of speed = change of hazard) and, therefore, the mode select switch has to be incorporated into the safety circuit. In the interest of the American Worker, I do insist on giving this guidance to the design engineer. Therefore, I do oppose the committee decision to reject the proposal.

SALZENSTEIN: I recommend keeping this comment alive, by revising the wording in the Recommendation in the Comment to read as follows: “The mode select switch therefore shall be incorporated into the safety circuit of the machine, when an incorrect fault mode may lead to a hazardous situation.” This should satisfy the committee objection.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment would remove the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment will remove ambiguity in the interpretation of this document.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment does not add clarity and does not comply with the NFPA Manual of Style because it contains nonmandatory language.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25
NEGATIVE: 1

EXPLANATION OF NEGATIVE:

PILZ: The changed wording implies the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment would remove the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment would remove the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment would remove the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment would remove the requirement to provide interlocks where necessary. Additionally, it gives a cross reference to the system requirements for programmable safety systems, should the design engineer decide to use the technology. I believe that the proposed changes improve the user friendliness of the document and oppose its rejection by the committee.
require increased reliability based on severity of risk. It may be prudent to assume same or similar standards will be applied to US.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Emergency operations does not necessarily equate to safety functions.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE:

FREUDENBERG: “Emergency switching off” is an industry practice in the semiconductor industry and is required on all semiconductor manufacturing equipment regardless of whether there are any moving parts or may also require “Emergency Stop.” There is considerable overlap in that “Emergency switching off” will likely be a category 0 “Emergency Stop” if there are any moving parts. “Emergency Stop” may or may not meet the requirements for “Emergency Switching off” depending on where power is removed to stop the moving parts. The important issue is that both types of emergency circuits do exist today and have identical requirements for actuators.

79-195-(9.2.5.4) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: A new concept is being introduced of “emergency switching off” but no definition is provided of when it or “emergency stop” should be used. There is no foundation provided as to why this new concept is being introduced. It is very likely that the existing concepts of category 0, 1, and 2 stop already cover this entire area. Thus, it is suggested that this new concept be struck entirely from NFPA 79.

SUBSTANTIATION: It is not possible to suggest a single change to correct this problem. The new standard refers to these two types of “emergency…” devices almost interchangeably. This is a serious logical inconsistency throughout a large part of the document.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: There is no proposed language by the submitter. Emergency Switching Off is an optional requirement that is to be supplied by the machine designer based on the hazards of the particular machine.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-196-(9.2.5.4.1) : Accept

SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: 9.2.5.4.1 Emergency Stop. Where the emergency stop function is used, it shall be initiated by a single human action.

Revise to read as follows:

9.2.5.4.1 Emergency Stop. Where the emergency stop function is used, it shall be initiated by a single human action.

SUBSTANTIATION: Revised for style and clarity.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-194-(9.2.5.4.1.3) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: Revise text to read as follows:

The term “risk assessment” is used without defining its meaning or putting in a requirement for it. Recommend adding a definition and possibly a requirement for this type of design analysis.

9.2.5.4.1.3 The emergency stop shall function as either a Category 0 or a Category 1 stop (see 9.2.2). The choice of the category of the emergency stop shall be determined by the risk assessment of the machine.

SUBSTANTIATION: This will help provide clarity and provide a source for further information on what a risk assessment is.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Deleting the sentence does not improve clarity or provide further information about risk assessment. There is no other method to help choose between category 0 and category 1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-199-(9.2.5.4.1.4 and 9.2.5.4.1.5) : Reject

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: Comment: The requirement for electromechanical components only seems overly restrictive. A lot has to do with proper engineering design and component selection to perform the functions safely.

SUBSTANTIATION: There appears to be no allowance for the use of solid state relays. Similar kinds of failure mode are present in both types of relays. E.g., both types of relays can have short circuit failures. In the electromechanical relay, it is the contact points welding. This appears to be more a matter of proper design and selection of components.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4:4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-200-(9.2.5.4.1.5) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: The requirement that a category 1 stop use electromechanical components only for final power removal does not reflect current state-of-the-art electronics. The “electromechanical components” phrase is universally interpreted today as meaning relay or contactor yet these devices are less reliable in many cases that pure electronic devices such as semiconductor switches. The electromechanical requirement should be removed.

9.2.5.4.1.5 Where a Category 1 or a Category 0 stop is used for the emergency stop function, final removal of power to the machine shall be ensured and shall be by means of electromechanical components.

SUBSTANTIATION: This will remove unnecessary complications from machine design and allow for use of modern electronic devices.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Deleting this sentence would not remove the requirement for ensuring that power will be removed.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-201-(9.2.5.4.1.5) : Accept in Principle

SUBMITTER: Michael H. Appold, Delphi Saginaw Steering Systems

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: Add the following words: Emergency stop shall be implemented using non-retentive relays.

SUBSTANTIATION: See exception from 9.2.5.4.1.4 above.

- Use of a non-retentive relay is implied/shown on page 1889, lines 113 & 115, figure D.1(e).
- Use of a non-retentive relay is by far the typical method used to meet all requirements of stop and emergency sub-clauses of this document.
- A new concept is being introduced of “emergency switching off” depending on where power is removed to stop the moving parts. The important issue is that both types of emergency circuits do exist today and have identical requirements for actuators.

79-198-(9.2.5.4.1.4) : Reject

SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO: 79-64

RECOMMENDATION: Replace text of 9.2.5.4.1.4 with the following:

2.9.5.4.1 A category 0 stop may be implemented by a system including the use of electronic logic components with or without digital communication, only where it complies with 11.3.4.

SUBSTANTIATION: This will allow control systems comprising programmable electronics and bus communication that fulfill the requirements of 11.3.4 (revision proposed by Mr. Fisher) which are sufficiently reliable for emergency stop functions and may even be more reliable than simple hard-wired systems as experience and investigations in Europe have shown.

For harmonization with the requirements relevant in other parts of the world (e.g., Europe), it is important to allow suitable electronic systems for E-Stop applications.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that the existing language in the exception to 9.2.5.4.1.4 is sufficient for the purpose.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

79-197-(9.2.5.4.1.3) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: Exception: See exception from 9.2.5.4.1.4 above.

SUBSTANTIATION: There appears to be no allowance for the use of solid state relays. Similar kinds of failure mode are present in both types of relays. E.g., both types of relays can have short circuit failures. In the electromechanical relay, it is the contact points welding. This appears to be more a matter of proper design and selection of components.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4:4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

Page 1889, lines 113 & 115, figure D.1(e).
for a Category 0 emergency stop function are sufficiently reliable for emergency stop functions that fulfill the requirements of (revised) 11.3.4 and are listed for a Category 0 emergency stop. In support of technical progress, I object to the committee action.

COMMITTEE STATEMENT: The committee understands that the submitter used the section numbers from the Proposal 79-62. The draft section number is 9.2.5.4.1.4. See committee action and statement on Comment 79-202 (Log # 106).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-204-(9.2.5.4.2.4) : Reject
SUBMITTER: Hartmut von Krosigk, Siemens AG Automation & Drives

COMMENT ON PROPOSAL NO: 79-62
RECOMMENDATION: Change text of 9.2.5.4.2.4 as shown: 9.2.5.4.2.4 Where a category 0 stop is used for the emergency stop function, it shall have only hardwired electromechanical components or electronic logic (hardware or software) system and digital communication which comply with 11.3.4 and are listed for Category 0 emergency stop function. The final removal of power shall be accomplished by means of electromechanical components.

Exception: An electronic logic (hardware or software) system as well as the communication network or link that complies with 11.3.4 and is listed for Category 0 emergency stop function shall be permitted. The final removal of power shall be accomplished by means of electromechanical components.

SUBSTANTIATION: Application of electronic logic and bus communication that is designed for safety functions is an alternative to hardwired not an exception. It is accepted by other standards bodies, e.g., ISA SP84. Control systems comprising programmable electronics and bus communication that fulfill the requirements of (revised) 11.3.4 and are listed for a Category 0 emergency stop function are sufficient reliable for emergency stop functions and may even be more reliable than simple hardwired systems as experience and investigations in Europe have shown.

Use of this technology for E-Stop Categories 0 and 1 is allowed in Europe since 1998 by the foreword of EN 60204-1. The European foreword to EN 60204-1 says explicitly that the paragraph 9.2.5.4 which forbids the application of electronic systems and bus communication for E-Stop functions may be replaced with the requirements of other relevant standards as, e.g., IEC 61508 or ISO 13849.

For harmonization of the requirements relevant in USA with the requirements relevant in other parts of the world, e.g., Europe, it is important to allow suitable electronic systems for E-Stop.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee understands that the submitter used the section numbers from the proposal 79-62. The draft section number is 9.2.5.4.1.4. The committee believes that the existing language in the exception used the section numbers from the Proposal 79-62. The draft section number is 9.2.5.4.1.4. See committee action and statement on Comment 79-202 (Log # 106).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-205-(9.2.5.4.2.4 (New )) : Accept in Principle
SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics, & Welding

COMMENT ON PROPOSAL NO: 79-72
RECOMMENDATION: Add text to read as follows: 9.2.5.4.2.4 Where a category 0 stop is used for the emergency stop function, it shall have only hardwired electromechanical components or electronic logic (hardware or software) system and digital communications which comply with 11.3.4 and are listed for Category 0 emergency stop function. The final removal of power shall be accomplished by means of electromechanical components.

Exceptions: An electronic logic (hardware or software) system as well as the communication network or link that complies with 11.3.4 and is listed for Category 0 emergency stop function shall be permitted. The final removal of power shall be accomplished by means of electromechanical components.

SUBSTANTIATION: Application of electronic logic and bus communication that is designed for safety functions is an alternative to hardwired not an exception. This has already been accepted by other standards bodies, e.g., ISA SP84. Control systems comprising programmable electronics and network communication that fulfill the requirements of (revised) 11.3.4 and are listed for a Category 0 emergency stop function are sufficiently reliable for emergency stop functions and may even be more reliable than simple hardwired systems as experience and investigations in Europe have shown.

Use of this technology for E-Stop Categories 0 and 1 is allowed in Europe since 1998 by the foreword of EN 60204-1. The European foreword to EN 60204-1 says explicitly that the paragraph 9.2.5.4 which forbids the application of electronic systems and bus communication for E-Stop functions may be replaced with the requirements of other relevant standards as, e.g., IEC 61508 or ISO 13849.

For harmonization of the requirements relevant in USA with the requirements relevant in other parts of the world, e.g., Europe, it is important to allow suitable electronic systems for E-Stop.

COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: The committee understands that the comment is to accept the text in 9.2.5.4.1.4 of the ROP draft.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-206-(9.2.5.6(2)) and (3)) : Accept in Principle
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Revise text to read as follows:
(2) it shall be...with a certain time limit of each other, not exceeding 0.5
seconds.
(3) Where the this time limit of less than or equal to 0.5 seconds is exceeded, both...
SUBSTANTIATION: The way that is written in both IEC 60204 and the old
NFPA 79 is more clear than the modified version.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-207-(9.2.5.6(6)) : Accept
SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics,
& Welding
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Revise text to read as follows:
9.2.5.6(6) Require of the release of both control devices, before the machine
operation is reinitiated.
SUBSTANTIATION: Present wording appears to have an extra “of” and
does not make sense.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-208-(9.2.5.7.1) : Accept in Principle
SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Move to definitions section (with consequent mi
editorial changes).
3.xx 9.2.5.7.4 An enabling device as used in this chapter is defined as an
additional manually operated control device used in conjunction with a start
control and when continuously actuated, allows a machine to function.
SUBSTANTIATION: Used extensively in 9.2.4 (prior to existing inline defi
nition) and also in 9.2.5.
COMMITTEE ACTION: Accept in Principle
Insert the definition of Enabling Device in Chapter 3 as follows:
3.xx Enabling Device. Manually operated control device used in conjunc
tion with a start control, when continuously actuated, will allow a machine to
function.
COMMITTEE STATEMENT: Editorial revision to meet the NFPA Manual
of Style format.
The committee understands that this action will delete 9.2.5.7.1 and move
this new definition to Chapter 3. Reumber 9.2.5.7.4 accordingly.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-209-(9.2.5.7.1) : Accept in Principle
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: The text of this clause is a definition and thus
should be placed in section 3 of this standard.
SUBSTANTIATION: None provided.
COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: See committee action and statement on
Comment 79-208-(9.2.5.7.1)
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-210-(9.2.5.7.4) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Revise text to read as follows:
9.2.5.7.4 When returning...
SUBSTANTIATION: This clause deals specifically with three position
switches and thus should be under the requirement of 9.2.5.7.3(4).
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-211-(9.2.7.1 (New)) : Accept
SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics,
& Welding
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Add text to the Definitions Clause 3 as follows:
3.XX Cableless Control. Control devices employing cableless (e.g., radio,
infra-red) techniques for transmitting commands and signals between a ma
chine control system and operator control station(s).
SUBSTANTIATION: Present wording of 9.2.7.1 does not include any defi
nition or description of what cableless control is. Since this is a new topic for
NFPA 79, I would suggest that Section 9.2.7.1 begins a definition to assist an
unknowing reader.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-212-(9.2.7.3.1) : Reject
SUBMITTER: Barry Gardner, Lamb Technicon
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Review text to read as follows:
9.2.7.3.1 Operator control stations shall include a separate and clearly iden
tifiable means to initiate the stop function of the machine or of all the motions
that causes a hazardous condition. Paragraph 10.2.2.3 states that “Emergency Stop. Red shall be used for emergency stop
function initiated on the machine results in an emergency stop function.”
OR
9.2.7.3.1 Operator MAIN (central) control stations shall include a separate
and clearly identifiable means to initiate the stop function of the machine or
of all the motions that causes a hazardous condition. Paragraph 10.2.2.3 states that “Emergency Stop. Red shall be used for emergency stop
function initiated on the machine results in an emergency stop function.”
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: A stop in a cableless control cannot provide an
emergency stop function and cannot be marked that it does.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-213-(9.2.7.5) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO:79-62
RECOMMENDATION: Add new text to read as follows:
9.2.7.5 Use of more than one operator control station. Where a machine has
more than one main or additional auxiliary functions, operator control station,
measures shall be taken to ensure that only one main or auxiliary function
operator control station shall be enabled at a given time. Indication of which
operator control station is in control of the machine shall be provided at loca
tions where necessary for the safety requirements of the machine. These op
erator control stations are not to be confused with the use of multiple
Operator Run stations where the run stations are used as a means of safeguarding
the operators.
SUBSTANTIATION: Need to ensure that the use of multiple operator control
stations is applied and used when needed and are not confused with the re
quired specifications above (see requirement of multiple operator stations in
9.2.5.2.4) as the common term for such a control is also an “Operator Control
Station.” It is common on very large machines to have remote pendant oper
ator stations so that the operator can have visibility of an auxiliary function
(such as die or tooling changes, auxiliary handling equipment adjust
ments) during that operation.
COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that for a stop command, a cableless control system can have only one station in control at a time as stated in the existing requirements.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-214-(9.2.7.5) : Reject

SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-62

RECOMMENDATION: Revise to read as follows:

9.2.7.5 Use of More Than One Operator Control Station. Where a machine has more than one operator control station, measures shall be taken to ensure that only one control station shall be enabled at a given time. Indication of which operator control station is in control of the machine shall be provided at locations where necessary for the safety requirements of the machine. Exception 1: A stop command from any one of the control stations shall be effective where necessary for the safety requirements of the machine. Exception 2: When a machine (such as a press, etc.) with more than one operator is safeguarded using multiple control devices to initiate hazardous motion, the start command shall require synchronized actuation of all control stations.

SUBSTANTIATION: The existing wording did not recognize the use of multiple two-hand controls to protect multiple operators, i.e., situation where 2-hand control is used as a presence sensing device to ensure that machine cannot start unless (both) operators are in a safe location.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that this exception is not appropriate for cableless operation.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

———

79-215-(9.3.4.5): Reject

SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-64

RECOMMENDATION: Rework 9.2.4.5 to read as follows:

9.3.4.5 Locking Safety Gates preventing access to coasting down moving parts that only be unlocked when the non-hazard status of the accessible area is reached or detected. The detection system shall be designed in compliance with the requirements of the safety circuit safeguarding the area.

SUBSTANTIATION: The protection against mechanical hazards is within the scope of the standard, as long as the hazard is electrically controllable. Therefore, the committee justification for rejecting the original proposal does not hold. Would the committee statement be correct, the entire paragraph 9.2 would have to be eliminated since it deals with the control of the mechanical apparatus of the machine and its hazards. The newly added wording will provide additional guidance to the user of the document on designing a safer machine.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee reaffirms its position taken on Proposal 79-64 (Log #149) of the 2002 ROP. Properly addressing mechanical hazards is more appropriately covered in other machine safety standards such as the B 11 series on safety of machine tools.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

NEGATIVE: 2

EXPLANATION OF NEGATIVE:

PILZ: The proposed wording is generic to all machinery. Such generic functionality is in the scope of NFPA 79, while the ANSI B11 series addresses the specific design criteria of a specific type of machinery. I, therefore, oppose the rejection by the committee.

SALZENSTEIN: The comment provides important guidance to a hazard often overlooked. NFPA 79 covers a broader complex of machines than the B11 series on machine tools.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment provides important guidance to a hazard often overlooked. NFPA 79 covers a broader complex of machines than the ANSI B11 series on machine tools.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that except for a stop command, a cableless control system can have only one station in control at a time as stated in the existing requirements.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-217-(9.3.6) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-79

RECOMMENDATION: The term “…interlocking device” is used without defining the term anywhere in the document or specifying that it is required anywhere.

SUBSTANTIATION: It is not possible to suggest a single change to correct this problem. The new standard refers to this type of device repeatedly without defining it or placing a requirement for it. At the same time, there are numerous implications that such a device is desirable or mandatory. This is a serious logical inconsistency throughout the entire document.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-218-(9.3.6) : Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-79

RECOMMENDATION: Revise text to read as follows:

The term “listed safety switches” causes a problem for international markets as the EU requires a CE approved interlocking device that does not necessarily have a US “listing”. We use switches and interlocking devices today that are CE marked and not UL listed. It is thus impossible to meet NFPA 79 and CEN standards.

9.3.6 Protective Interlock. Where doors are interlocked, the interlocking devices shall be listed safety switches to prevent the operation of the equipment when the doors are open.

An alternative could be to use the phrase “…or other internationally recognized standards…”

SUBSTANTIATION: Whatever requirements we put into NFPA-79, they should not be at odds with, or contradictory to, the CEN standards. This will only make the jobs harder for those manufacturers targeting international sales.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee is aware of existing devices that can meet both criteria.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-219-(9.3.6) : Reject


COMMENT ON PROPOSAL NO: 79-79

RECOMMENDATION: Revise text to read as follows:

9.3.6 Protective Interlock. Where doors are interlocked, the interlocking devices shall be listed safety switches to prevent the operation of the equipment when the doors are open.

SUBSTANTIATION: Add definition of “safety switch” to clause 3. Safety switch has a broad meaning and misused in product sales literature which may not meet the intended requirements. Not all listed switches are intended for use in safety related function. The intention here for the switch to be (1) listed and (2) meets certain criteria such as positive opening contact, direct linkage to the actuator and tamper proof.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not comply with the Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-220-(9.3.6) : Accept

SUBMITTER: David J. Crump, Lockheed Martin Systems Integration -
FISHER: NEMA believes that the Committee Statement for 79-223 incorrectly states that when the NFPA 79 Committee uses the word safety switch, it means that “it is a listed switch that has positive direct opening operation or provides similar reliability.” Comment 79-223 is then referenced. Comment 79-220 which was accepted by the Committee and is the basis for the above statement states “...the interlocking devices shall be listed safety switches, have either positive (direct) opening operation or provide similar reliability and prevent the operation of the equipment when the doors...”. Careful reading of the sentence indicates that the interlocking devices must:

(a) be a listed safety switches
(b) have either positive (direct) opening operation or provide... prevent the operation...
(c) prevent the operation...

It clearly does not say that a listed safety switch “has either positive (direct) opening operation...”. Neither is there any other place in the standard that states such an implicit definition of the term “safety switch”. Comment 79-223 is correct that the term “safety switch” is a long established term in the electrical industry referring to devices that meet UL 98. The UL representative present at the Committee meeting confirmed this. Comment 79-223 should be accepted and comment 79-220 should be rejected.

PADGETT: I agree with the comments in Mr. Fisher’s Explanation of Negative Vote on Comment 79-223.

79-224-(9.16) : Reject

SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMENT ON PROPOSAL NO: 79-83

RECOMMENDATION: Change section (1) of Note 2.3 to:
The combination of normally open and normally closed contacts operated by interlocking guards, while only the normally open contact shall be operated when the safe guard is in the closed position.

Additionally, add a drawing to illustrate the wording in (1). An example for such a drawing can be found in Annex A.61 in Figure B.6 - Switch illustration on pages 60 and 61.

(continued)
SUBSTANTIATION: I disagree with the substantiation of the committee with which the original proposal was rejected. It is commonly understood that devices are incorporated into circuitry schematic in the de-energized mode as found on the shelf. This is where the terms Normally Open and Normally Closed originate. To bring conformity to the circuitry drawings.

Every electrician should know this when reading a circuit diagram. When incorporated into a safety gate the normally open contact is actuated when the gate is closed. This means that the normal position of the contact during the operation of the machine is in the energized state and not in the de-energized state as drawn into the circuits. In order to point this out to the user of NFPA 79, the new wording and also the including of the graphical illustration was added. To me, the committee statement for rejecting the proposal actually is substantiation for the inclusion of the wording rather then for rejecting it. This in turn suggests to accept the change in wording as well as the inclusion of the graphical description.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee understands that the comment intended to modify the eighth paragraph of A.9.4.1(1) on page 1880 of the ROP draft.

The comment is unclear, the committee is unable to discern the location and wording of the proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23 NEGATIVE: 2

EXPLANATION OF NEGATIVE:

PILZ: 1 agree with the comments in Mr. Salzenstein’s Explanation of Negative Vote that the comment is useful, and that his recommended wording should be adopted.

SALZENSTEIN: The comment is useful to the uninitiated who are not aware of the safety ramifications of inappropriate switches and their application to gates and guards. Simple changes to the wording of the first sentence of the Recommendation in the Comment to read as follows: “The combination of normally open and normally closed contacts operated by interlocked guards, but only the normally open contact shall be operated when the guard is in the closed position.” This revision may clear up the intended wording.

COMMENT ON PROPOSAL NO: 79-99

RECOMMENDATION: Revise text to read as follows:

When the guard is in the closed position. This revision may clear up the intended wording.

SUBSTANTIATION: 12.2.1 of IEC 60204-1 (1997) uses this maximum height for all controlgear that requires regular maintenance and/or servicing. This same limit can be applied to hand-operated control devices. Just as a side note, most ergonomic resources put a maximum height of controls at approximately 1.8 m.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The upper level proposed reflects a mixing of requirements for the location for operator interface components and components located within a control enclosure. The committee understands this comment is directed towards Section 10.1.2.2.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-226-(10.1.4.2) : Reject


COMMENT ON PROPOSAL NO: 79-99

RECOMMENDATION: Revise text to read as follows:

Position sensors used in circuits with safety-related functions shall be listed devices and have positive (direct) opening operation or shall provide similar reliability.

SUBSTANTIATION: 9.3.6, Protective Interlocks have a requirement to be listed. It is important that these devices used to protect against hazards be approved (listed or recognized).

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This comment is unduly restrictive because listed may only speak to fire and shock and not the safety related reliability.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 20 NEGATIVE: 5

EXPLANATION OF NEGATIVE:

DOBROWSKY: The comment should be accepted. Requiring listed devices would enhance safety. The safety reliability is further enhanced by the requirement for positive opening.

DROBNICK: I agree with Mr. Salzenstein that position sensors used in safety-related functions should be listed for that application.

SALZENSTEIN: Position sensors used in circuits with safety-related functions shall be listed devices for the application and have positive (direct) opening operation or shall provide similar reliability.

This revision will satisfy the committee objection. Listing does only address the potential for shock and fire hazard. It is very important that devices exposed to operators and service personnel be evaluated for their potential to create shock or fire hazards. The committee attached the same importance to protective interlocks in Section 9.3.6.

PILZ: I agree with the comments in Mr. Salzenstein’s Explanation of Negative Vote, and suggest that his suggested wording be adopted.

SALZENSTEIN: Suggest revising the first sentence of the Recommendation in the Comment to read as follows: “Position sensors used in circuits with safety-related functions shall be listed devices for the application and have positive (direct) opening operation or shall provide similar reliability.”

This revision will satisfy the committee objection. Listing of such devices would be valuable to designers, installers and remanufacturers.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The committee understands that the comment intended to modify the eighth paragraph of A.9.4.1(1) on page 1880 of the ROP draft.

The comment is unclear, the committee is unable to discern the location and wording of the proposed text.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23 NEGATIVE: 2

EXPLANATION OF NEGATIVE:

PILZ: 1 agree with the comments in Mr. Salzenstein’s Explanation of Negative Vote that the comment is useful, and that his recommended wording should be adopted.

SALZENSTEIN: The comment is useful to the uninitiated who are not aware of the safety ramifications of inappropriate switches and their application to gates and guards. Simple changes to the wording of the first sentence of the Recommendation in the Comment to read as follows: “The combination of normally open and normally closed contacts operated by interlocked guards, but only the normally open contact shall be operated when the guard is in the closed position.” This revision may clear up the intended wording.

79-227-(10.1.6.1.4) : Reject

SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO: 79-99

RECOMMENDATION: Add new text to read as follows:

10.1.6.1.4 Operator interface devices shall not be located within the protective safeguarded area.

SUBSTANTIATION: Have found installations where type A & B movable barrier guards and presence sensing guards (light curtains) where installed causing the operator to reach through the protection area to access machine controls. The controls needed to be relocated, when the safeguarding was installed and there was no requirement to do so.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: This requirement is already covered in 10.1.2.2 and 10.1.6.1.3.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-228-(10.2.2.4) : Accept

SUBMITTER: Nick Momcilovic, QTI

(Revised)
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Revise text to read as follows:

RED, YELLOW, or GREEN shall not be used.

SUBSTANTIATION: Added YELLOW to harmonize with IEC 60204-1 (1997).

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-239-(10.7.1.2): Accept in Principle
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Revise text to read as follows:

Stop and emergency stop pushbuttons shall be located at each operator control station and at other locations where emergency stop is required.

SUBSTANTIATION: The printing industry (ANSI B65.1 & ISO 12648) defines a "stop/safe" - a function that has properties of both stop and emergency stop. It is a red, extended, mushroom head, actuator without the yellow ring behind it. It functions as either Category 0, 1, or 2 stop. In our industry, a stop/safe, rather than an emergency stop, is regularly used on every control station. The reason for this is that, an emergency stop is understood, by operators, to shut down the entire press line or finishing line (up to 200 ft long & which is comprised of various machines built by various manufacturers). The operator does not always want to shut down other parts of the "system" (line) that have no influence on his/her safety. Press and finishing lines are always equipped with at least one emergency stop to stop the entire line. In the most recent draft (#5) of ANSI B65.1 (July, 2001), it is noted that a stop/safe shall be required on each operator control station. Adding an emergency stop to each control station would add undue cost and burden to our industry without increasing the safety of the equipment produced.

COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: The submitters intent has been met by the action in the NFPA 79 ROP draft.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-234-(10.7.4) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Add a new 10.7.2.3 to read as follows:

Emergency stop switches shall not be flat switches or graphic representations based on software applications.

SUBSTANTIATION: These technologies are sometimes offered as acceptable substitutes for the hardware type electromechanical emergency stop switches. Flat switches provide no mechanical feedback of positive switch action. Software switches are dependent upon software programs and is useless without the touch screen monitor. When latter is off, function is not available.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-233-(10.7.3.3): Accept
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Add a new 10.7.2.3 to read as follows:

Emergency stop switches shall not be flat switches or graphic representations based on software applications.

COMMITTEE STATEMENT: By adding the term electromechanical, the requirement is unduly restrictive. The committee understands that the definition of electromechanical conflicts with its use in this comment.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-231-(10.7.1.2): Accept
SUBMITTER: Barry Gardner, Lamb Technicon
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Revise text to read as follows:

10.7.1.2 Stop and emergency stop pushbuttons shall be located at each operator station and at other locations where emergency stop is required.

SUBSTANTIATION: The statement (10.7.1.2) above using AND requires both type buttons at every operator station. Dedicated inline machine tools may incorporate a control operator’s station (where the overall machine is operated) and what might be considered an operator’s station at each individual workstation. When Stop is used as a category 0 stop and Emergency Stop is used as a category 1 stop, both types are not required at each individual work station. Providing an emergency stop at each operator’s station should meet the requirements. Paragraph 9.2.5.3.1 states that “ Each machine shall be equipped with a category 0 stop.” Paragraph 9.2.5.3.2 states that - Category 0, Category 1, and/or Category 2 stops shall be provided where indicated by an analysis of the risk assessment and the functional requirements of the machine. Category 0 and Category 1 stops shall be operational regardless of operating modes.” By definition the “Category 0 stop is an uncontrolled stop by immediately removing power to machine actuators,” “the main machine disconnect or a Stop button could provide this function. Requiring both buttons at each and every operator’s workstation would cause confusion to the operator when he/she is trying to get the machine stopped. Added cost is also an issue. This statement could be cleared up by defining better what is considered an “operator’s station.”

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-234-(10.7.4): Reject
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Revise text to read as follows:

...The background immediately around pushbuttons and disconnect switch actuators used as emergency stop devices shall be colored YELLOW and shall extend a minimum of 3 mm beyond the mounting collar.

SUBSTANTIATION: We have seen numerous examples of where the yellow ring surrounding an e-stop mushroom head pushbutton is 95% covered by the mounting collar such that only a sliver of yellow is showing. According to the current text, this would be acceptable. There are currently no standards (domestically or internationally) that we are aware of that define the amount of yellow that should surround an e-stop actuator. In a recent ANSI B65 committee meeting, it was voted to add this to the new rewrite of ANSI B65.1.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Specific dimensions are not required but it is intended that the background be easily identifiable.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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79-235-(10.7.4 Exception): Reject
SUBMITTER: David Lee, U.S. Postal Service
COMMENT ON PROPOSAL NO: 79-99
RECOMMENDATION: Revise text to read as follows:

...The background immediately around pushbuttons and disconnect switch actuators used as emergency stop devices shall be colored YELLOW and shall extend a minimum of 3 mm beyond the mounting collar.

SUBSTANTIATION: We have seen numerous examples of where the yellow ring surrounding an e-stop mushroom head pushbutton is 95% covered by the mounting collar such that only a sliver of yellow is showing. According to the current text, this would be acceptable. There are currently no standards (domestically or internationally) that we are aware of that define the amount of yellow that should surround an e-stop actuator. In a recent ANSI B65 committee meeting, it was voted to add this to the new rewrite of ANSI B65.1.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Specific dimensions are not required but it is intended that the background be easily identifiable.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
COMMENT ON PROPOSAL NO: 79-98
RECOMMENDATION: Add a new exception as follows:
Exception: Emergency stop switches do not require the use of the yellow background color if
(1) they meet the requirements of 10.2.3.1, or
(2) they are consistently larger in size and are physically different than the other operator actuation devices.

SUBSTANTIATION: Since there are exceptions in 10.2.3.1 to use legends of emergency stop switches, there should be similar exceptions requiring the use of the yellow background color. Such exceptions should recognize the use of legends, recognizability of other features such as switch size differentiation and placement locations.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The physical difference, “consistently larger”, being proposed is not defined. The proposed language is vague and unenforceable.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-236-(10.7.4 and 10.8.4.1) : Accept
SUBMITTER: David Lee, U.S. Postal Service

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The purpose of the background behind the button is that it aids in quick identification and location of the Emergency Stop.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-239-(10.9) : Accept in Principle
SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee believes it meets the intent of the submittor but will not be overly restrictive by limiting to color graphics.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
mance requirement and not a safety requirement, which goes against the scope of this standard.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: It is unclear what the submitter intends to determine as safe operation. Improper operation of a machine should always be considered as having an impact on safety. Inserting the term “safe” would not improve the understanding.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-241-(11.2.4): Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-155

RECOMMENDATION: Revise text to read as follows:

The requirement to protect all outputs of “programmable electronic systems” is far too broad. It is not certain if this is just low voltage outputs, high voltage, outputs that are internal to a control cabinet, or outputs that are routed outside of a cabinet. Low voltage outputs that do not go outside of a protective enclosure do not warrant this type of protection and would be cost prohibitive if required. The low voltage circuits typically used cannot result in an unsafe condition even in a short circuit. This requirement should be removed for circuits under 50 volts that are contained within a protective enclosure.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The submitter believes that the substantiation is inadequate as it is aware of numerous control systems which provide inherent protection for overload and short circuit overload.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-242-(11.3.2.1): Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-155

RECOMMENDATION: Revise text to read as follows:

The requirement to prevent memory alteration is overly broad and is not obvious in its intent. Some instances of memory alteration are normal and is allowed. The exact meaning that is implied here is unclear. Recommend deleting the requirement.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The submitter has failed to provide sufficient technical substantiation to delete the text of 11.3.2.1 that has been in NFPA 79 for several editions.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-242a-(11.3.4, and 9.4.3): Accept

SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery

COMMENT ON PROPOSAL NO: 79-73 and 79-74

RECOMMENDATION: Action Item No. 1) Replace 11.3.4 to read as follows:

11.3.4 Use in Safety-Related Functions.

Software and firmware-based controllers to be used in safety-related functions shall be listed for such use.

A.11.3.4 IEC 61508 provides requirements for the design of software and firmware based controllers for use in control systems performing safety-related functions.

Action Item No. 2) Add a new 9.4.3 to read as follows:

9.4.3 Control Systems Incorporating Software and Firmware Based Controllers

Control systems incorporating software and firmware based controllers performing safety-related functions shall:

a. Prevent unintended startup of equipment upon receipt of the failure
b. Provide subsequent operation until the component failure has been corrected

c. Prevent unintended startup of equipment upon correction of the failure,

(2) Provide protection equivalent to that of control systems incorporating hardwired/hardware components, and

(3) Be designed in conformance with an approved standard that provides requirements for such systems.

A.9.3.4 IEC 61508 provides requirements for the design of control systems incorporating the use of software and firmware based controllers to performing safety-related functions.

Action Item No. 3) Revise 9.2.5.4, 9.4.1, Exception to read as follows:

Exception: An electronic logic (hardware or software) system as well as the communication network or link that complies with both 9.4.3 and 11.3.4, and is listed for Category 0 emergency stop function shall be permitted. The final removal of power shall be accomplished by means of electromechanical components.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 24

COMMENT ON AFFIRMATIVE: BLOODGOOD: As I stated at the meeting, this requirement presupposes that there is a standard recognized in the United States to which the equipment is certified and approved. Comments such as using IEC 61508 (on which the United States voted NO) or ISO 13849 (on which the United States also voted NO) are not valid nor use the NFPA 79 as this standard are not correct. Also, the idea that “if we require it then the appropriate standards will be written” implies that the United States will accept the European approach for the application of programmable electronic systems might be possible but the two standards projects 0. In reality the United States will by default use the International standards (but not necessarily correctly). Also the concept that the Emergency Stop is a safety (or safety related) function is not correct. The Emergency Stop must be manually operated to perform its function as opposed to the usually safety function which operates automatically. I contend that the new text to be incorporated in the NFPA 79 document is premature if not incorrect.

KIIHR: I am voting in the affirmative with this committee action. This topic of the document was a subject of much heated debate during the ROC meeting in December. I think that the solution as presented in this comment is a compromise solution, which should work for most parties.

However, this topic will need to be addressed again in the next revision cycle of NFPA 79. As it involves emerging technologies, it will undoubtedly require further evaluation at that time.

PILZ: I thoroughly regret, that the well worded ROP proposals for 9.1.5 and 11.3.4 where changed to what is now 9.4.3 and 11.3.4 under 79-224a. I do agree, that the system character of safety circuitry design needs to be addressed, when guidance is given for the design of the circuit controlling function. I do disagree that only the system is to be included, however, that only when components or safety communication networks such considerations are necessary. Mechanical systems need the same considerations if functional safety shall be achieved. Furthermore, I do believe that the requirements for the system described in 9.3.4 as well as in 11.3.4 gives guidance on the design of the entire safety control system of the machine. 11.3.4 gives guidance for the design of the sub system programmable controller/information network, when it is intended to be used as part of the safety system described in 9.3.4. This, in my opinion, justifies the repetition.

It is unfortunate, that the committee proposal has combined 11.3.4 with 9.3.4 in a way, that neither paragraph can be read and understood independently. This will make the use of the document more difficult for the reader.

Since I believe in the principle correctness of the wording, I support the committee action. But I would prefer it if the following wording could be used instead:

9.3.4 Protection against unintended operation due to faults in the emergency stop or safety-related control system. The control system, that incorporates electromechanical or electric control devices, intended to control emergency stop function as well as functions protecting personnel from mechanical hazards, shall:

a. be designed in such fashion, that any single safety-related component, subassembly or circuitry fault shall:

b. lead to the shutdown of the system in a safe state

c. prevent subsequent operation until the fault is detected

d. prevent unintended startup of equipment upon correction of the fault

(2) be designed to an approved standard providing requirements for the design of safety related and emergency stop functions.

For programmable electronic devices or communication networks 11.3.4 shall also apply.

11.3.4 Use in Safety-Related Functions. Software and firmware based controllers and communication networks used in place of hardware-based components with safety-related devices shall:

(1) be designed so that any single safety-related component or firmware fail-
ure shall operate as follows:

a. Lead to the shutdown of the system in a safe state.

b. Prevent subsequent operation until the component failure has been corrected.

c. Prevent unintended startup of equipment upon correction of the failure.

(2) Provide protection equivalent to that of hardwired/hardware components.

(3) Be listed to an approved standard for safety-related functions.

(4) The design of the control system for emergency stop and safety functions shall conform to the requirements in 9.4.

By implementing this wording, we would create a closed loop within the standard for the design guidelines concerning functional safety, as the diagram provided below shows. Thus enabling NFPA 79 to become the generic reference standard for the design of circuitry controlling the functional safety of a machine.

**SUBSTANTIATION:**

(1) The design requirements a, b and c of (1) require the core system characteristics which are essential for safe operation. Even if the first sentence talks about failures of components, the subsequent requirements are related to the system which is relevant for safety. These general requirements are also the core of the international standards IEC 61508 and ISO 13849 for functional safety of electrical control systems and are thus essential for harmonization with the requirements, e.g., in Europe.

(3) This bullet requires a single device specific solution of the general requirements given in (1). It does not add any value and should therefore be deleted.

To assure that independent testers with sufficient expertise state if a system fulfills the requirements of (1) and (2) for the intended function listing should be required. It is not necessary for NFPA 79 to specify how the evaluation has to be done. Recognized test houses as UL, FM and TUV of North America have the necessary expertise for the evaluation even according to relevant international standards.

(Note): It is useful information for designers, manufacturers and testers which standards support to fulfill the requirements of 11.3.4.

**COMMITTEE ACTION:**

 Reject

**COMMITTEE STATEMENT:** See Comment 79-242a (Log #CC9). NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25 VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25 (Log #129)

79-245-(11.3.4) : Accept in Principle

SUBMITTER: Keith W. Anderson, Siemens Dematic Rapistan Corporation

**COMMENT ON PROPOSAL NO:79-155**

**RECOMMENDATION:** Revise text to read as follows:

Use of the term “safety related” is vague and poorly defined. Without a more detailed explanation, this requirement will be interpreted at the whim of the inspector. For now, the best suggestion is to delete all of it.

11.3.4 Use in Safety-Related Functions: Software and firmware-based controllers used in place of hardware-based components with safety-related devices shall:

- Incorporate at least one passive, self-monitored electromechanical device as backup to ensure a line disconnect in case of failure of the solid state components.

**SUBSTANTIATION:** There is no single change to this document that will correct this problem. There are too many references to this vague concept. This is a serious logical inconsistency throughout the entire document.

**COMMITTEE ACTION:**

 Reject

**COMMITTEE STATEMENT:** The submitter has provided insufficient technical substantiation to delete 11.3.4. Guidance on the safety related application of software and firmware based controllers is absolutely necessary to address current use and future anticipated use in the industry. See Comment 79-242a (Log #CC9).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25 **VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25 (Log #105)

79-244-(11.3.4) : Accept in Principle

SUBMITTER: Hartmut von Krosigk, Siemens AG Automation & Drives

**COMMENT ON PROPOSAL NO:79-73**

**RECOMMENDATION:** Change 11.3.4 as shown:

11.3.4 Use in Safety-Related Functions: Software and firmware-based controllers used in place of hardware-based components with safety-related devices shall:

- Be designed so that any single safety-related component or firmware failure shall operate as follows:
  - a. Lead to the shutdown of the system in a safe state
  - b. Prevent subsequent operation until the component failure has been corrected
  - c. Prevent unintended startup of equipment upon correction of the failure.

(2) Provide protection equivalent to that of hardwired/hardware components.

(3) Incorporate at least one passive, self-monitored electromechanical device as backup to ensure a line disconnect in case of failure of the solid state components.

(4) Be listed to an approved standard for safety-related functions such as UL 909 or UL 1998.

(Note): American standards as UL 1998 and ANSI B11 TR3 and international standards as IEC 61508 and ISO 13849 give guidance to designers and test houses how to achieve these requirements.

**SUBSTANTIATION:** (1) The design requirements a, b and c of (1) require the core system characteristics which are essential for safe operation. Even if the first sentence talks about failures of components, the subsequent requirements are related to the system which is relevant for safety. These general requirements are also the core of the international standards IEC 61508 and ISO 13849 for functional safety of electrical control systems and are thus essential for harmonization with the requirements, e.g., in Europe.

(3) This bullet requires a single device specific solution of the general requirements given in (1). It does not add any value and should therefore be deleted.

(4) To assure that independent testers with sufficient expertise state if a system fulfills the requirements of (1) and (2) for the intended function listing should be required. It is not necessary for NFPA 79 to specify how the evaluation has to be done. Recognized test houses such as UL, FM and TUV of North America have the necessary expertise for the evaluation even according to relevant international standards.

(Note): It is useful information for designers, manufacturers and testers which standards support to fulfill the requirements of 11.3.4.

**COMMITTEE ACTION:**

 Accept in Principle

**COMMITTEE STATEMENT:** See Comment 79-242a (Log #CC9). NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25 **VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25 (Log #162)
COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: See Comment 79-242a (Log #C9).

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The revision to 11.3.4 adds requirements for the system. See committee action and statement on Comment 79-242a (Log #CC9).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

— Copyright, NFPA
COMMENT ON PROPOSAL NO:79-155
RECOMMENDATION: Revise text to read as follows:
Where load conditions or reduced speeds can cause motor overheating, embedded motor thermal protection (effective of the motor speed range) shall be provided and interlocked with the adjustable speed drive system.
SUBSTANTIATION: The use of the word “embedded” implies that the thermal protection must either be within the drive or within the motor not allowing someone to have external motor thermal protection. There are drives and motors that do not have built in thermal protection or do have built-in thermal protection that is not sufficient for the application. In either case, external thermal protection will be necessary where overheating can occur.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Additional embedded motor thermal protection for adjustable speed drive is required. Embedded motor thermal protection is preferred where the motor and its associated adjustable speed drive have not been evaluated as a system. See committee action on Comment 79-153 (Log # 173) that relocated the requirement of 11.4 of the ROP draft into 7.3.1.2.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-258-(12.1.2) : Accept in Principle
SUBMITTER: Vince Baclawski, National Electrical Manufacturers Association

COMMITTEE STATEMENT: See the committee action on Comment 79-260 (Log #421)
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-259-(12.1.2) : Accept in Principle
SUBMITTER: Vince Baclawski, National Electrical Manufacturers Association

COMMITTEE STATEMENT: See the committee action on Comment 79-260 (Log #421)
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-260-(12.1.2) : Accept
SUBMITTER: Nick Momcilovic, QTI

COMMITTEE STATEMENT: Revise text to read as follows:
Minimum construction requirements shall comply with UL 508, UL 508A, UL 50, or NEMA 250 for metallic and nonmetallic enclosures.
SUBSTANTIATION: UL 508A as well as NEMA 250 both have requirements for enclosures. NEMA 250 was added to eliminate the bias.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-261-(12.1.3) : Reject
SUBMITTER: Nick Momcilovic, QTI

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Revise text to read as follows:
The depth...plus the required electrical clearances as described in [add reference].
SUBSTANTIATION: There should be a reference here to a requirement for spacings of components such as 12.2.1.3 or Table 10.1 of UL 508A (April, 2001).
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-262-(12.1.4) : Accept in Principle
SUBMITTER: Don Keller, Wabash MPI

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: There is no section 6.3.2.5 that is referred to.
SUBSTANTIATION: None provided.
COMMITTEE ACTION: Accept in Principle
Correct the cross reference in 12.1.4 to 6.2.3.
COMMITTEE STATEMENT: The committee agrees that the reference was incorrect but notes that the submitter did not provide a specific recommendation.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-263-(12.1.4) : Accept in Principle
SUBMITTER: David Lee, U.S. Postal Service

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Article 12.1.4 references 6.3.2.5. Cannot comment on this because Article 6.3.2.5 does not exist in my copy.
SUBSTANTIATION: None provided.
COMMITTEE ACTION: Accept in Principle
Correct the cross reference in 12.1.4 to 6.2.3.
COMMITTEE STATEMENT: The committee agrees that the reference was incorrect but notes that the submitter did not provide a specific recommendation.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-264-(12.1.4) : Accept in Principle
SUBMITTER: Paul Dobrowsky, Holley, NY

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Revise 12.1.4 as follows:
Any door(s) that permits access to live parts operating at 50 volts or more shall comply with 6.3.2.5.
SUBSTANTIATION: To correspond with the new definition and add clarity for which live parts need to be guarded.
COMMITTEE ACTION: Accept in Principle
Revise 12.1.4 to read as follows:
Any door(s) that permits access to live parts operating at 50 volts ac (rms value) or 60 volts dc or more shall comply with 6.2.3.
COMMITTEE STATEMENT: The committee action adds the dc levels for consistency with its usage in 6.2.3.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-265-(12.1.4) : Accept in Principle
SUBMITTER: Nick Momcilovic, QTI

COMMITTEE STATEMENT: The comment does not comply with the NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does not offer specific proposed text.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
97-266-(12.2.1.3) : Accept in Principle
SUBMITTER: Paul Dobrowsky, Holley, NY
COMMENT ON PROPOSAL NO: 79-98
RECOMMENDATION: Revise 12.2.1.3 as follows:
Exposed, nonarcing, bare, live parts operating at 50 volts or more within an
enclosure or compartment shall have an air space of not less than 13 mm
(1/2 in.) between them and the uninsulated walls of the enclosure or compart-
ment, including conduit fittings. The air space for uninsulated doors of the
enclosure shall be not less than 25 mm (1 in.). Where barriers between metal
enclosures or compartments and arcing parts are required, they shall be of
flame-retardant, noncarbонizing insulating materials.
SUBSTANTIATION: To correspond with the new definition and add clarity
for which live parts need to be guarded.
COMMITTEE ACTION: Accept in Principle
Revise 12.2.1.3 in the comment to read as follows:
Exposed, nonarcing, bare, live parts operating at 50 volts ac (rms value),
or 60 volts dc or more, within an enclosure or compartment shall have an air
space of not less than 13 mm (1/2 in.) between them and the uninsulated walls
of the enclosure or compartment, including conduit fittings. The air space for
insulated doors of the enclosure shall be not less than 25 mm (1 in.). Where
barriers between metal enclosures or compartments and arcing parts are re-
quired, they shall be of flame-retardant, noncarbонizing insulating materials.
COMMITTEE STATEMENT: The committee action adds the dc levels for
consistency with its usage in 6.2.3.1.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NEGATIVE: 1
COMMITTEE STATEMENT: The committee action adds the dc levels for
consistency with its usage in 6.2.3.1.

97-267-(12.2.1.3) : Reject
SUBMITTER: David J. Crump, Lockheed Martin Systems Integration -
Owego/Rep. Product Safety
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Revise text to read as follows:
...they shall be flame-retardant, noncarbонizing insulating materials with a
minimum flame rating of V2.
SUBSTANTIATION: There are a couple of ways to determine if a material
is flame retardant, ASTM and UL. Also, there are different degrees of being
flame retardant. A material could have a minimal flame retardant proper-
ties and still be called flame retardant. Recommended that when a material is
required to be flame retardant, a measure of how much it is be specified. UL
94 is the dominate standard for this. Its text can also be found in UL 1950 and
IEC 950. V2 for this application is similar to that specified in UL 1950 4.4.3.
COMMITTEE STATEMENT: The committee has found that there are
materials, which qualified testing laboratories permit to provide this type of
insulation, which are not UL 94, Safety Standard for Test for Flammability of
Plastic Materials, rated. All listed enclosures meet this rating.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 24
NEGATIVE: 1
EXPLANATION OF NEGATIVE:
FREUDENBERG: Plastic enclosures and barriers are commonly used and the
following UL standard provide the specific tests for each rating that may
be used:
UL94 - Tests for Flammability of Plastic Materials for Parts in Devices and
Appliances.
UL746C - Polymeric Materials - Use in Electrical Equipment Evaluations
“Flame retardant” is not the most appropriate flammability rating for plastic
parts and enclosures.

97-268-(12.2.1.3) : Reject
SUBMITTER: Nick Maculicic, OIT
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: The following information needs to be clarified
in this clause. Are fingersafe terminals considered bare live parts? Does this
clause apply to PELV devices? Why is there a different spacing requirement
for uninsulated doors versus uninsulated walls of an enclosure? Shouldn’t this
be the same?
SUBSTANTIATION: None provided.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The comment does not comply with the
NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does
not offer specific proposed text.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NEGATIVE: 25
COMMITTEE STATEMENT: The comment does not comply with the
NFPA Regulations Governing Committee Projects, Section 4-4.5(c), since it does
not offer specific proposed text.

97-269-(12.2.1.5.4) : Accept
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Add new text to read as follows:
Exception: Rivets shall be permitted to be used for attaching mounting rails
and wiring channels provided the exposed surface is smooth and free from any
portion of a protruding stud.
SUBSTANTIATION: It is likely that “Pop” rivets will be used and if not
properly installed, the tension and setting stud can break off leaving the bro-
ken, sharp end protruding with the potential of puncturing a live conductor,
creating a ground fault (short).
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NEGATIVE: 0
COMMITTEE STATEMENT: The comment contains unenforceable lan-
guage. Additionally, the concern is already covered by 12.1.1.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
NEGATIVE: 0
COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Add new text to read as follows:
12.2.1.12 When devices or components are mounted by solid leads or the leads are in excess of (1) one in the device shall be secured by a means other than just the leads.

SUBSTANTIATION: Have had resistors, capacitors and arc suppressors (including the disk type) leads break where they were terminated on terminal blocks by just the leads, due to movement (flexing) caused by machine vibration.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The comment is too restrictive. Devices are to be mounted by manufacturer requirements. The concerns of the submitter are currently addressed by 12.1.1(2).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-274-(12.2.2.1) : Accept
SUBMITTER: David Fisher, Rockwell Automation

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Delete the words “(built in control)” from the first sentence.

SUBSTANTIATION: The term adds confusion to the requirements rather than clarifying the requirements.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-275-(12.2.2.5) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Add new text to read as follows:
12.2.2.5 The groups shall be permitted to be mounted adjacent to previously provided that each group can be readily identified (e.g., by markings by use of different sizes by colors) and separated by either at least one unused terminal block or barrier.

SUBSTANTIATION: Guidance to show methods of separating the groups of terminal blocks from each other.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The proposed revision does not add clarity. The use of barriers is only one way to accomplish the identification of markings required by this section.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-275a-(12.2.2.5) : Accept
SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Modify 12.2.2.5 of the ROP Draft to read:
12.2.2.5 Terminal groups for power circuits, associated control circuits, and other control circuits shall be permitted to be mounted adjacent to previously provided that each group can be readily identified (e.g., by markings by use of different sizes, by use of barriers, by colors).

SUBSTANTIATION: Existing language alludes to section 12.2.2.4 but is unclear. The section (12.2.2.5) is not a complete requirement without adding descriptive text. Corrected editorially to improve clarity. Add descriptive text to make section a stand-alone requirement.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-277-(12.3.2) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Add new text to read as follows:
12.3.2 Enclosures of control equipment shall provide a degree of protection of at least NEMA Type 1 and Type 12. Exception: If ventilation is needed due to equipment heat generation suitable open spaces shall be permitted if the opening is designed to prevent the entry of foreign substances. If forced ventilation is used, the enclosure shall be “pressurized” and the exhaust vented.

SUBSTANTIATION: The equipment will be in an “open” and “exposed” environment and the enclosures will not be protected by additional barriers (such as wood building studs, plaster board, etc.) as typically found in building construction. Such industrial environments typically contain oils, other fluid lubricants, solvents, air born dust and debris that would not be sealed (gasketed) from entering and contaminating the interior. Damage caused by likely harsh treatment by incidental contact caused from material/tooling handling operations would be lessened by heavier metal.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee believes that the submitter’s environmental concerns are adequately addressed by 12.1.1(2) and 12.3.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-278-(12.4) : Reject
SUBMITTER: Vincent Baclawski, National Electrical Manufacturers Association

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Change title of Article 12.4. to “Control Equipment Enclosures, Doors and Openings”.

SUBSTANTIATION: It is not clear from the draft if this section was to be limited to enclosures of control equipment or it was intended to be applicable to all enclosures. In some cases simply for limiting access to certain general purpose utility spaces, doors are provided. It would appear from this section that all subparagraph items are applicable to all door and openings, unless title is clarified.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The phrase “Control Equipment” is within the Chapter 12 Title and is therefore not necessary within the section title.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-279-(12.3.2) : Reject
SUBMITTER: David Lee, U.S. Postal Service

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Change title of Article 12.4. to “Control Equipment Enclosures, Doors and Openings”.

SUBSTANTIATION: It is not clear from the draft if this section was to be limited to enclosures of control equipment or it was intended to be applicable to all enclosures. In some cases simply for limiting access to certain general purpose utility spaces, doors are provided. It would appear from this section that all subparagraph items are applicable to all door and openings, unless title is clarified.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The phrase “Control Equipment” is within the Chapter 12 Title and is therefore not necessary within the section title.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-280-(12.3.2) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Add new text to read as follows:
12.3.2 Enclosures of control equipment shall provide a degree of protection of at least NEMA Type 1 and Type 12. Exception: If ventilation is needed due to equipment heat generation suitable open spaces shall be permitted if the opening is designed to prevent the entry of foreign substances. If forced ventilation is used, the enclosure shall be “pressurized” and the exhaust vented.

SUBSTANTIATION: The equipment will be in an “open” and “exposed” environment and the enclosures will not be protected by additional barriers (such as wood building studs, plaster board, etc.) as typically found in building construction. Such industrial environments typically contain oils, other fluid lubricants, solvents, air born dust and debris that would not be sealed (gasketed) from entering and contaminating the interior. Damage caused by likely harsh treatment by incidental contact caused from material/tooling handling operations would be lessened by heavier metal.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee believes that the submitter’s environmental concerns are adequately addressed by 12.1.1(2) and 12.3.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-281-(12.3.2) : Reject
SUBMITTER: Vincent Baclawski, National Electrical Manufacturers Association

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Change title of Article 12.4. to “Control Equipment Enclosures, Doors and Openings”.

SUBSTANTIATION: It is not clear from the draft if this section was to be limited to enclosures of control equipment or it was intended to be applicable to all enclosures. In some cases simply for limiting access to certain general purpose utility spaces, doors are provided. It would appear from this section that all subparagraph items are applicable to all door and openings, unless title is clarified.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The phrase “Control Equipment” is within the Chapter 12 Title and is therefore not necessary within the section title.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-282-(12.3.2) : Reject
SUBMITTER: David Lee, U.S. Postal Service

COMMENT ON PROPOSAL NO:79-84
RECOMMENDATION: Change title of Article 12.4. to “Control Equipment Enclosures, Doors and Openings”.

SUBSTANTIATION: It is not clear from the draft if this section was to be limited to enclosures of control equipment or it was intended to be applicable to all enclosures. In some cases simply for limiting access to certain general purpose utility spaces, doors are provided. It would appear from this section that all subparagraph items are applicable to all door and openings, unless title is clarified.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The phrase “Control Equipment” is within the Chapter 12 Title and is therefore not necessary within the section title.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
79-280-(12.4.3) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Delete the following text:
Subplates having a surface area of more than 5,082 cm² (2400 in.) shall have supports provided in addition to the panel mounting means to aid in subplate installation.
SUBSTANTIATION: This clause, as it is written, does not seem to be a safety concern within the scope of this standard. If there is a safety concern as to supporting a large subplate, specific information on the supporting means should be provided.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The intent of this section is to provide requirements for the support of subplates during installation and removal and not to provide additional support.

79-280a-(12.4.5) : Accept
SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Replace 12.4.5 of the ROP Draft to read as follows:
12.4.5 Inherently corrosion-resistant surfaces of the enclosure interior, exterior and subplates shall not be painted unless the paint process is suitable for the adhesion of the paint to the surface material.
SUBSTANTIATION: In order to address the concerns of the submitter of Comment 79-282, the committee addresses the concerns of flaking of misapplied coatings. The committee further clarified the original submitters request with the added text by adding “sub-plate” and “enclosure exterior” to this requirement. This text also better describes when paint coatings may be applied to corrosion-resistant surfaces such as galvanized, stainless steel, aluminum, zinc chromate plating and other similar surfaces.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-281-(12.4.5) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Add new text as follows:
12.4.5 ...finish suitable for the intended environment free of scratches, nicks, or other visible imperfections.
SUBSTANTIATION: Damage to the finish allows deterioration to occur (rust) which over time would cause loss of protection and its intended purpose.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The reference to visible imperfections is subject to interpretation. Visible imperfections may not negatively impact the installation.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-282-(12.4.5) : Accept in Principle
SUBMITTER: Thomas Pilz, Pilz Automation Safety L.P.
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Add to the end of proposed 12.4.5
“Interior corrosion-resistant surfaces shall not be painted unless the materials used are suitable for painting. Surfaces such as galvanized surfaces shall not be painted.”
SUBSTANTIATION: Incompatible coatings can flake with time and/or heat. These flakes can potentially cause overheating, fire hazard or circuit malfunction.
COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: See Comment 79-280a (Log #CC5).
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

Affirmative: 25
VOTE ON COMMITTEE ACTION
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE
COMMITTEE ACTION
COMMITTEE STATEMENT

79-283-(12.4.5) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Delete the following text:
12.4.5 The exterior of the enclosure shall be of a material suitable for the intended environment, or include a protective finish suitable for the intended environment.
SUBSTANTIATION: The requirements listed in this clause are already given in 12.4.1.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-284-(12.4.7) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Revise text to read as follows:
Door fasteners on enclosures and compartments with door openings shall comply with either UL 50, UL 508, UL 508A, or NEMA 250, less than 1016 mm (40 in.) tall shall be designed to seal tightly around its perimeter with either captive fasteners or vault-type hardware that latch at the top and bottom.
SUBSTANTIATION: There are various scenarios that are not covered by either 12.4.7 and 12.4.8 that are in the above-mentioned standards. Unless all the scenarios and exceptions can be described here, a general reference should be made.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-285-(12.4.8) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Add new text to read as follows:
Door fasteners on enclosures and compartments with door openings shall comply with either UL 50, UL 508, UL 508A, or NEMA 250. Unless all the scenarios and exceptions can be described here, a general reference should be made.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-286-(12.4.10) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Add new text to read as follows:
12.4.10 ... which would impair the degree of protection. Gasket(s) shall be paint and defect free.
SUBSTANTIATION: Painting of the enclosure, either by the OEM or customer (repainting) needs to be specified so that the gasket(s) degree of protection is available. Same for if the gasket becomes damaged, it needs to be replaced or suitably repaired.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The submitter’s concerns are addressed by the second sentence of 12.4.1 and 12.4.10.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-287-(12.4.14) : Reject
SUBMITTER: David Fisher, Rockwell Automation
COMMENT ON PROPOSAL NO: 79-84
RECOMMENDATION: Delete all of the existing language and replace with the following simple statement:

Affirmative: 25
12.4.14 The enclosure shall withstand temperatures that can be generated by internal components in normal or abnormal operation.

**SUBSTANTIATION:** Informative language describing methods to accomplish base requirements have been deleted to provide the designer options in the machine design without being overly restrictive.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee believes that in an attempt to simplify the section important requirements were left out of the proposed revision.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-288-(12.4.15) : Reject

**SUBMITTER:** George Schreck, Komatsu America Industries LLC

**COMMENT ON PROPOSAL NO. 79-84**

**RECOMMENDATION:** Add new text to read as follows:

*Dirt, metal chips, and other debris shall be kept out of enclosures. No screws, nuts, washers, shavings, etc., shall be permitted to fall into or behind wire ways, terminal strips, or devices.*

**SUBSTANTIATION:** Dirt, debris, and other material has caused shorts, flash-overs, small fire (overheated device igniting loose papers) when doors have been left open to the industrial environment, new conduit openings cut into enclosures, holes drilled and tapped into sub-panel and power is restored (or just left on). The need for cleanliness needs to be required or it will be less likely to happen.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** This material is already covered in Section 12.3.1.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-289-(12.5) : Reject

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO. 79-32**

**RECOMMENDATION:** Relocate the proposed 12.5 into a new general section in Chapter 4.

**SUBSTANTIATION:** Working clearances and access do not only apply to Control Equipment (the title of this chapter). They should be located in a general portion of this standard.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The proposed revision would introduce new requirements and add new exceptions which may expand the scope of the rules. The committee believes that public review is necessary.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 23

NEGATIVE: 2

**EXPLANATION OF NEGATIVE:**

**DOBROWSKY:** The comment should be accepted. The present requirement is in a chapter that applies to control equipment. Working clearances are applicable to other equipment also.

**GARVEY:** Placing the working clearances in Chapter 4 would have allowed the exceptions to apply to all types of electrical equipment on the machine. It may be appropriate to reduce the depth of the working space for live parts such as test ports and terminal strips that are separated from the control equipment. Since Chapter 12 only applies to Control Equipment, Authorities Having Jurisdiction will employ the more restrictive provisions of the National Electrical Code.

79-290-(12.5.1.1) : Reject

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO. 79-84**

**RECOMMENDATION:** Revise 12.5.1.1 as follows:

*The depth of the working space in the direction of access to live parts operating at 50 volts or more shall not be less than indicated in Table 12.5.1.1. Distances shall be measured from the control cabinet or compartment front or opening.*

**SUBSTANTIATION:** To correspond with the new definition and add clarity for which live parts need working space.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** Provisions for accessible work space are not dependent only on the voltage.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-291-(12.5.1.1 Exception No. 4) : Accept in Principle

**SUBMITTER:** David Fisher, Rockwell Automation

**COMMENT ON PROPOSAL NO. 79-84**

**RECOMMENDATION:** Revise the exception to read:

*Exception No. 4: Condition 1 working clearance depth shall be permitted between control cabinets or compartments located across the aisle from each other, or across from a grounded surface, and all associated control cabinet of compartment devices and equipment operating at greater than 50 volts rms ac or 60 volts dc are separately enclosed, guarded, or constructed so that openings to live parts of the devices and equipment will not permit the entry of a 12.5 mm (0.5 in.) diameter rod.*

**SUBSTANTIATION:** The actual requirement for an IP20 rated enclosure are added rather than making a reference to a term not defined in an ANSI standard.

**COMMITTEE ACTION:** Accept in Principle

Revise the exception to read:

*Exception No. 2: By special permission, Working space clearance depth of... OR
Exception No. 2: By special permission, from working space clearance depth of... OR
Exception No. 6: By special permission, Working space clearance depth of less than 762 mm... OR
Exception No. 6: By special permission, from working space clearance depth of less than 762 mm...*

79-292-(12.5.1.1 Exceptions No. 2 and No. 6) : Accept in Principle in Part


**COMMENT ON PROPOSAL NO. 79-84**

**RECOMMENDATION:** Revise text to read as follows:

*Exception No. 2: By special permission, Working space clearance depth of... OR
Exception No. 2: By special permission, from working space clearance depth of... OR
Exception No. 6: By special permission, Working space clearance depth of less than 762 mm... OR
Exception No. 6: By special permission, from working space clearance depth of less than 762 mm...*

**SUBSTANTIATION:** As the ROP is written, to use Exceptions No. 2 and No. 6, permission is required. However, who grants such permission is not stated. To clarify and avoid potential arguments, suggest that the exception stand on its own merit with no approval required. However, if it is strongly felt that permission is required, then who grants the permission needs to be included.

**COMMITTEE ACTION:** Accept in Principle in Part

Add the following definition in Chapter 3 from Article 100 of the 2002 NEC:

3.3.xx Special Permission. The written consent of the authority having jurisdiction.

**COMMITTEE STATEMENT:** It is not the intent of the committee to modify Exceptions No. 2 and No. 6 to 12.5.1.1. The committee has added the definition of special permission to clarify the use of the exceptions. The committee believes this meets the intent of the submittor.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-293-(12.5.2.1) : Reject

**SUBMITTER:** David Lee, U.S. Postal Service

**COMMENT ON PROPOSAL NO. 79-84**

**RECOMMENDATION:** Add the words “The enclosed” to the beginning of the sentence so as to read as follows:

*12.5.2.1 The enclosed space required by Section 12.5 shall not be used for...*

**SUBSTANTIATION:** The unmodified proposed language is acceptable when the required working space is that of a wiring closet or something similar. In a working environment where the working space is not physically enclosed and there is major usage and movement of wheeled equipped containers, the matter of what constitutes storage is a constant issue. With wheeled con-
tainers, the space in front of a controlled panel is still easily accessible when needed and there is no access issue when working on equipment.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** Section 12.5.2.1 refers to the working space outside the enclosure. The working space rules apply equally to enclosed and unenclosed space in front of electrical equipment.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-294-(12.5.2.2) : Reject

**SUBMITTER:** Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO:** 79-84

**RECOMMENDATION:** Revise 12.5.2.2 as follows:

When normally enclosed live parts operating at 50 volts or more are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

**SUBSTANTIATION:** To correspond with the new definition and add clarity for which live parts need working space.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** Provisions for accessible work space are not dependent only on the voltage.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-295-(12.6.1) : Reject

**SUBMITTER:** David Lee, U.S. Postal Service

**COMMENT ON PROPOSAL NO:** 79-84

**RECOMMENDATION:** This section does not reflect today's electronic control technology. It needs an introductory such as "When operated at greater than 50 volts, control equipment..."

**SUBSTANTIATION:** 12.6.1 is written as if limit switches, positions sensors are all based on open technology requiring more than 50 volts ac. Currently available electronic control sensors are often operated at less than 30 volts hermetically sealed, etc.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee believes that this section does reflect today's electronic control technology. This section applies equally to all voltages because it covers both working clearances and clearances for maintenance, e.g., removal and replacement of components.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-296-(12.6.1) : Accept

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-171

**RECOMMENDATION:** Revise text to read as follows:

Control equipment (e.g., limit switches, brakes, solenoids, position sensors) shall be protected from physical damage, unless designed for a specific environment, shall be protected from physical damage, and shall be free from the possibility of accidental operation by normal machine movements or by the operator.

**SUBSTANTIATION:** Certain components may be designed for a particular environment that may be other than clean and dry (i.e., hazardous locations, wash down areas, outdoors, etc.). These components should not be restricted to only a clean and dry environment.

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** The committee agrees that the requirement is already in 10.1.4.1 but the scope of that section is different. Machine mounted control equipment is addressed in 12.6 and position sensors are covered in 10.1.4.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-297-(12.6.2) : Reject

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-84

**RECOMMENDATION:** Delete clause 12.6.2.

**SUBSTANTIATION:** The requirement has already been stated in 10.1.4.1. It is not necessary to restate this clause.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee agrees that the requirement is already in 10.1.4.1 but the scope of that section is different. Machine mounted control equipment is addressed in 12.6 and position sensors are covered in 10.1.4.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-298-(12.6.4) : Accept in Principle

**SUBMITTER:** George Schreck, Komatsu America Industries LLC

**COMMENT ON PROPOSAL NO:** 79-84

**RECOMMENDATION:** Add new text to read as follows:

12.6.4 External control devices to the control enclosure shall be oil-tight.

**SUBSTANTIATION:** Device operating or controlling means (open contacts) could become faulty due to the contamination of oil or debris (nonfunctional oil shorts). Oil on signal contacts could be an insulator preventing conduction or metal slivers causing a short across the contacts, have had debris build up on tripping mechanism that froze the motion ability causing operation malfunction.

**COMMITTEE ACTION:** Accept in Principle

**COMMITTEE STATEMENT:** The committee action on Comment 79-296 (Log #429) meets the concerns expressed in the submitter’s substantiation. It is not the intent of this action to add a new section 12.6.4 to or mandate oil-tight control devices.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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79-299-(13.1.1) : Accept

**SUBMITTER:** Todd F. Lottmann, Washington, MO

**COMMENT ON PROPOSAL NO:** 79-112

**RECOMMENDATION:** Remove explanatory material and reword as Note in annex A. Include additional examples of external influences.

Revise proposed section 13.1.1:

General Conductors, cables, and flexible cords shall be selected for the operating conditions (e.g., voltage, current, protection against electric shock, grouping of cables) and external influences (e.g., ambient temperature, presence of water or corrosive substances, mechanical stresses (including stresses during installation, fire hazards) that exist. Conductors, cables and flexible cords shall be identified for their intended use.

Move the deleted text to proposed Annex A and reword as follows.

Typical operating conditions of:

- Voltage
- Current
- Protection against electric shock
- Grouping of cables
- External influences include:
  - Ambient temperature
  - Presence of water, oil, or other fluid substances
  - Radiation
  - Ultraviolet Light
  - Corrosive substances
  - Mechanical stresses
  - Installation fire hazards

**SUBSTANTIATION:** Removed, reworded, and added explanatory material as a note in proposed Annex A to comply with the Manual of Style.

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 24

**NEGATIVE:** 1

**EXPLANATION OF NEGATIVE:**

SANDERS: The committee action should have been to "Accept in Principle" and change "...Radiation" to "...non-ionizing radiation" to correlate with Section 4.4.7 and text.

This would then also agree with committee action on Comment 79-426, log 79-426, which was accepted to change Annex H, Question 6 from "Radiation" to "Non-ionizing radiation" in order to correlate with Section 4.4.7 and text.

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79-300-(13.1.1) : Accept in Principle in Part

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-112

**RECOMMENDATION:** Revise text to read as follows:

Conductors, cables, and flexible cords shall be selected for the operating conditions (e.g., voltage, current, protection against electric shock, grouping of cables) and external influences (e.g., ambient temperature, presence of water or corrosive substances, mechanical stresses, including stresses during installation, fire hazards) (e.g., ambient temperature, presence of water or corrosive substances, mechanical stresses, including stresses during installation, fire hazards).
COMMITTEE STATEMENT: The committee intends Chapter 13 to deal with equipment grounding issues (e.g., IEC 60204-1) and this Exception will move us further apart and will permit the uncontrolled use of machine structural members that could affect personnel safety and possibly compromise electronic control functioning.

Effective grounding and bonding consists of many conductive paths that are interconnected and terminated so that, taken together, form a usefully low impedance path for all frequencies of interest. Machine mating surface integrity is questionable, as being able to meet the necessary conditions for power, safety, and performance.

Lower and higher frequency characteristics of most grounding related bonding techniques are quite different. Six major concerns are:

1. contact resistance (at termination and mating parts surfaces, aging effects);
2. dissimilar materials (galvanic half-cells, corrosion failure, EMI generation);
3. skin effect (shallow penetrations into conductive materials, high frequency effect on bonding paths);
4. bond reactance (size, shape, introduce reactance, avoid self-inductance);
5. conductor resistance (DC and frequency effect on voltage drops across parts); and
6. overheating and fusing parts (with respect to NEC ampacity limits on FR fusing of conductors or terminations).

The protection of copper due to the frequency skin depth effect is approximately 8.5 mm (5/16-in.) at 60 Hz and 0.066 mm (0.0026 in.) 1 MHz. For magnetic iron it is approximately 1.4 mm (1/16-in.) at 60 Hz and .011 mm (1/2000-in.) at 1 MHz (“Introduction to Electromagnetic Fields and Waves”, Dale Corson and Paul Lorrain, Taylor-1, page 339, W.H. Freeman and Company 1962). Further discussion of skin depth effect can be found in “Practical Design of Power Supplies”, Ron Lenk, page 108, IEEE Press 1998 and “Modeling Conductor Resistance in AC Circuits”, H.L. Nakra, pages 67-8, IEEE Power Engineering Review, June 2001. (NFPA 70 1981 and earlier editions used to take note of the frequency effect and provided 60 Hz multipliers in Chapter 9, Table 9.)

EXPLANATION OF NEGATIVE: SANDERS: The use of machine members for the electrical bonding of machine mounted metallic components is to minimize the possibility of touch shock hazard between adjacent conductive parts and not for equipment grounding conductor purposes.

IEC 60204-1, Clause 8.2.1 states that requirements of IEC 60364-5-54 must be satisfied before structural members can be used for protective bonding.

Since this equivalency has not been established, a condition to promote harmonization cannot be achieved.

The use of machine members should never be considered adequate for use as a portion of the equipment grounding conductor path.
## Table 13.2.2 Single Conductor Characteristics

<table>
<thead>
<tr>
<th>Wire Size or (AWG/kcmil)</th>
<th>Cross-Sectional Area, Nominal (cm²/mm²)</th>
<th>DC Resistance at 25°C (ohms/400 ft/kFT)</th>
<th>DC Resistance at 25°C (ohms/km)</th>
<th>Nonflexing (ASTM Class)</th>
<th>Flexing (ASTM Class)</th>
<th>Constant Flex (ASTM Class/AWG Size)</th>
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<td>640/0.324</td>
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<td>35.10</td>
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<td>10(K)</td>
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<td>26(K)</td>
<td>65(M/34)</td>
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<td>41(K/30)</td>
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</tbody>
</table>

(B), (C), (K): ASTM Class designation B and C per ASTM B 8-81, Class designation K per ASTM B 174-1971 (R1980).

(e): A class designation has not been assigned to this conductor but is designated as size 22-7 in ASTM B 286-1974 (R1979) and is composed of strands 10 mils in diameter (30 AWG).


(-): Constant flexing cables are not constructed in these sizes.

### SUBSTANTIATION

- Added technical information for metric to correlate with NFPA 70 2002. Column for “ohms/km” was added to comply with the NFPA style manual requirements. Values for the new column were a conversion from ft to km. Existing column heading for “ohms/1000 ft” was changed to “ohms/kFT” to correlate with recent title changes to NEC Table 8.

### COMMITTEE ACTION

Reject

### COMMITTEE STATEMENT

1. Conversion ratios between kFT and kM are not consistent. This may or may not be due to rounding off errors.
2. NFPA 79 Table 13.2.2 is based upon ASTM values and types B and C of ASTM B8 and type K per ASTM B 173 for nonflexing and flexing duty, while NFPA 70 Table 8 is based upon NBS Handbook 100, 1966 and Handbook 109, 1972.
3. Rounded off resistance values may or may not be used that may introduce errors. No evidence has been submitted to document degree of accuracy.
4. No formula included in the substantiation to insure that MOS Annex B Table values have been followed for conversion factors.
5. Introduces new material that has not had adequate review.
6. NEMA wire comparisons have not been accounted for.

### NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE

25

### VOTE ON COMMITTEE ACTION

AFFIRMATIVE: 25

SUBMITTER: David J. Crump, Lockheed Martin Systems Integration -
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Revise text to read as follows:

13.2.7.2 Other conductors, specific for the use, shall be permitted only under engineering supervision and where documented experience has shown that extreme conditions of use exist.

SUBSTANTIATION: Some severe machine requirements exceed the capability of listed conductors and cables in certain instances, such as heat treatment, plastic extrusion and the like. Specialty conductors are necessary that have the range of high temperature and flexibility that such require. The restrictions imposed in proposed 13.2.7.2 are to ensure there is sufficient engineering review and documentation. While it is desired that listed products be employed, it is also recognized that standard wiring methods are just simply not up to all the tasks encountered in the present manufacturing facility.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The words “specific for the use” are inaccurate to address safety issues such as flame retardancy and smoke propagation. Also, the use of the terms “engineering supervision” and “documented experience” are vague and unenforceable.

SUBMITTER: Kurt Zierhut, Haas Automation

COMMITTEE STATEMENT: See committee action and statement on Comment 79-267 (Log #375).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-307-(13.2.6): Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Revise text to read as follows:

The requirement for “braided shield” where subject to longitudinal flexing is counter to both common practice and research that recommends differently. This requirement is obviously misplaced and must be removed to prevent tremendous complications and cost from being added to machines.

N adaptive protection where subject to longitudinal flexing. Toothed jacking applications (e.g., a robot arm) shall require shields designed specifically for their use. The shields and drain wire shall be covered with an outer jacket that is suitable for the environment. In all cases the shield shall provide a continuous conducting surface in the presence of bending and flexing.

SUBSTANTIATION: This will remove unnecessary complications from machine design.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The submitter has not presented sufficient evidence to support the deletion of braided shielded wire for applications where longitudinal flexing is encountered. Furthermore, the proposed text revision would serve to remove the specification to use shielded conductors in all applications.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-308-(13.2.7.1): Reject

SUBMITTER: Melvin K. Sanders, TECO, Inc.

COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Add text to read as follows:

13.2.7 Special Cables and Conductors.

13.2.7.1 Other listed conductors and listed cables shall be permitted.

13.2.7.2 Other conductors, specific for the use, shall be permitted only under engineering supervision and where documented experience has shown that extreme conditions of use exist.

SUBSTANTIATION: Some severe machine requirements exceed the capability of listed conductors and cables in certain instances, such as heat treatment, plastic extrusion and the like. Specialty conductors are necessary that have the range of high temperature and flexibility that such require. The restrictions imposed in proposed 13.2.7.2 are to ensure there is sufficient engineering review and documentation. While it is desired that listed products be employed, it is also recognized that standard wiring methods are just simply not up to all the tasks encountered in the present manufacturing facility.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The words “specific for the use” are inadequate to address safety issues such as flame retardancy and smoke propagation. Also, the use of the terms “engineering supervision” and “documented experience” are vague and unenforceable.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-309-(13.2.7.1): Reject

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Add the following wire types to the list allowed in 13.3.1.

<table>
<thead>
<tr>
<th>Wire Type</th>
<th>Temperature Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTW</td>
<td>60 degrees C</td>
</tr>
<tr>
<td>C (140 degrees F)</td>
<td>Wet Locations</td>
</tr>
<tr>
<td>90 degrees C</td>
<td>Dry Locations</td>
</tr>
<tr>
<td>RHH</td>
<td>90 degrees C</td>
</tr>
<tr>
<td>(167 degrees F)</td>
<td>Dry Locations</td>
</tr>
<tr>
<td>THHN</td>
<td>90 degrees C</td>
</tr>
<tr>
<td>(194 degrees F)</td>
<td>Dry Locations</td>
</tr>
<tr>
<td>THW</td>
<td>75 degrees C</td>
</tr>
<tr>
<td>Moisture- and Heat-Resistant Thermoplastic</td>
<td></td>
</tr>
<tr>
<td>(167 degrees F)</td>
<td>Dry and Wet Locations</td>
</tr>
<tr>
<td>RHH - Thermoset</td>
<td>75 degrees C</td>
</tr>
<tr>
<td>(167 degrees F)</td>
<td>Dry and Wet Locations</td>
</tr>
<tr>
<td>XHHW-2 - Moisture Resistant Thermoset</td>
<td>75 degrees C</td>
</tr>
<tr>
<td>(167 degrees F)</td>
<td>Dry and Wet Locations</td>
</tr>
</tbody>
</table>

SUBSTANTIATION: The insulation and the finished wires and cables shall have flame-retardant properties and temperature limits and characteristics as follows:

(1) MTW - Moisture-, Heat-, and Oil-Resistant Thermoplastic

60 degrees C (140 degrees F) Wet Locations
90 degrees C (194 degrees F) Dry Locations

(2) THHN - Heat-Resistant Thermosets

90 degrees C (194 degrees F) Dry Locations
75 degrees C (167 degrees F) Dry and Wet Locations

(3) THW - Moisture- and Heat-Resistant Thermoplastic

75 degrees C (167 degrees F) Dry and Wet Locations

(4) THWN - Moisture- and Heat-Resistant Thermoplastic

75 degrees C (167 degrees F) Dry and Wet Locations

(5) RHH - Thermoset

90 degrees C (167 degrees F) Dry Locations

(6) RHW - Moisture Resistant Thermoset

35 degrees C (167 degrees F) Dry and Wet Locations

(7) RHW-2 - Moisture Resistant Thermoset

90 degrees C (167 degrees F) Dry and Wet Locations

(8) XHWW - Moisture Resistant Thermoset

75 degrees C (167 degrees F) Wet Locations
90 degrees C (167 degrees F) Dry Locations

(9) XHHW-2 - Moisture Resistant Thermoset

90 degrees C (167 degrees F) Dry and Wet Locations

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-312-(Table 13.2.3.2): Accept

SUBMITTER: Todd F. Lottmann, Washington, MO
COMMENT ON PROPOSAL NO: 79-112

RECOMMENDATION: Editorally revise table 13.3.2 value for #8 from 0 to 30 for insulation thickness and correct spelling in title for insulation as follows:

Table 13.3.2 Thickness of Single Conductor Insulation (Mils)

<table>
<thead>
<tr>
<th>Wire Size (AWG or kcmil)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 AWG</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>20</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>18</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>16</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>14</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>12</td>
<td>30/27</td>
<td>15/13(4)</td>
</tr>
<tr>
<td>10</td>
<td>30/27</td>
<td>20/18(4)</td>
</tr>
<tr>
<td>8</td>
<td>45/40</td>
<td>30/27(5)</td>
</tr>
<tr>
<td>6</td>
<td>60/54</td>
<td>30/27(5)</td>
</tr>
<tr>
<td>4 ÷ 2</td>
<td>60/54</td>
<td>40/36(6)</td>
</tr>
<tr>
<td>1 ÷ 4/0</td>
<td>80/72</td>
<td>50/45(7)</td>
</tr>
<tr>
<td>250 ÷ 500 Kcmil</td>
<td>95/86</td>
<td>60/54(8)</td>
</tr>
<tr>
<td>550 - 1000</td>
<td>110/99</td>
<td>70/63(9)</td>
</tr>
</tbody>
</table>

SUBSTANTIATION: The intended value for #8, type B, average insulation thickness is 30 mils. The table reads 0. Revised spelling error in title from “unsulaiton” to “insulation”.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

97-313-(Table 13.3.2) - Accept

SUBMITTER: Nick Momcilovic, QTI

79-314-(13.5): Reject

SUBMITTER: Richard E. Kreamelmeyer, Cincinnati Machine

COMMENT ON PROPOSAL NO: 79-112

RECOMMENDATION: Add new text to read as follows:

Table 13.5 Conductor Ampacity Based on Copper Conductors with 60°C and 75°C Insulation in an Ambient Temperature of 30°C.

Notes:
1. Wire types listed in Section 13.3.1 shall be permitted to be used at the ampacities listed in this table.
2. The source for the ampacities in this table is Table 310-16 of NFPA 70, National Electrical Code.
3. For conductor ampacities of single insulated conductors see Table 310-17 of NFPA 70, National Electrical Code.

SUBSTANTIATION: Note 2: Grammatical errors
Add Note 3:
The source noted for Table 13.5 is Table 310-16 of NFPA 70 National Electrical Code. This table in NFPA 70 specifically states that the ampacities shown are for “…Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried)…” This table is explicitly not applicable to Single insulated Conductors that are not in a raceway, cable or earth. Table 310-17 should be used per NFPA 70. The third column of Table 11 in the current NFPA 79 has its origin in Table 310-17 and is noted as such (see note 3 of the current table). Substantiation for the omission of the reference to Table 13.5 in the proposed NFPA 79 is needed because of non-compliance with NFPA 70. Single insulated conductors may not be in a raceway. An enclosure, which has a controlled environment requirement by control manufacturers of 40 degrees C (reference 4.4.3 Ambient Operating Temperature), cannot by definition be considered a raceway, cable, or earth. Manufacturers must use the third column of Table 11 of the current edition of NFPA 79. The proposed omission of the third column of Table 11, with no reference to Table 310-17 NFPA 70 “Allowable Ampacities of Single Insulated Conductors, rated 0 through 2000 Volts, in Free Air Based on Ambient Air Temperature of 30 degrees C (86 degrees F),” will create confusion, unnecessarily increase cost, and creates legacy issues for all manufacturers.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: Table 310.17 ampacities are based on conductors in free air. Conductors on Industrial Machinery are enclosed in race-
ways or terminated in enclosed equipment requiring the ampacities in Table 130.16.

All Listed equipment terminations are tested and rated for conductors with ampacities in accordance with Table 310-16 making these sizes mandatory where the conductor terminates.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25  
**VOTE ON COMMITTEE ACTION:**  
**AFFIRMATIVE:** 25

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**79-315-(13.5) : Accept**  
**SUBMITTER:** Todd F. Lottmann, Washington, MO  
**COMMENT ON PROPOSAL NO:** 79-112  
**RECOMMENDATION:** Reword to add title 13.5 Conductor Ampacity. Retain remaining text and number as 13.5.1. Renumber remaining sections accordingly.

- **13.5.1** Conductor Ampacity. The continuous current carried by conductors shall not exceed the values given Table 13.5.
- **13.5.2** Motor circuit conductors supplying a single motor shall have an ampacity not less than 125 percent of the motor full-load current rating.
- **13.5.3** Combined load conductors shall have an ampacity not less than 125 percent of the full-load current rating of all resistance heating loads plus 125 percent of the full-load current rating of the highest rated motor plus the sum of the full-load current ratings of all other connected motors and apparatus in operation at the same time.
- **13.5.4** Where ampacity derating is required for ambient temperature correction for other than 30°C or adjusted for more than three current-carrying conductors in a raceway or cable, the factor(s) shall be taken from Tables 13.5.3(a) and 13.5.3(b). Sizing of conductors within control enclosures in wiring harnesses or wiring channels shall be based on the ampacity in cable or raceway.
- **13.5.5** The maximum size of a conductor selected from Table 13.5 and connected to a motor controller shall not exceed the values given in Table 13.5.4.

**Exception:** Where other motor controllers are used, the maximum conductor size shall not exceed that specified by the manufacturer enclosure.

**13.5.6** Conductor/Terminal Compatibility. The conductor(s) shall be compatible with the device terminal(s), and the conductor size(s) shall not exceed the range recommended by the device manufacturer.

**SUBSTANTIATION:** Revised section to comply with the Manual of Style.

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25  
**VOTE ON COMMITTEE ACTION:**  
**AFFIRMATIVE:** 25

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**79-317-(Table 13.5) : Reject**  
**SUBMITTER:** Michael H. Appold, Delphi Saginaw Steering Systems  
**COMMENT ON PROPOSAL NO:** 79-112  
**RECOMMENDATION:** Add to Table 13.5: Conductor Ampacity Based on Copper Conductors with 60°C, 75°C, and 90°C Insulation in an Ambient Temperature of 30°C

**Table 13.5**  
<table>
<thead>
<tr>
<th>Conductor Size</th>
<th>Ampacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG/MCM</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.5</td>
</tr>
<tr>
<td>28</td>
<td>0.8</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>130</td>
</tr>
<tr>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>1/0</td>
<td>170</td>
</tr>
<tr>
<td>2/0</td>
<td>195</td>
</tr>
<tr>
<td>3/0</td>
<td>225</td>
</tr>
<tr>
<td>4/0</td>
<td>260</td>
</tr>
<tr>
<td>250</td>
<td>290</td>
</tr>
<tr>
<td>300</td>
<td>320</td>
</tr>
<tr>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>400</td>
<td>380</td>
</tr>
<tr>
<td>500</td>
<td>430</td>
</tr>
<tr>
<td>600</td>
<td>475</td>
</tr>
<tr>
<td>700</td>
<td>520</td>
</tr>
<tr>
<td>750</td>
<td>535</td>
</tr>
<tr>
<td>800</td>
<td>555</td>
</tr>
<tr>
<td>900</td>
<td>585</td>
</tr>
<tr>
<td>1000</td>
<td>615</td>
</tr>
</tbody>
</table>

Except as noted, ampacities taken from NFPA 70, Table 310-16.

Note 1: Comparing values in NFPA 79, Table 13.5 ampacities for wires below 16 AWG are the same for all three temperature ratings.

**SUBSTANTIATION:** NFPA 70, National Electric Code, clearly documents proper sizing for conductors with this insulation rating.

NFPA 79, Clause 13.3.1 lists MTW and THHN 90°C (dry locations) as the...
first two insulation types of four allowed, allowing and promoting their use. NFPA 79, clause and tables should be consistent in requirements, allowances, referencing, etc.

Major users such automotive (e.g., GM ES1 circa 1984, etc.) and machine tool builders have for some time applied these wire insulation types within their ratings.

Following the proposed addition to the table is technically correct.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The terminal provisions of equipment have not been evaluated at the 90 degree C rating. NFPA 70 addresses facility wiring concerns and not the specific, specialized applications such as an industrial control enclosure. NFPA 70-2002 Article 670.1 FPN refers users to this NFPA 79 Standard.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

79-318-(13.5(B)): Accept

**SUBMITTER:** Melvin K. Sanders, TECO, Inc.

**RECOMMENDATION:** Add text to read as follows:

Make the proposed first sentence “13.5.1” and add part “13.5.2” as follows:

13.5.1. The continuous current carried by conductors shall not exceed the values given in Table 13.5.

13.5.2. Ampacity adjustment for 90-degree C insulated conductors amperages shall be based on the amperacies in the 75 degree C column.

**SUBSTANTIATION:** 90 degree C insulation is permitted to be used on machinery and in machinery enclosures per proposed 13.3.1(2), and Table 13.3.2 Column B provides information as to its construction. 13.3.1(2). However, no direction is given on the ampacity value to use for ampacity adjustment.

Even though this Standard recognizes the higher temperature insulation, the conductor application is based upon that of MTW.

Temperature rise of conductors and of enclosures is due to machine duty cycles, and the physical size of conductors is governed by the parent document of 110-14(C) in conjunction with the heat sinking capabilities of the terminations. Another source of concern is the maximum expected ambient temperature of the machine itself, such as a factory with no air-conditioning. Even with facility room temperature control, that within a control enclosure is expected to operate at a 10 degree C rise above room ambient because of the many heat sources installed within: control transformers, conductors heating along their length based on resistance, the bundling effect due to routing inside a closed cabinet, current flow through components, restricted air flow, etc.

The proposed (b) completes the picture so designers and users will know the correct column to use. If the normal practice of adjusting from the greater ampacities due to their higher insulation heat rating is followed, the elevated temperatures will result in nuisance outages and earlier component failure.

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** It is not the intent of this comment to replace 13.5.1 and 13.5.2 from the ROP draft. The existing 13.5.1 of the ROP Draft becomes 13.5.3 and the existing 13.5.2 of the ROP Draft becomes 13.5.4 and renumber the remainder. Do not delete any text from the ROP draft.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

**COMMENT ON AFFIRMATIVE:**

SANDERS: The section paragraph numbers will need adjusting to correlate with the committee action on Comment 79-315 (13.3), log 213 and comply with the MOS.

79-319-(13.5.2): Accept

**SUBMITTER:** Melvin K. Sanders, TECO, Inc.

**RECOMMENDATION:** Add “based on their duty cycle” after “motors and apparatus”.

13.5.2 Combined load conductors shall have an ampacity not less than 125 percent of the full-load current rating of all resistance heating loads plus 125 percent of the full-load current rating of the highest rated motor plus the sum of the full-load current ratings of all other connected motors and apparatus based on their duty cycle that may be in operation at the same time.

**SUBSTANTIATION:** This will allow correlation with the parent NFPA 70 2002 Edition Section 670.4(a) which CMP 11 unreasonably accepted this same language from Proposal 11-111 (Log #2844).

A machine operating cycle may involve numerous load-no-load conditions for a given operation. These are determined under engineering supervision and do not vary much over the life of the unit. This will allow machine application of what Sections 310-15(a) and 430-26 presently permit for facilities.

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** The committee understands that this action will not modify the action taken on Comment 79-318 (Log #53) but is in addition to the action taken on 79-318.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

**COMMENT ON AFFIRMATIVE:**

SANDERS: The section paragraph numbers will need adjusting to correlate with the committee action on Comment 79-315 (13.3), log 213 and comply with the MOS.

79-320-(13.5.2): Accept

**TCC NOTE:** The Technical Correlating Committee understands that the final wording in 13.5.2 is as shown in Comment 79-319.

**SUBMITTER:** Todd F. Lottmann, Washington, MO

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** The committee accepts the editorial revisions that appear in the ROP draft to comply with the NFPA Manual of Style.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 21

**NEGATIVE:** 4

**EXPLANATION OF NEGATIVE:**

DRONBICK: I agree with Mr. Fisher that the action taken on 79-320 conflict with the action taken on 79-319.

FISHER: NEMA believes that the action on this should be rejected because it is in conflict with comment 79-319 which was also accepted by the Committee. NEMA believes that the appropriate action would have been to accept in principle and refer to the action taken on 79-319. As of now, it seems that the appropriate thing to do is to reject the comment. This will allow the action taken on 79-319 to stand without a conflict.

KIIHR: I agree with the comments in Mr. Fisher’s Explanation of Negative Vote. The action is incorrect in stating that acceptance of this comment is inconsistent with the committee action on Comment 79-319. Therefore, I am voting negative on the committee action to Accept Comment 79-320.

PADGETT: I agree with the comments in Mr. Fisher’s Explanation of Negative Vote.

79-321-(13.5.2 Exception No. 1 (New)): Reject

**SUBMITTER:** Endel Mell, Husky Injection Molding Systems Ltd

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** The cable for resistive heating loads may be sized to 100% installed full load current when all of the following conditions are satisfied:

1. The load is of a cyclic nature, with automatic temperature control, and run-away monitoring and control.

Type testing has proven that continuous overload is unlikely.

The fuse or circuit breaker current rating does not exceed 125% (or the next standard rating of the installed full load current).

The demonstrated full load current during normal operation does not exceed 80% of the installed full load current.

**SUBSTANTIATION:** North American standard breakers (80% continuous load rated) may need to be upsized to 125% when starting heaters from cold to avoid nuisance tripping.

After attaining the operating temperature, which takes less than 3 hours (the minimum time for continuous load according to NFPA 70), the heat circuits are energized and de-energized using sensing and time interval control. If the sensor fails or gives high temperature, the power is switched off. The R.M.S. load current measured over several minutes is typically 50% or less of the arithmetical sum of the installed heater full load current.

The type-tested requirement provides additional electrical overload safeguard in relaxing the 125% cable ampacity requirement. (Any increase in load current due to variation in heater resistance will be identified during load tests. Current increases for up to 10% supply voltage variation will be accommodated for in the 80% installed full load current limit.)

Substantiation for Exception No. 1:

The proposed conditions are cited under NFPA 70 clause and tables should be consistent in requirements, allowing and promoting their use. NFPA 70, the heat circuits are energized and de-energized using sensing and time interval control. If the sensor fails or gives high temperature, the power is switched off. The R.M.S. load current measured over several minutes is typically 50% or less of the arithmetical sum of the installed heater full load current.

The type-tested requirement provides additional electrical overload safeguard in relaxing the 125% cable ampacity requirement. (Any increase in load current due to variation in heater resistance will be identified during load tests. Current increases for up to 10% supply voltage variation will be accommodated for in the 80% installed full load current limit.)

Substantiation for revised table:

Cables exist in machines, and electrical cabinets, that are rated to operate continuously under dry conditions at 90°C.
The permissible derating factors of these cables are higher than cables rated at 75°C, as recognized in NFPA 70-1999, Tables 310-16 and 310-17 (Correction factors at the end of the table). These figures were reaffirmed in NFPA 2002 draft tables 310.16 and 310.17 respectively. There is no increase in electrical safety risk in derating 90°C and 75°C cables differently, provided the terminals at the wire ends are rated to handle the higher cable temperature.

Not including the 90°C cable derating factors, (as permitted in NFPA 79-1979, Table 11, Fine Print Note No. 2), will cause some cables with the present design to increase by one AWG. This will have a negative impact on the competitiveness of North American cabinet builders, in comparison to their EC counterparts who are not required to comply with this voluntary standard.

The use of derating factors for 90°C cables as in the NFPA 310-16 table has had no adverse effect, or report of overheating. This practice is permitted by EN60204.

**COMMITTEE ACTION** Reject

**COMMITTEE STATEMENT** While some controllers work by energizing and deenergizing the heater circuit (PWM or "Time-interval" control), this proposal does not specifically mandate the use of these controllers. If other types of controllers are used, the aggregate load currents will be substantially greater than the values that are put forth in the submitters substantiation.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

**COMMITTEE ACTION** Accept

**COMMITTEE STATEMENT** The submitter has not provided technical substantiation.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE:** 25

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Table 13.5.3(a) Correction Factors For Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature</th>
<th>Ambient Derating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-25°C</td>
<td>0°C</td>
</tr>
<tr>
<td>26-30°C</td>
<td>0°C</td>
</tr>
<tr>
<td>31-35°C</td>
<td>0°C</td>
</tr>
<tr>
<td>36-40°C</td>
<td>0°C</td>
</tr>
<tr>
<td>41-45°C</td>
<td>0°C</td>
</tr>
<tr>
<td>46-50°C</td>
<td>0°C</td>
</tr>
<tr>
<td>51-55°C</td>
<td>0°C</td>
</tr>
<tr>
<td>56-60°C</td>
<td>0°C</td>
</tr>
<tr>
<td>61-70°C</td>
<td>0°C</td>
</tr>
</tbody>
</table>

The 90°C cable derating column may only be applied to cables of 90°C and above, and with terminals listed to operate with 90°C rated conductors.
substantiation to warrant the addition of this new exception. The comment assumes the facility transition along a circuit length is the same as a temperature transition at a terminal.

COMMITTEE ACTION

RECOMMENDATION: New 13.5.3 Table 13.5.3 (b) Wire Adjustment Factors for Enclosed Conduit

COMMITTEE ACTION

COMMITTEE STATEMENT: See committee action on Comment 79-320 (Log #218). The committee suggests the testing information included in the substantiation be considered by a SDO in the development of a standard relating to these devices.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMITTEE STATEMENT: Adequate conductor protection requires a complete evaluation of the overcurrent protective device with its intended ratings and associated conductor sizes.

79-328-(13.6.1) : Accept in Principle

SUBMITTER: Todd F. Lottmann, Washington, MO

COMMENT ON PROPOSAL NO: 79-116

RECOMMENDATION: Continue to accept proposal 79-116.

SUBSTANTIATION: Certain circuit breakers are fully capable of providing overcurrent protection for these 16 or 18 AWG wires. That fact has been demonstrated by the tests reported in the letter to Square D Company from UL dated April 23, 2001. [I have provided a copy of the letter].

Mr. Knecht has commented that there should be some assurance from UL that a testing program for these circuit breakers exists. The critical point in responding is the panel’s requirement that the circuit breaker be “listed.” The test program will have to be in place before any circuit breaker can be listed. A formal test program has been requested by Square D Company and is presently being developed by UL. The industry will be notified by bulletin of the program in detail. Included in the industry to be notified is the UL 489 Standard Technical Panel, which includes a member from Mr. Knecht’s employer as well as experts from around the industry.

The development of the program should be left to UL and their representatives around the industry who are well versed in protection of conductors by circuit breakers. The proposed test program will directly verify protection of the wire at conditions of maximum time and current for the circuit breaker characteristic. It will also verify that the circuit breaker will protect 14 AWG and is self-protected when connected with either 1 or 14 AWG conductors. There is no reason to exclude suitably listed circuit breakers from this application. Recognize that UL has wanted verification that there is a suitable application for circuit breakers protecting these small wires before they will develop a listing program. This proposed addition to NFPA 79 provides the reason for developing the listing program.

NOTE: Supporting material is available for review at NFPA Headquarters.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See committee action on Comment 79-330 (Log #218). The committee suggests the testing information included in the substantiation be considered by a SDO in the development of a standard relating to these devices.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMITTEE ACTION: Reject

13.6.1 Conductors shall not be smaller than 14 AWG for power circuits unless otherwise permitted in (a) or (b).

(a) 16 AWG shall be permitted if part of a jacketed multicore cable assembly or flexible cord, or individual conductors used in a cabinet or enclosure. Under the following conditions:

(1) Non-motor power circuits of 8 amperes or less provided all the following conditions are met:

(a) Circuit is protected in accordance with Clause 7
(b) Overcurrent protection does not exceed 10 amperes
(c) Overcurrent protection is provided by:

(1) A branch circuit rated circuit breakers listed and marked for use with 16 AWG wire
(2) Branch circuit rated fuses listed and marked for use with 16 AWG wire

(2) Motor power circuits with a full load ampacity of 8 amperes or less provided all the following conditions are met:

(a) Circuit is protected in accordance with Clause 7
(b) Overcurrent protection does not exceed 7 amperes
(c) Overcurrent protection is provided by:

(1) A branch circuit rated circuit breakers listed and marked for use with 16 AWG wire
(2) Branch circuit rated fuses listed and marked for use with 18 AWG wire

13.6.2 Conductors shall not be smaller than 16 AWG for motor power circuits within control enclosures or operator stations provided all the following conditions are met:

(1) A branch circuit rated circuit breakers listed and marked for use with 16 AWG wire
(2) Branch circuit rated fuses listed and marked for use with 18 AWG wire
(3) Class CC, Class J, or Class T fuses

13.6.3 Motor power circuits shall not be smaller than 18 AWG for control circuits within control enclosures or operator stations provided all the following conditions are met:

(1) A branch circuit rated circuit breakers listed and marked for use with 16 AWG wire
(2) Branch circuit rated fuses listed and marked for use with 18 AWG wire
(3) Class CC, Class J, or Class T fuses

13.6.4 Conductors for Electronic programmable control input/output and static control shall not be smaller than 16 AWG for control circuits within control enclosures or operator stations provided all the following conditions are met:

(1) A branch circuit rated circuit breakers listed and marked for use with 16 AWG wire
(2) Branch circuit rated fuses listed and marked for use with 18 AWG wire
(3) Class CC, Class J, or Class T fuses

13.6.5 Shielded Conductors. Shielded conductors shall consist of stranded, covered copper of 25 AWG or larger for single conductors used in subassemblies and 22 AWG or larger for all other uses.

Recommendation: Add the following text as a note in Annex A for section 13.6.4:

A.13.6.4 Examples of special wiring applications include shielded wire, wire clip type connectors, shielded conductors, or the like.

SUBSTANTIATION: Rewrite section 13.6.3 for clarity. Added the word “class” to new section 13.6.1 for fuse types to provide clarity. Changed No. to AWG in Section 13.6.1 to comply with the manual of style. Added the words “and marked” for circuit breakers and “branch circuit rated fuses listed and marked for use with (16 or 18) AWG wire” for fuses to a new section 13.6.1 to clarify that protective devices used for this protection must be specifically marked for this purpose. Move remaining listed items to separate renumbered sections to provide clarity. Renumber existing 13.6.2 to correlate with previous changes. Move and reword explanatory references in exceptions to existing 13.6.1(a)and (b) to Annex A as note to comply with the NFPA Manual of Style.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Revise text to read as follows:
The tensile stress of the conductors as low as practicable during machine operations. Where copper conductors are used, the tensile stress shall not exceed 15.677 (2176 psi) of the copper cross-sectional area.

SUBSTANTIATION: This does not seem to be a very practical requirement. Measuring the tensile strength of the conductor would consist of measuring the force on the insulation and on the conductor. Depending on how the conductor is terminated, the insulation could be bearing most of the tensile stress or it could be equally dispersed among the conductor and the insulation. Now take a multi-conductor cable and apply the same concept and the difficulty rises dramatically.

COMMITTEE ACTION: Accept in Principle
1) Revise second sentence of 13.7.2 in the ROP draft to read as follows: The tensile stress shall not exceed manufacturer’s specifications.
2) Remove the Annex item A.13.7.2.

COMMITTEE STATEMENT: This revision makes the application more universal to all permitted cables used on a take-up reel. In addition, the proposed revision correlates with the provisions in 14.4.3. The Annex was removed since it applied to the deleted sentence. This will reduce complexity and meets the submitters concern.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-333-(13.7.4): Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Add new text to read as follows:
13.7.4. Multi-conductor cable used to make connections to infrequently moved or devices shall be secured at both ends by an oil-tight connector terminated at both ends and limited to a maximum of 1 meter between conductors.

SUBSTANTIATION: Limits the amount of exposed cable that needs to be replaced if damaged or becomes unsuitable for use (such as oil soaked outer insulation that has become brittle, breaking, exposing the inner conductors). Have had difficulty in replacing extremely long runs when cable was used from the control enclosure (at the rear of a machine) to a motor located 20 ft away (at the front of a machine) with the cable snaking through machine openings and structure. (Maintenance issue)

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Oil-tight connectors are not required in all applications.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-334-(13.8.1): Accept
SUBMITTER: Todd F. Lottmann, Washington, MO
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Revise 13.8.1 to include a reference to existing Table 13.9.1. Correct Table number reference to Table 13.8.2.
13.8.1. Multiconductor flexible cords shall be suitable for the intended use and be of the type listed in Table 13.8.2.

SUBSTANTIATION: This change would provide a list of acceptable flexible cord types which correlates with NEC article 400.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-335-(13.8.2): Accept
SUBMITTER: Todd F. Lottmann, Washington, MO
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Renumber table to correlate with text of 13.8.2. Remove explanatory reference to the NEC.

SUBSTANTIATION: Renumbered table to correlate with text of 13.8.2. Remove explanatory reference to the NEC.

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: The committee understands that this action will delete the source reference note to Table 13.8.2.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-336-(13.8.2 Exception No. 1 (New)): Reject
SUBMITTER: Endel Mell, Husky Injection Molding Systems Ltd
COMMENT ON PROPOSAL NO: 79-112
Add the following at the end of this clause: Exception No. 1. Listed flexible cables may use ampacity Table 13.5 provided:
The insulation is equivalent to fixed conductors that the table may be used for.

The table ampacity is not greater than either the listed nor the recommended ampacity of the cable manufacturer.

SUBSTANTIATION: The addition of a new table for flexible cord is appropriate. This will provide more precise applications of current ampacity to flexible cords, such as SO cords. However, special cables for servos, and power cables for specific applications are often different than flexible cords (given in NFPA 70 - Article 400). These cables sometimes have the same ampacity as in Table 13.5. (E.g., Offlex 190 cable is listed as AWM, and the vendor references NEC Tables 310-16 and 310-17 for wires and cables, not Table 400-5(A), for flexible cords.) There is no need to reduce the ampacities of cables that are identified as suitable for higher currents.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee is uncertain as to the location of the proposed new exception. The committee notes however that the ampacities of conductors that employ insulation of a type listed in 13.3.1 is determined by Table 13.5.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-337-(13.8.3): Accept
SUBMITTER: Todd F. Lottmann, Washington, MO
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: New section 13.8.3 to provide requirements for derating of flexible cords with more than three conductors.
13.8.3. Where ampacity derating is required for more than three current-carrying conductors, the factor(s) shall be taken from Table 13.5.3(b).

SUBSTANTIATION: This new section will provide a reference for derating of flexible cords with more than three current carrying conductors. Table 13.5.3(b) is the same as Table 400.5 in the NEC for derating of flexible cords for more than 3 current carrying conductors.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-338-(Table 13.9.1): Accept
SUBMITTER: Melvin K. Sanders, TECO, Inc.
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Revise "Table 13.9.1 title to "Table 13.8.2" and in the last note under this table change "Table 13.9.1" to "Table 13.8.2".

SUBSTANTIATION: Editorial revision to follow the proposed clause numbering sequence.

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: See committee action on Comment 79-335 (Log# 214).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-339-(Table 13.9.1): Accept
SUBMITTER: Michael F. Crampton, General Motors - Controls, Robotics, & Welding
COMMENT ON PROPOSAL NO: 79-112
RECOMMENDATION: Revise text to read as follows: Rename Table 13.9.1 as Table 13.8.2.

SUBSTANTIATION: In the ROP Draft, it appears that Chapter 13 was renumbered, and in the process the numbering on the corresponding Table in Section 13.8.2 was not changed as it should have been.

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: See committee action on Comment 79-335 (Log# 214).
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NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Add text to read as follows:
14.1.2.2 Factory-applied connectors molded onto cables shall be permitted.
Such connectors shall not be considered as splices or joints. Connector housings using crimped terminals are considered to be splices or joints and shall not be used.

STANdATION: The use of crimped terminals that are inserted into connector housings cannot be checked for secure crimping (have had conductors pull out), need a special tool to remove the terminal from the housing for replacement or repair, and are usually meant for consumer items, not subject to the rigors of the industrial environment (vibration - intermittent connections between mating parts caused by loosening due to machine shock).

(Molex or Amp brands type of connectors used in television/radios, computers and other consumer products).

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed new text in 14.1.2.2 is already covered by the existing requirements in 14.1.2.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-341-(14.1.1.1): Accept
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Add new text to read as follows:
14.1.1.1 All connections shall be secured against accidental loosening and shall ensure a thoroughly good connection. Thread locking sealants, epoxies, glues, or other similar compounds shall not be used.

STANdATION: Have found the use of "lock tight" thread sealant used to prevent the loosening of terminal screws which is a non-conducting fluid, and if the wrong type used (red), cannot loosen the terminal. Only way to break the connection is to cut the conductor.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: See committee action on Comment 79-335 (Log #214).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-342-(14.1.1.12): Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Add new text to read as follows:
14.1.1.12 A ring type pressure connector (or comparable pressure device) shall be used to connect stranded conductors to devices with lug-type terminals which are not equipped with saddle straps or equivalent means of retaining conductor strands.

STANdATION: Guidance on method of making connection to devices that do not have terminals that do not contain or entrap strands of the conductor when making terminations.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed new text in 14.1.1.12 is already covered by the existing requirements in 14.1.1.8.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-343-(14.1.1.12): Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC
COMMENT ON PROPOSAL NO: 76-122
RECOMMENDATION: Add new text to read as follows:
14.1.1.14 Rung terminals or similar devices shall not be bent to meet electrical or mechanical clearances.

STANdATION: Have found the above terminals bent causing premature failure of the connection.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed new text is a manufacturing process issue. This involves a work practices and the proposed text would be overly restrictive.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-344-(14.1.2.2): Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

79-345-(14.1.3): Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: The recommended text does not provide additional clarity and adds technical requirements that go beyond the scope of an editorially revision.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed new text in 14.1.2.2 is already covered by the existing requirements in 14.1.2.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-346-(14.1.3): Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Conductor of different circuits shall be permitted to be laid side by side, and occupy the same raceway (duct, e.g., wireway, trunking), or be in the same multicircuit cable assembly provided that the arrangement does not impair the functioning of the respective circuits. Functionally associated circuit conductors including power, control, remote I/O, signaling, and communication cables shall be permitted to be in the same raceway or cable assembly regardless of voltage, provided they do not interfere with the functioning of the respective circuits. All are insulated for the maximum voltage of any circuit within the raceway or cable assembly. Where those circuits operate at different voltages, the conductors shall be separated by barriers or shall all be insulated for the highest voltage of any circuit to which any conductor within the same raceway (duct) or cable assembly is subjected.

Exception: Different voltage insulation levels or conductor properties shall be permitted in the same cable assembly, provided the cable assembly has been designed and tested to the identified application.

STANdATION: No requirements change, only wording was editorially revised for simplification and added clarity.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed new text in 14.1.2.2 is already covered by the existing requirements in 14.1.2.1.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-347-(14.1.4): Reject
SUBMITTER: Joseph V. DeAngelo, Erie Press Systems
COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Revise to read as follows: Exposed cables, to include “micro/mini” change power control cables with connectors, installed along the structure...
SUBSTANTIATION: This will add clarity to the standard.
COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The proposed text does not add additional clarity and the provision is already covered by 13.2.7.1 and 14.1.4.1.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This meets the intent of the submitter.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This clause better fits under 13.6.7.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided a proposal for a new definition of “Cables.” Guidance to the answer of this question may be found in both UL 62, Flexible Cord & Fixture Wire and UL 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This meets the intent of the submitter.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided the definition of “Cables” in terms of protection. This should be added as an exception or put into a separate clause.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This clause better fits under 13.6.7.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This meets the intent of the submitter.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided a proposal for a new definition of “Cables.” Guidance to the answer of this question may be found in both UL 62, Flexible Cord & Fixture Wire and UL 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This clause better fits under 13.6.7.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided the definition of “Cables” in terms of protection. This should be added as an exception or put into a separate clause.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This clause better fits under 13.6.7.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided a proposal for a new definition of “Cables.” Guidance to the answer of this question may be found in both UL 62, Flexible Cord & Fixture Wire and UL 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: This clause better fits under 13.6.7.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMITTEE STATEMENT: The submitter of the comment has provided a proposal for a new definition of “Cables.” Guidance to the answer of this question may be found in both UL 62, Flexible Cord & Fixture Wire and UL 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-356-(14.1.4.11) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: Add new text to read as follows:
14.1.4.11 Unused conductors of a multi-conductor cable shall not be cut off or made shorter than the longest free conductor remaining. The unused conductor shall have its end taped or protected from incidental contact with live parts or connections. The unused conductor shall be coiled and stored in a workmanlike manner.

SUBSTANTIATION: Unused conductors can be used as spares so if a wire fault occurs within the cable, the remaining unused conductors can be utilized, and the entire cable does not need to be replaced. Taping or protecting the unused ends prevents unexpected shock hazard.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee believes that the proposed text would introduce a work practice that is too restrictive for some cable assemblies.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-357-(14.1.4.13) : Reject
SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: Add new text to read as follows:
14.1.1.13 Connections to motors, solenoids, and other devices that have integral leads and are sized No. 4 AWG or smaller shall be made with a ring type pressure connector. The connectors shall be bolted together and taped with an oil-resistant listed electrical tape. Connections when completed shall not be enclosed or concealed within conduit or fittings and at least 6 in. of free conductor shall be left at each connection point.

Exception: Connections can be contained within conduit body fittings of sufficient capacity.

SUBSTANTIATION: Guidance on method of making connection to devices that have integral leads and without the use of “wirenuts.”

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The proposed new text in 14.1.1.13 is already covered by the existing requirements in 14.5.9.2. In addition the submither has provided insufficient technical substantiation to mandate the use of ring type pressure connectors for all connection to motors and other devices with conductor sizes 4 AWG or smaller. See committee action and statement on Comment 79-384 (log #280).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-358-(14.2.1.1) : Reject
SUBMITTER: Michael F. C rampton, General Motors - Controls, Robotics, & Welding

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: Revise text to read as follows:
14.2.1.1 Conductors shall be identified at each termination by number, letter, color (either solid or with one or more stripes), or a combination thereof and shall correspond with the technical documentation. Where practicable, conductor insulation shall be identified for function by color (either solid or with one or more stripes).

SUBSTANTIATION: Statement of Problem: This wording looks like a relaxation of the present requirement to color code wiring for functional purposes (NFPA 79 1997 Section 16.1.1), and could potentially cause systems to be wired with individual conductors only marked with numbers or letters for termination and not color coded for function, except for the ones specifically required as noted in the last comment in the negative vote by Mr. Knecht on Section 14.2. The most problematic concern is that we will have the possibility of one system with AC, DC, high and low voltages, and none of the wiring required to be color coded for function. Color coding for function identifies quickly the location of conductors which may carry the highest potential for shock hazard.

Multiconductor cable is not an issue, since Exception 3 covers this.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: Functional identification of conductors is presently covered by 14.2.4.3. To place it in this subsection confuses the thrust of this subsection which is to identify conductors at their termination. It is inappropriate to place it in the general section.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 24
NEGATIVE: 1

EXPLANATION OF NEGATIVE VOTE:
SUBMITTERS: The Panel Action on the Comment should be ACCEPT. I agree with the substantiation of the submitter and do not agree with the Committee statement that: “It is inappropriate to place it in the general section.”

79-359-(14.2.1.1 Exception) : Accept
SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: 14.2.1.1 Conductors shall be identified at each termination by number, letter, color (either solid or with one or more stripes), or a combination thereof and shall correspond with the technical documentation. Internal wiring on individual devices purchased completely wired shall not require additional identification.

Exception No. 1: Internal wiring on individual devices purchased completely wired.

Exception No. 2: Where the insulation used is not available in the colors required (e.g. high temperature insulation, chemically resistant insulation).

Exception No. 3: Where multiconductor cable is used and other means of permanent identification is provided.

SUBSTANTIATION: Editorial simplification of the existing requirements, made Exception No. 1 part of the mandatory requirements, the other two exceptions do not relate to the text in 14.2.1.1.

Please note this comment is part of, and related to, the other comments made on the section 14.2 subsections by task group 2.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-359-(14.2.1.2) : Accept
SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: Modify 14.2.1.2 to read:
14.2.1.2 Where numbers are used to identify conductors, they shall be Arabic; letters shall be Roman (either upper or lower case).

SUBSTANTIATION: Existing language alludes to section 14.2.1.1 but is unclear. The section (14.2.1.2) is not a complete requirement without adding descriptive text. Editorialy revised to improve clarity. Add descriptive text to make section a stand-alone requirement.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-360-(14.2.2.1) : Accept
SUBMITTER: Nick Momcilovic, QTI

COMMENT ON PROPOSAL NO:79-171
RECOMMENDATION: Revise text to read as follows:
The color GREEN with or without one or more YELLOW stripes shall be used to identify the equipment grounding conductor where insulated or covered. The color identification shall be strictly reserved for the equipment grounding (protective bonding) conductor.

SUBSTANTIATION: Removing the parenthesis bring this into the require
ment and not just as an informative requirement. Additionally, this should be done to keep consistent with the harmonization efforts with IEC 60204-1 (1997).

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: The committee notes that removal of the parenthesis was done to add clarity. The committee does not agree that by having the text within parenthesis in this section makes it informative. If it was informative it would be in the form of a note.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-361-(14.2.2.1 Exception No. 3) : Accept
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO:79-171
RECOMMENDATION: Revise text to read as follows:
Exception No. 3: For grounded control circuits, use of a GREEN insulated conductor (with or without one or more YELLOW stripes) or a bare conductor from the transformer terminal to a grounding terminal on the control panel shall be permitted.
SUBSTANTIATION: Removing the parenthesis brings this into the requirement and not just as an informative requirement. Additionally, this should be done to keep consistent with the harmonization efforts with IEC 60204-1 (1997).
COMMITTEE ACTION:Accept
COMMITTEE STATEMENT: The committee notes that removal of the parenthesis was done to add clarity. The committee does not agree that by having the text within parenthesis in this section makes it informative. If it was informative it would be in the form of a note.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMENT ON AFFIRMATIVE:
SANDERS: Capitalized words in the text harmonize with the source document IEC 60204-1 (1997).

79-362-(14.2.2.2) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: Revise text to read as follows:
14.2.2.2. Where the equipment grounding (protective) conductor is identified by its shape, position, or construction (e.g., a braided conductor), or where the insulated conductor is not readily accessible, color coding throughout its length shall not be required. But the ends or accessible positions shall be clearly identified as required in 14.2.1 and the terminals as required in 8.2.1.2.4. By Figure 8.2.1.2.4, the color green (with or without one or more YELLOW stripes), or the bicolor combination GREEN-AND-YELLOW.
SUBSTANTIATION: No requirements were changed; wording was editorially revised for simplification and added clarity.
COMMITTEE ACTION:Reject
COMMITTEE STATEMENT: The submitter states in his substantiation that the changes are merely editorial, however the committee believes that the revision contains substantive changes.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-363-(14.2.2.2) : Accept in Principle
SUBMITTER: Nick Momcilovic, OGI
COMMENT ON PROPOSAL NO:79-171
RECOMMENDATION: Revise text to read as follows:
Where the equipment grounding (protective) conductor is identified by its shape, position, or construction (e.g., a braided conductor) or where the insulated conductor is not readily accessible, color coding throughout its length shall not be required. But the ends or accessible position shall be clearly identified by the symbol in Figure 8.2.1.2.4, the color GREEN (with or without one or more YELLOW stripes), or the bicolor combination GREEN-AND-YELLOW.
SUBSTANTIATION: Removing the parenthesis brings this into the requirement and not just as an informative requirement. Additionally, this should be done to keep consistent with the harmonization efforts with IEC 60204-1 (1997).
COMMITTEE ACTION:Accept in Principle
Revise text in the ROP Draft to read as follows:
14.2.2.2 Where the equipment grounding (protective) conductor is identified by its shape, position, or construction (e.g., a braided conductor) or where the insulated conductor is not readily accessible, color coding throughout its length shall not be required. The ends or accessible portion shall be clearly identified by its shape, position, or construction (e.g., a braided conductor) or where the insulated conductor is not readily accessible, color coding throughout its length shall not be required. But the ends or accessible position shall be clearly identified by the symbol in Figure 8.2.1.2.4, the color green (with or without one or more YELLOW stripes), or the bicolor combination GREEN-AND-YELLOW.
COMMITTEE STATEMENT: Editorial corrections were made. In addition, the Green and Yellow was revised to correlate with the action taken on 79-179 (Log #408). The committee notes that removal of the parenthesis was done to add clarity.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMENT ON AFFIRMATIVE:
SANDERS: Capitalized words in the text harmonize with the source document IEC 60204-1 (1997).

79-364-(14.2.3.2) : Accept
SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: 14.2.3.2 The use of other colors for the following applications shall be as follows:
(1) WHITE with BLUE stripe for grounded (current-carrying) dc circuit conductor.
(2) WHITE with ORANGE stripe or WHITE with YELLOW stripe for grounded (current-carrying) circuit conductor, which remains energized when the main disconnecting means is in the off position.
The color choice of the stripe shall be consistent with the ungrounded conductor of the excepted circuit described in 5.3.5.
SUBSTANTIATION: Editorial comment: The term “excepted circuit” when referenced back to 5.3.5 clarifies the meaning of the requirement. Please note that this comment is part of, and related to, the other comments made on the section 14.2 subsections by task group 2.
COMMITTEE ACTION:Accept
COMMITTEE STATEMENT: The committee believes that the addition of the term voltage in 14.2.4.3 as proposed by the comment does not add clarity.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMENT ON AFFIRMATIVE:
SANDERS: Capitalized words in the text harmonize with the source document IEC 60204-1 (1997).

79-365-(14.2.4.1 Exception) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO:79-122
RECOMMENDATION: 14.2.4.1* Ungrounded circuit conductors that remain energized when the supply disconnecting means is in the off position shall be consistently applied as either ORANGE or YELLOW. These color identifications shall be strictly reserved for this application only.
COMMITTEE ACTION:Reject
COMMITTEE STATEMENT: The editorial correction deletes a needed exception that is necessary for clarity and useability in Section 14.2.4.1.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMENT ON AFFIRMATIVE:
SANDERS: Capitalized words in the text harmonize with the source document IEC 60204-1 (1997).

79-366-(14.2.4.3 Exception) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company
COMMENT ON PROPOSAL NO:79-122 and 79-129
RECOMMENDATION: 14.2.4.3 The use of other colors shall be for the purpose of voltage identification, such as follows:
(1) BLACK for ungrounded line, load, and control conductors at line voltage
(2) RED for ungrounded ac control conductors at less than line voltage
(3) BLUE for ungrounded dc control conductors
Exception No. 1: Internal wiring on individual devices purchased completely wired.
Exception No. 2: Where the insulation used is not available in the colors required (e.g., high temperature insulation, chemically resistant insulation).
SUBSTANTIATION: There has been a comment to do an editorial simplification to 14.2.1.1 existing requirements by making Exception #1 part of mandatory requirements, if that comment is acted on, then this exception No. 1 is not needed in 14.2.4.1 either. Please note this comment is part of, and related to, the other comments made on the section 14.2 subsections by task group 2.
COMMITTEE ACTION:Reject
COMMITTEE STATEMENT: The editorial correction deletes a needed exception that is necessary for clarity and useability in Section 14.2.4.1.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
COMMENT ON AFFIRMATIVE:
SANDERS: Capitalized words in the text harmonize with the source document IEC 60204-1 (1997).

79-367-(14.2.5) : Accept
SUBMITTER: William E. Anderson, The Procter & Gamble Company

REFERENCES
14.2.1.1 Grounding And Protective Grounding
14.2.2 Conductors
14.2.3 Color Coding Of Conductors
14.2.4 Voltage Identification
The committee wants to retain Exception No. 1. See committee action and statement on Comment 79-365 (Log #219).

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE: 25**

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97-367-(14.2.4.3(5)): Reject

**SUBMITTER:** Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO:** 79-171

**RECOMMENDATION:** Revise text to read as follows:

(3) BLUE for undergrounded dc control conductors at less than line voltage.

**SUBSTANTIATION:** The same rationale used in (1) and (2) should be applied here.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** This material is already covered in (1) of Section 14.2.4.3.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE: 25**

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97-368-(14.2.4.3(1)) : Accept in Principle in Part

**SUBMITTER:** William E. Anderson, The Procter & Gamble Company

**COMMENT ON PROPOSAL NO:** 79-122

**RECOMMENDATION:** Revise text to read as follows:

14.3.3 Conductors, cords and cables used to connect devices mounted on doors or to other movable parts shall comply with flexing requirements of Section 13.7. Conductors, cords and cables used for flexing applications shall be of sufficient length to permit full movement of the door or the movable part. The conductors shall be anchored to the fixed part and to the movable part independently of the electrical connection.

**SUBSTANTIATION:** Editorially combine existing requirements 14.5.10.4 and Exception, 14.5.10.5 and 14.5.10.6 and Exception for cords with similar [same] requirements that exist for cables in 14.3 and 14.4 for ease of use and clarity.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** Section 14.5.4.10.3 requires that the installation of cords follow 14.1.4. The permitted uses for cords are found in 14.5.10.4, 14.5.10.5, 14.5.10.6, and 14.3.7. Acceptance of the proposed text would expand the permitted use of cords.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE: 25**

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97-369-(14.3.1 & 14.3.4) : Accept

**SUBMITTER:** William E. Anderson, The Procter & Gamble Company

**COMMENTS ON PROPOSAL NO:** 79-122

**RECOMMENDATION:** Revise text to read as follows:

14.3.1 Panel conductors shall be supported where necessary to keep them in place. Nonmetallic ducts shall be permitted only when they are made with a flame-retardant insulating material.

14.3.4 Panel conductors shall be supported where necessary to keep them in place. Conductors that do not run in ducts shall be supported.

**SUBSTANTIATION:** Editorial revision to place closely related requirements together to improve readability.

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE: 25**

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97-370-(14.3.3): Reject

**SUBMITTER:** William E. Anderson, The Procter & Gamble Company

**COMMENT ON PROPOSAL NO:** 79-122

**RECOMMENDATION:** Revise text to read as follows:

14.5.10.4 Multiple-device control panels shall be equipped with terminal blocks or with attachment plugs for all outgoing control conductors. Wiring directly to the terminal connection points on input or output modules of programmable electronic systems shall be permitted.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** As stated in the ROP draft, this item number requires all outgoing wires to be terminated via terminal blocks or attachment plugs (specific exceptions being listed in 14.3.6). Sections of industry do currently allow the use of the wire termination points on input/output cards to be these "terminal blocks" because:

1) The I/O terminals are neatly organized,
2) adjacent in wire number,
3) readily accessible, etc. Based on the committee discussions concerning comment 79-371 we believe our proposed wording can be consistently enforced and/or evaluated, improve reliability, and reduce costs.

The committee believes that the current standard already allows this termination method. This revision simply clarify the issue. It explicitly states current industry practices with requirements which can be consistently enforced. This comment addresses the submitter’s concerns on comment 79-371.

**COMMITTEE ACTION:** Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25**

**VOTE ON COMMITTEE ACTION:**

**AFFIRMATIVE: 25**

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97-371-(14.3.5 Exception No. 1): Reject

**SUBMITTER:** Endel Mell, Husky Injection Molding Systems Ltd

**COMMENT ON PROPOSAL NO:** 79-122

**RECOMMENDATION:** New [14.3.5] Wiring Connection at Cabinet Interface

Add the following at the end of this clause:

Exception No. 1: Control cables may be connected directly to the devices in the cabinet provided:

There is no requirement for disconnection from the electrical cabinet (e.g., for machine shipment or servicing).

Adequate test points are provided by terminals on the devices, or other means, such as test jigs.

**SUBSTANTIATION:** Elimination of wire joints, which do not reduce the effectiveness of the machine in operation and servicing, will improve reliability and reduce costs, since possible failures at cable junctions are avoided.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** The committee believes that the language is unenforceable because it specifies "adequate" test points to be provided. The
practice described in the proposed comment is already permitted in Section 14.3.6 for power cables and cables of measuring circuits. See the action on Comment 79-370a (Log #89). 

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

COMMITTEE STATEMENT: The proposed language does not add clarity. Permitted uses of cords within control enclosures are addressed by 14.3.7.

COMMITTEE ACTION: Reject

SUBMITTER: William E. Anderson, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO: 79-370a

RECOMMENDATION: The proposed new text includes a requirement that exists for cables in 14.3 and 14.4 for ease of use and clarity.

COMMITTEE ACTION: Accept

SUBMITTER: George Schreck, Komatsu America Industries LLC

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: New text to read as follows:

14.4.2.2 Conductor external to the electrical equipment enclosure(s) shall be enclosed in raceway (duct) described in Section 14.5. Exception: Cables and cable connectors need not be enclosed in a raceway where they are protected and supported in accordance with 14.1.4 are otherwise protected and supported.

COMMITTEE ACTION: Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Review text to read as follows:

14.4.2.2 Conductors external to the electrical equipment enclosure(s) shall be enclosed in raceway (duct) described in Section 14.5. Exception: Cables and cable connectors need not be enclosed in a raceway where they are protected and supported in accordance with 14.1.4 are otherwise protected and supported.

COMMITTEE ACTION: Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: The cable handling system shall be so designed that lateral cable angles do not exceed 5 degrees, avoiding torsion in the cable when being wound on and off cable-drumms and approaching and leaving cable guidance devices.

COMMITTEE ACTION: Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Review text to read as follows:

14.4.3.6.2 Measures shall be taken to ensure that at least two turns of flexible cables always remain on a drum.

COMMITTEE ACTION: Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Review to read as follows:

14.4.3.6.1 The cable handling system shall be so designed that lateral cable angles do not exceed 5 degrees, avoiding torsion in the cable when being wound on and off cable-drumms and approaching and leaving cable guidance devices.

COMMITTEE ACTION: Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Review to read as follows:

14.4.3.6.1 The cable handling system shall be so designed that lateral cable angles do not exceed 5 degrees, avoiding torsion in the cable when being wound on and off cable-drumms and approaching and leaving cable guidance devices.
ties shall be designed so that the inner bending radius is not less than the values given in Table 14.4.3.6.3. Exception: A smaller bending radius shall be permitted if the cable is identified for the purpose.

Table 14.4.3.6.3 Minimum Permitted Bending Radii for the Forced Guiding of Flexible Cables.

SUBSTANTIATION: Editorial comment. 14.4.3.6.7 and .8 are subset groups on cable handling of 14.4.3 “Connection to Moving Elements of the Machine.” Group together, including the table and renumber accordingly for clarity. also renumber paragraphs 14.4.3.9 and 14.4.3.10 ahead of the new subset on cable handling.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

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Table 14.4.3.8 Minimum Permitted Bending Radii for the Forced Guiding of Flexible Cables

<table>
<thead>
<tr>
<th>Application</th>
<th>Cable Diameter or Thickness of Flat Cable (d)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>(d) (mm)</td>
</tr>
<tr>
<td></td>
<td>d ≤ 8</td>
</tr>
<tr>
<td>Cable drums</td>
<td>6 d</td>
</tr>
<tr>
<td>Guide rollers</td>
<td>6 d</td>
</tr>
<tr>
<td>Festoon systems</td>
<td>6 d</td>
</tr>
<tr>
<td>All others</td>
<td>6 d</td>
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</tbody>
</table>

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Table 14.5.3.1.4 Minimum Radii of Conduit Bends

<table>
<thead>
<tr>
<th>Conduit Size</th>
<th>One Shot and Full Shoe Benders</th>
<th>Other Bends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric Designator</td>
<td>Trade Size</td>
<td>mm</td>
</tr>
<tr>
<td>16</td>
<td>½</td>
<td>101.6</td>
</tr>
<tr>
<td>21</td>
<td>ø</td>
<td>114.3</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
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<tr>
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<tr>
<td>41</td>
<td>1½</td>
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<td>2</td>
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<td>5</td>
<td>609.6</td>
</tr>
<tr>
<td>155</td>
<td>6</td>
<td>762</td>
</tr>
</tbody>
</table>
Machinery,

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Renumber entire section 14.5.10 (14.5.10.1 through 14.5.10.6 inclusive) to follow 14.1.4 as new section 14.1.5.

Re-numbered sections 14.5.10 through 14.5.10.6.

SUBSTANTIATION: Current 14.5.10 Cords is under 14.5 Raceways. This appears to be an improper placement. Moving Cords to follow 14.1.4 Cables appears to be the proper location for this section. This move editorially improves clarity and readability for the user. The committee understands that this action is purely an editorial renumbering and does not change any of the previous committee comments on comments.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-382-(14.5.1.1) : Accept

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Revise text to read as follows:

14.5.1.1 Raceways (ducts), factory elbows and couplings, and associated fittings shall be listed and shall be identified for the environment.

Exception: Raceways (ducts) fabricated as part of the machine that comply with the requirements of 14.5.6 shall not be required to be listed.

SUBSTANTIATION: Editorial revision: The original requirement was indicated in Chapter 3 in the definitions of various raceway types, Proposal 79-11 (Log #37). Moving a normative requirement from the definition chapter to the appropriate normative text is consistent with the present standards format and style. The Exception is to allow for the current practice when custom raceways are constructed.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The addition of factory elbows and couplings, and associated fittings is to correlate with the revisions to the definitions of the various raceways in Chapter 3 and the NEC requirements for listing of raceways. The addition of this section was added to correlate with requirements of 14.5.7 for machine compartments and wireways.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-383-(14.5.1.5) : Accept in Principle

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: Revise text to read as follows:

14.5.1.5 Cord, conduit or cable is flexible conduit or the multiconductor cable is flexible. The specific requirement in proposed section 14.5.9.2 is overly restrictive and would disallow the use of more effective solderless connection technologies such as split bolt, bolt type pressure, screw-on, set-screw screw on, clamp-on and crimp-on types. No empirical data has been provided to substantiate why these technologies should be prohibited. The substantiation provided for proposed section 14.5.9.2 is highly subjective in nature, and appears to be without foundation.

The specific requirement in proposed section 14.5.9.2 for ring-type pressure connectors is overly restrictive and would disallow the use of more effective solderless connection technologies such as split bolt, bolt type pressure, screw-on, set-screw screw on, clamp-on and crimp-on types. No empirical data has been provided to substantiate why these technologies should be prohibited. The substantiation provided for proposed section 14.5.9.2 is highly subjective in nature, and appears to be without foundation.

The specific requirement in proposed section 14.5.9.2 "...and bolted" lacks sufficient prescription to be effectively, uniformly and safely implemented. What bolt size, with what thread pitch, of what material construction, with what flat or lock washers, torqued to what value should be used for what wire sizes? None of the fore mentioned solderless connection technologies are applied with such ambiguity. Because of the ambiguity associated with the practice identified in the proposed section 14.5.9.2, it is reasonable to conclude that the practice is actually less effective and potentially less safe than the technologies it would prohibit.

COMMITTEE ACTION: Accept in Principle

Revise 14.5.9.2 of the ROP Draft to read as follows:

14.5.9.2 Electrical connections at motor terminal boxes shall be made with an identified method of connection. Twist on wire connectors shall not be used for this purpose.

COMMITTEE STATEMENT: There are methods of connections available today which would meet the requirements of this section and is not overly restrictive.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-385-(14.5.9.2) : Accept in Principle

SUBMITTER: Endell Mell, Husky Injection Molding Systems Ltd

COMMENT ON PROPOSAL NO: 79-122

RECOMMENDATION: New [14.5.9.2] Motor Connection Boxes

Revise the clause as follows:

Electrical connections to motors - solenoids and other devices with integral leads (without fixed terminals), sizes 14 AWG through 1 AWG shall be made with ring-type pressure connectors (pressure-tool applied) and bolted. Electrical connections to motors with fixed listed terminals shall be made in accordance with the instructions of the terminal manufacturer.

SUBSTANTIATION: Devices that are not electric motors are removed from the draft to align with the clause title. Some motors (e.g., from IEC suppliers, or servo motors) are supplied with terminals or connectors fixed to the motor junction box. Termination of motor cables is executed differently from methods described in the original proposal, therefore, additional specification is needed.

COMMITTEE ACTION: Accept in Principle

COMMITTEE STATEMENT: See the committee action and statement on Comment 79-384 (Log #280).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-386-(14.5.10 and A-4.5.10.1) : Reject

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122 & 79-146

RECOMMENDATION: Revise text to read as follows:

14.5.10.1 Cord

14.5.10.1* Manufactured assemblies with factory-applied molded connectors applied to cord shall be permitted.

14.5.10.2 The use of cord shall be limited to individual exposed lengths of 15 m (50 ft) or less.

14.5.10.3 Cord shall be installed in accordance with the provision of 14.1.4.

14.5.10.4* For additional information on flexible cords, refer to ANSI/UL 62, Flexible Cord and Fixture Wire.

SUBSTANTIATION: Editorially relocate “Cords” to be a part of 14.1.2 “Conductor and Cable [and add cord] runs”. Note: Other comments that combine existing requirements 14.5.10.4 and exception, 14.5.10.5 and 14.5.10.6 and Exception for Cords with similar [same] requirements that exist for cables in 14.3 and 14.4 for ease of use and clarity.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: See committee action and statement on Comment 79-370 (Log #63).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-387-(14.5.10.4 and Exception) and 14.4.2.4, 14.4.2.3 : Reject

SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122 & 79-146

RECOMMENDATION: Revise text to read as follows:

14.5.10.4 Cord shall be permitted for use with flexible connections to pendant pushbutton stations. Chains or wire rope external to the cord shall support the weight of pendant stations.

Exception: Cords listed for the purpose shall be permitted to be used without an external chain or wire rope. [ROP 79-146 (Log #101)]

14.4.2.4* Cord, flexible conduit or multicore conductor with flexible properties shall be used where it is necessary to employ flexible connections to pendant pushbutton stations. The weight of the pendant stations shall be supported by means other than the cord, flexible conduit or the multicore conductor with flexible properties except where the cord, conduit or cable is
specifically designed for that purpose.

SUBSTANTIATION: Editorialy combine existing requirements 14.5.10.4 and Exception, 14.5.10.5 and 14.5.10.6 and Exception for cords with similar [same] requirements that exist for cables in 14.3 and 14.4 for ease of use and clarity.

Note: Proposed numbering assumes that the original 14.4.2.3 was relocated to 14.4.1.2 per another task group 2 comment.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: See committee action and statement on Comment 79-370 (Log# 63).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-389-(14.5.10.5 and 14.4.2.4, 14.4.2.5) : Accept in Principle
SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Revise text to read as follows:

14.5.10.5 Cord shall be permitted for use with connections involving small or infrequent movements, but shall also be permitted to complete the connection to normally stationary motors, limit switches, and other externally mounted devices.

14.4.2.4 Cord or flexible flexible conduit or multi-conductor cable with flexible properties shall be used for connections involving small or infrequent movements. They shall be permitted to complete the connection to stationary motors, position switches, and other externally mounted devices. Where pre-wired devices (e.g., position switches, proximity switches) are supplied, the integral cord or cable shall not be required to be enclosed in a raceway (duct).

SUBSTANTIATION: Editorialy combine existing requirements 14.5.10.4 and Exception, 14.5.10.5 and 14.5.10.6 and Exception for Cords with similar [same] requirements that exist for cables in 14.3 and 14.4 for ease of use and clarity. Note proposed numbering assumes that the original 14.4.2.3 was relocated to 14.4.1.2 per another task group 2 comment.

COMMITTEE ACTION: Accept in Principle
COMMITTEE STATEMENT: See committee action and statement on Comment 79-370 (Log# 63).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-389-(14.5.10.6 and Exception and 14.4.3.1) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Revise text to read as follows:

14.5.10.6 Connections to frequently moving parts shall be made with multi-conductor flexible cords and multi-conductor flexible cables that are otherwise permitted on industrial machines, and raceways functionally associated with industrial manufacturing systems.

SUBSTANTIATION: The proposed text limits single conductors supported by machine mounted cable trays to 1/0 AWG and larger, and the new text will clarify that where cables smaller than 1/0 AWG are similarly supported they are to be multi-conductor.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee is unaware of multiconductor flexible cords listed for use in cable tray systems. In addition, NFPA 70, Table 392.3(A) does not permit the use of cords within cable trays. See action on Comment 79-389a (Log #CC17).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-389a-(14.5.11) : Accept
SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Revise section 14.5.11 of the ROP draft to read as follows:

14.5.11 Cable Trays. Cable trays to be used for cable or raceway support on industrial machines shall be permitted. Cable trays shall be permitted to support single conductors 1/0 or larger that are otherwise permitted on industrial machines.

(2) Multi-conductor flexible cables that are otherwise permitted on industrial machines.

(3) Raceways functionally associated with industrial manufacturing systems.

SUBSTANTIATION: This comment clarifies the requirement by breaking the second from the last sentence of 14.5.11 into an enumerated list. The original sentence was extremely long and cumbersome. This revision results in no technical changes, it is purely editorial. This action will editorially improve clarity and readability for the user.

This revision includes all committee actions on comments taken during the ROC meeting.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-390-(14.5.11) : Accept in Principle in Part
SUBMITTER: Melvin K. Sanders, TECo., Inc.

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Add in the second sentence: “multi-conductor flexible cords and multi-conductor flexible” after “industrial machines.”

14.5.11 Cable trays. Cable trays to be used for cable or raceway support on industrial machines shall be permitted. Cable trays shall be permitted to support single conductors 1/0 or larger that are otherwise permitted on industrial machines, multi-conductor flexible cords and multi-conductor flexible cables that are otherwise permitted on industrial machines, and raceways functionally associated with industrial manufacturing systems.

SUBSTANTIATION: The proposed text limits single conductors supported by machine mounted cable trays to 1/0 AWG and larger, and the new text will clarify that where cables smaller than 1/0 AWG are similarly supported they are to be multi-conductor.

COMMITTEE ACTION: Accept in Principle in Part
COMMITTEE STATEMENT: The committee is unaware of multiconductor flexible cords listed for use in cable tray systems. In addition, NFPA 70, Table 392.3(A) does not permit the use of cords within cable trays. See action on Comment 79-389a (Log #CC17).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-391-(14.5.11, 14.5.8 and 14.5.9) : Reject
SUBMITTER: William E. Anderson, The Procter & Gamble Company

COMMENT ON PROPOSAL NO: 79-122
RECOMMENDATION: Revise text to read as follows:

14.5.89 Connection Boxes and Other Boxes.
14.5.910 Motor Connection Boxes.
14.5.48 Cable Trays. Cable trays to be used for cable or raceway support on industrial machines shall be permitted. Cable trays shall be permitted to support single conductors 1/0 or larger that are otherwise permitted on industrial machines, cables that are otherwise permitted on industrial machines, and raceways functionally associated with industrial manufacturing systems.

1 Single conductors 1/0 or larger that are otherwise permitted on industrial machines.
(2) Cords or cables that are otherwise permitted on industrial machines.
(3) Raceways that are functionally associated with industrial manufacturing systems.

SUBSTANTIATION: The committee is unaware of multiconductor flexible cords listed for use in cable tray systems. In addition, NFPA 70, Table 392.3(A) does not permit the use of cords within cable trays. See action on Comment 79-389a (Log #CC17).

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The attempt to reorganize this material contains a substantive change to add cords to cable trays. See action on Comment 79-389a (Log #CC17).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

79-392-(15.5 (7)) : Reject

COMMENT ON PROPOSAL NO: 79-79
RECOMMENDATION: Revise text as follows:

15.5
(7) Method of starting and possible influence of the in-rush current on the operation of other users, taking into account possible special considerations stipulated by the supply authority. The user shall state these requirements using the inquiry form in Appendix B.

SUBSTANTIATION: The manufacturer does not know these requirements.
The user must participate in supplying these requirements.

**COMMITTEE ACTION**: Reject

**COMMITTEE STATEMENT**: The proposed additional text would constitute a violation of the NFPA Manual of Style Section 2.3.9.2 by including a mandatory reference to informative text.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-393-(15.7)**: Accept

**SUBMITTER**: George Schreck, Komatsu America Industries LLC

**COMMENT ON PROPOSAL NO**: 79-149

**RECOMMENDATION**: Add new text as follows:

15.7 Direction Arrow. Where reverse rotation can produce an unsafe condition or cause damage to connected equipment a direction arrow shall be installed. The arrow shall be adjacent to the motor and plainly visible.

**SUBSTANTIATION**: Need to provide visible protection to avoid damage to driven equipment if it is rotated in the reverse direction - typical need would be to protect lube and hydraulic pumps.

**COMMITTEE ACTION**: Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-393a-(16.2.1.1)**: Accept

**SUBMITTER**: Technical Committee on Electrical Equipment of Industrial Machinery

**COMMENT ON PROPOSAL NO**: 79-105

**RECOMMENDATION**: In Section 16.2.1.1, revise the reference pointer (8.5). The proper cross-reference is 8.4.

**SUBSTANTIATION**: There is no section 8.5. Editorially correct improper cross reference.

**COMMITTEE ACTION**: Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-394-(16.2.1.2)**: Reject

**SUBMITTER**: Kurt Zierlut, Haas Automation

**COMMENT ON PROPOSAL NO**: 79-105

**RECOMMENDATION**: Revise text to read as follows:

The requirement for “ground fault protection” of work lights is unnecessary. This might make more sense if it was for a movable light or was not sealed against liquids. As it is, the third sentence of 16.2.1.2 should be deleted.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 23

**NEGATIVE**: 2

**EXPLANATION OF NEGATIVE**: DOBBROWSKY: The comment should be accepted. Many work lights are designed for use on machine tools and have been evaluated for use without GFCI protection. This requirement is not in IEC 60204-1.

**PADGFT**: I agree with the comments in Mr. Dobrowsky’s Explanation of Negative Vote.

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**79-395-(16.2.4.2)**: Accept

**SUBMITTER**: Thomas Pilz, Pilz Automation Safety L.P.

**COMMENT ON PROPOSAL NO**: 79-105

**RECOMMENDATION**: Revise to read as follows:

(2) Constructed with an insulating material protecting the lamp so as to prevent unintentional contact; except where fixed lighting is out of reach of normal maintenance and other personnel who may have to perform tasks above normal access level.

**SUBSTANTIATION**: Eliminate the Exception to improve clarity and to protect maintenance and other personnel who may have to perform tasks above normal access level.

**COMMITTEE ACTION**: Accept

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-396-(17.2.1)**: Reject


**COMMENT ON PROPOSAL NO**: 79-171

**RECOMMENDATION**: Revise text to read as follows:

Enclosures that do not clearly show that they contain hazardous electrical devices shall be marked with a...

**SUBSTANTIATION**: If there are no hazards, then safety signs should not be required. This adds some clarification even though to most, it should be obvious.

**COMMITTEE ACTION**: Reject

**COMMITTEE STATEMENT**: The committee believes that adequate direction is provided in Section 17.2.3 to determine when safety signs for an electrical enclosure are required.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-397-(17.2.1)**: Reject

**SUBMITTER**: Nick Momcilovic, QTI

**COMMENT ON PROPOSAL NO**: 79-171

**RECOMMENDATION**: Revise text to read as follows:

Enclosures that do not clearly show that they contain electrical devices shall be marked either with a safety sign in accordance with ANSI Z535 series, which deal with product safety signs or with the graphical symbol 60417-2-IEC-5016 and the whole sign in accordance with B.3.6 of ISO 3864. [insert pictogram of symbol]

**SUBSTANTIATION**: By adding the recommended text above, this brings this clause in harmonization with IEC 60204-1. The lightning bolt in a triangle symbol is understood worldwide. The future of international standardization is quickly moving towards symbology-only warning labels.

**COMMITTEE ACTION**: Reject

**COMMITTEE STATEMENT**: The proposed text would add a mandatory reference to a product standard that is in conflict with ANSI Z535.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-398-(17.2.4)**: Reject

**SUBMITTER**: Paul Dobrowsky, Holley, NY

**COMMENT ON PROPOSAL NO**: 79-18

**RECOMMENDATION**: Revise 17.2.4 as follows: A safety sign shall be provided adjacent to the disconnecting operating handle(s) where the disconnect(s) that is interlocked with the enclosure door does not de-energize all exposed live parts operating at 50 volts or more when the disconnect(s) is in the open (off) position.

**SUBSTANTIATION**: To correspond with the new definition and add clarity for which live parts need to be disconnected.

**COMMITTEE ACTION**: Reject

**COMMITTEE STATEMENT**: The assumption that voltage levels are the only criteria when evaluating the safety aspect against electrical hazard is not correct. The committee believes it is still possible for a hazardous condition to be present at circuits operating at less than 50 volts.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE**: 25

**VOTE ON COMMITTEE ACTION**:

**AFFIRMATIVE**: 25

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**79-399-(17.4.1)**: Accept

**SUBMITTER**: Michael F. Crampton, General Motors - Controls, Robotics, & Welding

**COMMENT ON PROPOSAL NO**: 79-18

**RECOMMENDATION**: Add back the deleted bullet as follows: -short-circuit interrupting rating of the machine overcurrent protective device, where furnished as part of the equipment.

**SUBSTANTIATION**: Problem: The nameplate is for use after the machine is installed. The user or owner should be able to see from the nameplate what the short-circuit interrupting capacity of the machine is. The revision as it stands attempts to clear the discrepancy that the short-circuit interrupting capacity of the disconnecting means is not always the short-circuit interrupting capacity of the machine. However, the baby has been thrown out with the wash water. Changing the original bullet wording to read “machine overcurrent protective device”, rather than “Machine disconnecting means” reduces
the specificity of where the interrupting capacity of the machine is taken from, and still maintains the nameplate information critical to ensuring the system is designed safely and coordinated correctly with the plant electrical supply system.

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: It is the intent of the comment that this text be added as a new item 6 and move the current item 6 to become item 7.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 24 NEGATIVE: 1
EXPLANATION OF NEGATIVE: GARVEY: The submitter requested the short-circuit rating of the machine overcurrent protective device be placed on the machine nameplate. The panel votes to accept the comment. Yet the submitter’s statement indicated “The user of this document should be able to see from the nameplate what the short-circuit interrupting capacity of the machine is.” (The submitter of the comment underlined the word “machine”.) I agree with this statement.

The short-circuit interrupting rating of the machine is not the same as the short-circuit interrupting capacity of the machine overcurrent protective device. UL 508 does not require that this rating be established. The combination of the machine overcurrent protective device in combination with other branch-circuit rated devices on the machine is normally not a series rated system. A conservative estimate of the short-circuit rating of the machine would be the short circuit withstand rating of the lowest rating of the least rated relay or contactor in the control panel. This value may be as low as 5000-amperes.

The value of the short-circuit interrupting rating of the main circuit breaker or fusible switch is probably much greater. It may be as high as 50,000 or 100,000-amperes. If we vote to place the interrupting capacity of machine overcurrent protective device on the nameplate, we will mislead some users and operators. The language in the ROP draft did not contain this proposed requirement for this reason. We should return the ROP draft language by rejecting this comment.

The nameplate should yield information critical to ensuring the machine can be safely installed on the factory floor. The committee should address the real problem during the next cycle.

COMMENT ON AFFIRMATIVE: CALLANAN: The Committee has debated this issue for a considerable period of time. It appears that for the purposes of the nameplate information, this is the correct information and the bulleted item should appear as the proposal included. However, I agree with the submitter of the Comment that the goal is to be able to determine the short-circuit interrupting capacity of the machine so the components of the machine can comply with Sections 110.9 and 110.10 of the NEC. This is what is important to the end user and also to any personnel that may work on the equipment. I believe that additional work and perhaps research needs to be conducted to determine how this issue can best be resolved to meet the needs of the machine builder and the end user. It is my intention to form a Task Group to begin work immediately to develop proposals for the next edition of NFPA 79 that may, perhaps, identify a method to provide this important information.

VOTING: I agree with the committee action to add the deleted bullet “short-circuit interrupting rating of the machine overcurrent protective device, where furnished as part of the equipment” back into 17.4.1.

Two of the bullets in 17.4.1 for the machine nameplate data are as follows:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

(6) Short-circuit interrupting rating of the machine overcurrent protective device, where furnished as part of the equipment

The requirement is that both NFPA 79 (1974) and NEC 70 Article 670.3. The requirements of bullets (5) and (6) confuse committee members, engineers, and users. They believed the bullets are either the same or do not understand the meanings at all. Example: See proposal 79-401 (Log #452). The committee’s action to add bullet (6) back into 17.4.1 is acceptable because bullet (5) should not be in 17.4.1 without bullet (6). In the future, I would recommend that both bullets be either deleted or clearly written in NEC 70 Article 670 and NFPA 79 so there is no mistake the intent of the requirement. The next step would be to revise NEC 70 Article 670 and then follow with NFPA 79.

The required values of the ratings in these bullets are as follows:
1. Bullet 5 is the ampere rating of the main disconnecting means fuse or circuit breaker, where provided.
2. Bullet 6 is either the short-circuit interrupting rating specified on the circuit breaker or the short-circuit interrupting rating specified on a fused disconnect switch (or accompanying literature). The value for a fused main disconnect switch shall be no greater than the maximum specified by a nationally recognized testing laboratory for the disconnect switch and fuse combination.

RECOMMENDATION: The Technical Correlating Committee directs the committee to consider the comments expressed in the voting. This action will be considered by the committee as a public comment.

SUBSTANTIATION: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3-4.2 and 3-4.3 of the Regulations Governing Committee Projects.

COMMITTEE ACTION: Accept
COMMITTEE STATEMENT: The committee did consider the comments expressed in the voting. See the committee action and statement on Comment 79-399 (Log #127).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

COMMENT ON AFFIRMATIVE: WITHROW: I accept the committee action on this proposal. However, I don’t believe the committee addressed the comments expressed in the correct proposal. The TCC proposal 79-400 (Log #400) directed the committee to consider the comments expressed in the voting on ROP proposal 79-23 (Log #45).

One of the comments on the ROP proposal 79-23 was a method the to establish the value for the nameplate short-circuit interrupting rating of the machine overcurrent protective device as follows: 17.4.1.1 The value for the nameplate short-circuit interrupting rating of the machine overcurrent protective device shall be either: – the short-circuit interrupting rating as specified on a circuit breaker, or – the short-circuit interrupting rating specified on a fused disconnect switch or accompanying literature. This value shall be no greater than the maximum specified by a nationally recognized testing laboratory for the disconnect switch and fuse combination.

As author of the above comment, I withdraw my comments on the ROP proposal 79-23 (Log #45).

RECOMMENDATION: Delete the following text:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

SUBSTANTIATION: The original text in NFPA 79 (1997) and IEC 60204-1 (1997) is more clear than the modified text.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The requirement for item (5) correlates with the requirement in 670.3(A) of the NEC.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

RECOMMENDATION: 79-401-(17.4.1.5) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Delete the following text:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

SUBSTANTIATION: This requirement does not add any level of safety to equipment and is not in harmony in 17.4 of IEC 60204-1 (1997).

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not agree with the submitter’s substantiation that this requirement does not add an additional level of safety. The purpose of Section 17.4.5 is to indicate that there is overcurrent protection supplied in the main part of the machine. The committee notes that it is also a required marking in Section 670.3(B) of the NEC and was part of NFPA 79-1997 Section 4.7.3.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Delete the following text:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

SUBSTANTIATION: This requirement does not add any level of safety to the machine shall be marked “overcurrent protection provided at machine supply terminals.” a separate nameplate shall be permitted to be used for this purpose.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not agree with the submitter’s substantiation that this requirement does not add an additional level of safety. The purpose of Section 17.4.5 is to indicate that there is overcurrent protection supplied in the main part of the machine. The committee notes that it is also a required marking in Section 670.3(B) of the NEC and was part of NFPA 79-1997 Section 4.7.3.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

RECOMMENDATION: 79-402-(17.4.5) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Delete the following text:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

SUBSTANTIATION: This requirement does not add any level of safety to equipment and is not in harmony in 17.4 of IEC 60204-1 (1997).

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not agree with the submitter’s substantiation that this requirement does not add an additional level of safety. The purpose of Section 17.4.5 is to indicate that there is overcurrent protection supplied in the main part of the machine. The committee notes that it is also a required marking in Section 670.3(B) of the NEC and was part of NFPA 79-1997 Section 4.7.3.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23

RECOMMENDATION: 79-402-(17.4.5) : Reject
SUBMITTER: Nick Momcilovic, QTI
COMMENT ON PROPOSAL NO: 79-171
RECOMMENDATION: Delete the following text:

(5) Maximum ampere rating of the short-circuit and ground-fault protective device, where provided

SUBSTANTIATION: This requirement does not add any level of safety to the machine shall be marked “overcurrent protection provided at machine supply terminals.” a separate nameplate shall be permitted to be used for this purpose.

COMMITTEE ACTION: Reject
COMMITTEE STATEMENT: The committee does not agree with the submitter’s substantiation that this requirement does not add an additional level of safety. The purpose of Section 17.4.5 is to indicate that there is overcurrent protection supplied in the main part of the machine. The committee notes that it is also a required marking in Section 670.3(B) of the NEC and was part of NFPA 79-1997 Section 4.7.3.
contractor, and the machine manufacturer, the manufacturer can furnish the supply conductors and overcurrent protective device for the supply conductors to the main disconnecting means. Using section 7.2.2 and the section 1.4 comments, the user can include this requirement in Appendix B. The machine manufacturer shall install an additional nameplate, which reads “supply conductor and overcurrent protective device for the supply conductor provided to the machine supply terminals.”

RECOMMENDATION: ON PROPOSAL 79-402a LOG #CC2
Reject the approved proposal 79-402a Log # CC2 and editorially change the reference in 17.4.5 from 7.2.3 to 7.2.2.

79-403-(18.1.3) : Accept
SUBMITTER: Gary J. Locke, Lockheed Martin Systems Integration
COMMENT ON PROPOSAL NO: 79-19
RECOMMENDATION: 18.1.3 Technical documentation shall be permitted to be supplied in medium as agreed upon format by the machinery supplier and the recipient user of the machinery.

SUBSTANTIATION: The text in proposed section 18.1.3 states the obvious, and serves no useful purpose as written.

The use of the word “format” is inappropriate relative to the documented substantiation provided; i.e., “This section was added to permit electronic format only if agreed upon.” The use of the word “medium” is more appropriate as it can be used to describe a commercial entity’s standard technical documentation layout approach. Semantics relative to the use of the word “format” would contribute to confusion on the part of the users of this standard, and economic waste.

Technical documentation provided to the user of the machinery is of little value if it is not provided in a user-friendly medium. If the user cannot access the technical data because non-viable medium was provided relative to the user’s environment, an unsafe condition would result. The user would be forced to interact with, and attempt to maintain, the machinery without the benefit referencing the germane and pertinent information required by this standard. In order to enhance safety in the work place, the technical data must be supplied in a medium useable by, and acceptable to, the user community.

COMMITTEE ACTION: Accept
Revise 18.1.3 of the ROP Draft to read as follows:
18.1.3 Technical documentation shall be supplied in medium agreed upon by the machinery supplier and the user of the machinery.

COMMITTEE STATEMENT: Editorial correction.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 23
NEGATIVE: 1
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 24
NEGATION: 1
the PLC or operator interface, etc.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that it is difficult (in some cases impossible) to troubleshoot a machine without comprehending the logic which controls its action; whether that logic is configurable by the user or not. In addition, the requirement “where appropriate” addresses the concerns of the submitter.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-406-(18.7.3 Exception) : Reject

SUBMITTER: Michael H. Appold, Delphi Saginaw Steering Systems

COMMENT ON PROPOSAL NO: 79-19

RECOMMENDATION: Add the following:

Exception: Switch symbols for solid-state sensors, such as proximity switches, shall be shown on the electrical schematic diagrams with electrical power turned ON.

SUBSTANTIATION: The intent of existing clause 18.7.3 is to reflect a machine in its “normal” state/condition/position, to ease in troubleshooting. The majority of position sensors used on machinery are proximity sensors. With electrical supply turned off (existing wording) all proximity sensors would be drawn identical (N.O. open), regardless of physical tooling position. With electrical supply turned on (proposed wording): up to one-half of the sensors would be drawn in true state - N.O held closed, indicative of machine position.

- Without this exception, the existing clause accomplishes its intent for all devices except solid state sensors.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The exception creates uncertainty that may result in misapplications in troubleshooting and perhaps even safety related concerns. In addition, built in diagnostics and machine sequence diagrams will assist in troubleshooting.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-406a-(18.7.6): Accept

SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery

COMMENT ON PROPOSAL NO: 79-19

RECOMMENDATION: Add a new exception to Section 18.7.6 of the ROP Draft to read as follows:

Exception: Upon agreement between the machine manufacturer and the user, an alternate convention shall be permitted (e.g. one of the IEC standard presentation methods).

SUBSTANTIATION: The committee is aware that there are maintenance organizations that normally use other control elementary documentation presentation methods and that it should be possible to obtain the necessary documentation while using this standard.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-410-(18.10.2 (3)) : Accept


COMMENT ON PROPOSAL NO: 79-19

RECOMMENDATION: Revise text as follows:

18.10.2 Supplier and alternative sources where available

(1) Supplier and (supplier’s part number) alternative sources where available
(2) Its general characteristics where appropriate
(3) Quantity of items with the same reference designation

SUBSTANTIATION: Grammatical errors.

Alternative sources should not be required for parts lists. Our service parts manuals include this information. This mandate would create unnecessary duplication and would increase drawing maintenance. Alternative sources may be determined by a purchasing department after design is complete and not necessarily in engineering at the time of drawing creation. The sample parts list shown in Annex D does not show an “alternative source”.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The committee understands that the action on this comment would insert an asterisk after 18.10 with an Annex note, A 18.10, to read as follows: A.18.10 See D.1(a).

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-408-(18.7.6): Reject

SUBMITTER: Endell Mell, Husky Injection Molding Systems Ltd

COMMENT ON PROPOSAL NO: 79-21

RECOMMENDATION: Add the following to the end of 18.7.6: Alternatively, circuit devices shown between horizontal lines according to IEC standard practice, shall be permitted.

SUBSTANTIATION: Commercial electrical schematic drawing programs exist that provide good schematic circuit diagrams, in IEC format. These circuit formats are accepted and utilized by some UL cabinet builders, and end customers. Embracing these alternatives in this specification will help to achieve harmonization with EN 60204.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The comment does not provide sufficient information to require drawings to conform to IEC standards. See Comment 79-406a (Log #CC6) which adds an exception that will permit alternate conventions to be used where the machine manufacturer and user agree.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-409-(18.10): Accept

SUBMITTER: Richard E. Kreamelemeyer, Cincinnati Machine

COMMENT ON PROPOSAL NO: 79-19

RECOMMENDATION: Revise text to read as follows:

18.10 Parts List

18.10.2 The parts list shall show the following for each item:
(1) Reference designation used in the documentation
(2) Its type designation
(3) Supplier and (supplier’s part number) alternative sources where available
(4) Its general characteristics where appropriate
(5) Quantity of items with the same reference designation

SUBSTANTIATION: The committee believes that it is difficult to achieve harmonization with EN 60204.

COMMITTEE ACTION: Accept

COMMITTEE STATEMENT: The exception creates uncertainty that may result in misapplications in troubleshooting and perhaps even safety related concerns. In addition, built in diagnostics and machine sequence diagrams will assist in troubleshooting.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-407-(18.7.6): Reject

SUBMITTER: Richard E. Kreamelemeyer, Cincinnati Machine

COMMENT ON PROPOSAL NO: 79-19

RECOMMENDATION: Revise text to read as follows:

18.7.6 AC (single phase) and DC control circuit devices shall be shown between vertical lines that represent control power wiring. The left vertical line shall be the control circuit’s common and the right line shall be the operating coil’s common, except where permitted by Chapter 9 design requirements.

SUBSTANTIATION: 18.7.6 does not follow the example diagram in IEC 61082-1 Section 2.2.1.10 circuit diagram (figures 4, 5, and 7). Paragraph 18.7.2 notes that IEC 61082-1 should be used for examples of circuit diagrams. This example shows only 3 phase circuits and not single phase AC or DC control circuits and is not identified as such in their wording. NFPA intent is unclear as to follow IEC practices or 18.7.6 and NFPA 79 Annex D methods.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The proposed revision to Section 18.7.6 is unnecessary and does not add clarity and does not assist in the usability of this section.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-411-(19.1): Reject

SUBMITTER: Kurt Zierhut, Haas Automation

COMMENT ON PROPOSAL NO: 79-159

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The committee believes that it is difficult to troubleshoot a machine without comprehending the logic which controls its action; whether that logic is configurable by the user or not. In addition, the requirement “where appropriate” addresses the concerns of the submitter.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25
19.3 Insulation Resistance Tests. The insulation resistance measured at 500 V d.c. between the power circuit conductors and the protective bonding circuit shall be not less than 1 Megohm. The test shall be conducted and documented. When the electrical equipment is modified, the continuity of grounding shall be retested and documented by the qualified person making the modifications. The requirements in Section 19.7 shall apply.

SUBSTANTIATION: This change will remove any ambiguity as to who is required to do re-testing. Otherwise, there would be a completely open requirement possible on the manufacturer even when it is not in control of changes.

COMMITTEE ACTION: Reject

COMMITTEE STATEMENT: The reference to the requirements in Section 19.7 provides the direction that only the “changed” portion of the machine requires the “retest” and therefore eliminates ambiguity. It is beyond the scope of this document to define “who” will perform the retest, especially given an extended period of operation from the initial installation and commissioning of the system. This requirement is intended to provide guidance to the user, if and when major changes are performed.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-414-(19.3) : Accept in Principle
SUBMITTER: Kurt Zierhut, Haas Automation

COMMITTEE STATEMENT: See panel action and statement on Comment 79-414-(19.3) as follows:

The requirement to re-test is vague as to who may do the modifications and who is required to do the re-testing. This should be modified to be specific to just the end user. There are already requirements for testing by the manufacturer so this is the obvious change that should be made.

19.1* General. The verification of the continuity of the equipment grounding (protective bonding) circuit shall be conducted and documented. The requirement to re-test is vague as to who may do the modifications and who is required to do the re-testing. This should be modified to be specific to just the end user. There are already requirements for testing by the manufacturer so this is the obvious change that should be made.

COMMITTEE STATEMENT: The text of Section 19.3 was inadvertently omitted from the ROP Draft but appeared in the ROP Proposal 159 and should be included. The Exception as shown in the ROP Proposal 79-150 is not required because the application referred to has been deleted from the specific requirements within the Standard.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-415-(19.4) : Reject
SUBMITTER: William Johnston, Brown Machine LLC


NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-416-(19.5) : Accept
SUBMITTER: Nick Momcilovic, QTI


NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-417-(19.7) : Reject
SUBMITTER: Kurt Zierhut, Haas Automation

COMMITTEE STATEMENT: The change will remove any ambiguity as to who is required to do re-testing. Otherwise there would be a completely open requirement possible on the manufacturer even when it is not in control of changes.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-418-(19.7) : Reject
the Plastics Industry, Inc.

**COMMENT ON PROPOSAL NO:**79-159

**RECOMMENDATION:** Revise text as follows: 19.7 Retesting. Where a portion of the machine and its associated equipment is changed or modified, that portion shall be reverified and retested as appropriate. Disassembly and re-assembly is not considered to be a change or modification.

**SUBSTANTIATION:** It is not practical or necessary to repeat this text when ever some disassembly takes place, such as in installation or maintenance.

**COMMITTEE ACTION:** Reject

**COMMITTEE STATEMENT:** Sees committee action and statement on Committee 79-4 (Annex A) as desirable. The committee believes that disassembly and reassembly could effect the continuity of the equipment grounding circuit.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

97-419-(Chapter 20 Bibliography) : Accept in Principle

**SUBMITTER:** Thomas Pilz, Pilz Automation Safety L.P.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** Affirmative: 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

97-420-(Annex A) : Accept

**SUBMITTER:** Technical Correlating Committee National Electrical Code,

**COMMITTEE ACTION:** The Technical Correlating Committee directs the committee to review the use of all NOTES throughout the document. The Technical Correlating Committee recognizes that the committee desire is in conflict with the NFPA Manual of Style. However, the Technical Correlating Committee offers two possible directions for the Technical Committee to proceed for this edition of NFPA 79.

Option 1: Convert all of the NOTES to FPN’s (as used in the NEC). However, in doing so, the committee must review each of the notes and adhere to the strict FPN guidelines as used in the NEC. The FPN cannot contain any requirements, alternatives, interpretations of the requirement, or permissive statements. Examples of unacceptable NOTES are found in, but are not limited to, 1.1 Note 1 (Proposal 79-8), 1.1 Note 2 (Proposal 79-8), 3.5 NOTE (Proposal 79-11), 3.20 NOTE (Proposal 79-11), 3.87 NOTE (Proposal 79-11), 4.4.2 NOTE (Proposal 79-24). If the material cannot be rewritten to comply with these rules, then it should be deleted.

The Technical Correlating Committee would ask the NFPA Standards Council to allow this option for this edition of NFPA 79.

Option 2: The Technical Committee is to relocate all explanatory NOTES to Annex A of the document in accordance with the NFPA Manual of Style. In this arrangement, the required rules for the content of the NOTE is not as restrictive of the FPN concept used in the NEC. The FPN does not contain any requirements, alternatives, interpretations of the requirement, or permissive statements. Examples of unacceptable NOTES are found in, but are not limited to, 1.1 Note 1 (Proposal 79-8), 1.1 Note 2 (Proposal 79-8), 3.5 NOTE (Proposal 79-11), 3.20 NOTE (Proposal 79-11), 3.87 NOTE (Proposal 79-11), 4.4.2 NOTE (Proposal 79-24). If the material cannot be rewritten to comply with these rules, then it should be deleted.

**COMMITTEE ACTION:** Accept

**COMMITTEE STATEMENT:** The committee has selected Option 2 of the recommendation.

**NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE:** 25

**VOTE ON COMMITTEE ACTION:** AFFIRMATIVE: 25

**COMMENT ON AFFIRMATIVE:** BLOODGOOD: When the procedures outweigh the ‘product’ (i.e., that understanding and use of a standard) then the user of the standard is the loser. This the case with the MOS procedure which requires that all notes be moved to Annex A which makes the full understanding of the various requirements difficult at best. When the reader must turn to the back of the document on a continuous basis they will either lose continuity or simply not use Annex A. An unfortunate result. As to the possibility of making all of the notes Fine Print Notes, I gave this some thought but discarded it as this would only be allowed for one cycle.

KIIHR: I am, unfortunately, forced to hold my nose and vote in the affirmative for this committee action. Although I am opposed to the action itself, I think that it is our only alternative at this point.

I am extremely disappointed in the action of the NEC Technical Correlating Committee in this matter. They have in effect “blind-sided” the NFPA 79 Technical Committee with this comment. The NFPA 79 Technical Committee has repeatedly expressed our distaste with the Manual of Style requirement that all explanatory notes be located in the Annex of the document. At every turn we were told that this is a Manual of Style issue, and that we had no alternative. Then at the 11th hour, the Technical Correlating Committee submits this comment 79-420, which allows us the option to place the notes back into the document, provided we make extensive editorial corrections to every one of the notes. At this late stage of the process, we had no choice but to leave the notes in Annex A.

The placement of all notes in an Annex does not aid in the usability of the document for the user. In fact, by placing the notes well away from where they are required, the notes become virtually useless. One solution to this problem would be for the NFPA to publish this document electronically. By this, I mean more than just a simple PDF version of the printed document. If the notes were electronically linked to the relevant sections of the document, then they would only be a mouse click away. This would greatly aid the end user of the document.
A.9.4.1.2.2 Provisions for redundancy

By providing partial or complete redundancy it is possible to minimize the probability that one single failure in the electrical circuit can result in a hazardous condition. Redundancy can be effective in normal operation (i.e., on-line redundancy) or designed as special circuits that take over the protective function (i.e., off-line redundancy) only where the operating function fails. A.9.4.1.2.2.1

A.9.4.1.2.2.2 Where off-line redundancy that is not active during normal operation is used, suitable measures should be taken to ensure that these control circuits are available when required.

A.9.4.1.3 Use of diversity

A.9.4.1.3.1 The use of control circuits having different principles of operation or differing types of devices can reduce the probability of faults and failures giving rise to hazards. Examples include the following:

1. The combination of normally open and normally closed contacts operated by interlocking guards.
2. The use of different types of control circuit components in the circuit.
3. The combination of electromechanical and electronic circuits in redundant configurations.
4. The combination of electrical and nonelectrical systems (e.g., mechanical, hydraulic, pneumatic) can perform the redundant function and provide the diversity.

A.9.4.1.4 Functional tests

Functional tests can be carried out automatically by the control system, or manually by inspection or tests at start-up and at predetermined intervals, or a combination as appropriate (see also Sections 18.2 and 19.6).

SUBSTANTIATION: Information in Annex note was originally in normative text, when it was moved to a note the paragraph identification was removed. Paragraph identification and previously used heading were added back. The paragraph identification is needed for cross-reference as well as readability, which is added in this committee proposal.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

_________________________________________________________

79-423-(A.3.3.13 Circuit Breaker): Accept

SUBMITTER: Paul Dobrowsky, Holley, NY

COMMENT ON PROPOSAL NO: 79-11

RECOMMENDATION: Add a Note in Annex A to the definition for circuit breaker (3.3.13) to match the text in the 2002 NEC.

Note to Reader: The automatic opening means can be integral, direct acting with the circuit breaker or remote from the circuit breaker.

SUBSTANTIATION: To be consistent with the language used in the NEC.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

_________________________________________________________

79-423a-(A.9.4.1): Accept

SUBMITTER: Technical Committee on Electrical Equipment of Industrial Machinery,

COMMENT ON PROPOSAL NO: 79-67

RECOMMENDATION: Replace existing A.9.4.1 in ROP Draft with the following:

A.9.4.1. General

A.9.4.1.1.1 Measures to reduce these risks include but are not limited to the following:

1. Protective devices on the machine (e.g., interlock guards, trip devices)
2. Protective interlocking of the electrical circuit
3. Use of proven circuit techniques and components (see A.9.4.1.2.1)
4. Provisions of partial or complete redundancy (see A.9.4.1.2.2) or diversity (see A.9.4.1.2.2.)
5. Provision for functional tests (see A.9.4.1.4)

A.9.4.1.2 In general, only single failures are to be regarded. In the event of higher levels of risk, it can be necessary to ensure that more than one failure cannot result in a hazardous condition.

A.9.4.1.2.1 Measures to minimize risk in the event of failure

A.9.4.1.2.1 Use of proven circuit techniques and components

Measures to minimize risk in the event of failure include the use of proven circuit techniques and components. These measures include but are not limited to the following:

1. Bonding of control circuits for operational purposes (see 9.4.2.1)
2. Operation of the control device (i.e., the operating coil) connected to the bonded conductor and all switching elements (e.g., contacts) contacted to the nonearthed (grounded) side of the control supply (see 9.4.2.1)
3. Stopping by de-energizing (see 9.2.2)
4. Switching of all live conductors to the device being controlled
5. Use of switching devices having positive opening operation (see IEC 60947-5-1)
6. Circuit design to reduce the possibility of failures causing undesirable operations

A.9.4.1.2.2 Provisions for redundancy
These documents are very expensive and may:
(1) confuse the intent of the NFPA if read in context of the entire IEC standard.
(2) increase the tendency for non-compliance and
(3) provides unnecessary complexity.
If the intent of NFPA is to comply with IEC, then so state with exceptions. NFPA intent is ambiguous and will not promote uniformity of documentation across the industry. Our products are CE marked and TUV inspected using the current NFPA 79 JIC format. This is accepted worldwide on our export machines. The IEC references should be eliminated or a more accurate example from IEC should be placed in Annex D.

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION: AFFIRMATIVE: 25

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AFFIRMATIVE: 25

VOTE ON COMMITTEE ACTION:

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97-425-(A-18.7.2) : Accept
SUBMITTER: Richard E. Kreamelmeyer, Cincinnati Machine
COMMENT ON PROPOSAL NO: 79-19
RECOMMENDATION: Revise text to read as follows: A-18.7.2 Examples of circuit diagrams can be found in in IEC 61082-1 and IEC 61082-2.5 Annex D.
SUBSTANTIATION: Annex D uses the “USA version (JIC)” of a ladder diagram (rails with rungs) ref. 18.7.6, and IEC uses the DIN standard. The two methods are not the same and will generate confusion and inconsistencies if the IEC standard is referenced. The reference designator examples shown in IEC 61082-1 do not reflect what is shown in Annex E examples. Which is valid? What is the difference between the terms “electrical diagrams” (A.18.7.1) AND “circuit diagrams” (A.18.7.2)? Our products are CE marked and TUV inspected using the current NFPA 79 JIC format. This is accepted worldwide on our export machines. The IEC references should be eliminated or a more accurate example from IEC should be placed in Annex D.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

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97-426-(Annex B.6, 13, 18, 33..) : Accept
SUBMITTER: Melvin K. Sanders, TECO Inc.
COMMENT ON PROPOSAL NO: 79-163
RECOMMENDATION: I propose these revisions to the following questions:
6. Non-ionizing radiation
13. Type of power supply earthing system grounding (see IEC 0936A)
IT system with one point directly earthed, with a protective conductor (PE) connected directly to that point
TT system with one point directly earthed but the protective conductor (PE) connected to that one point of the system
IT system (that is not directly earthed)
Wye phases midpoint grounded Delta phase midpoint grounded
Delta phases corner grounded High impedance grounded
Wye phases midpoint ungrounded Delta phases ungrounded
18. Limit of power up to which three-phase a.c. motors may be started directly across the incoming supply line?
3.) 4kWHP
33. For cableless control systems, specify the time delay before automatic machine shutdown is initiated in the absence of a valid signal? (see 9.2.7.3): seconds

SUBSTANTIATION: Question 6 changed to “Non-radiation” to more accurately reflect the type of radiation covered.
Question 13 changed “earthing” to “system grounding” to reflect the term used in NFPA 70. The acronyms “TN,” “IT,” and “TT” are terms not employed in this Standard. However, it is useful to provide information based upon the system to be encountered.
Question 18 changed “kW” to “HP” to reflect the term used in the United States.
Question 33 changed “s” to “seconds” to follow MOS guidelines.
COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

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97-427-(Annex C, C.2, C.5, C.7 ..) :
TCC NOTE: The Technical Correlating Committee directs that the Technical Committee action on Comment 79-427 be reported as “Hold” consistent with Section 4-4-6.2.2 of the NFPA Regulations Governing Committee Projects in that it contains material that has not had adequate public review.
SUBMITTER: Nicholas R. Rafferty, E.I. DuPont de Nemours & Co., Inc. Engineering B3455
COMMENT ON PROPOSAL NO: 79-164
RECOMMENDATION: Add new text to read as follows:
C.2 Plastics machinery
Examples of plastics machinery are as follows:
1) Injection molding machines
2) Extrusion machines
3) Blow molding machines
4) Specialized processing machines
5) Thermostat blowing machines
6) size reduction machinery (including cutting, sawing, and sanding operations)
C.3 Material Handling machinery
Examples of material-handling machinery are as follows:
1) Industrial robots
2) Transfer machines
3) Transfer conveyor systems
4) Storage and retrieval systems
5) Palletizers / de-palletizers
C.7 Mechanical system machinery
1) Compressors
2) Refrigeration and air-conditioning machines
3) Heating and ventilating machines
SUBSTANTIATION: This standard has had a history of being viewed as a machine tool only standard. More specific examples are needed to promote this standard to the broader section of industrial applications, from machine tool, plastics manufacturer, to non-process related machinery and systems that are commonly used in the chemical & Petrochemical industry. A second consideration is that as safety standards for machinery (similar to those in Europe) are developed in the US, this standard needs to be part of the implementation of safety-related controls which should be recognized for common machinery in industry that would not be covered by process safety standards.
COMMITTEE ACTION: Accept in Principle in Part
Delete C.7 (1), (2), and (3).
Delete C.5 (3)
Change C.5(4) to read Storage and retrieval machinery
C.6(1) to read Size reduction machinery
COMMITTEE STATEMENT: 1.) C.7 (1), (2), and (3) were deleted because there is not substantiation to include these specific machines. 2.) C.5 (3) was deleted because it is redundant with C.5(2). 3.) The additional proposed text in C.5(4) was changed to read Storage and retrieval machinery for clarity and consistency.
4.) The added text to C.6(1) did not add clarity.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 23
NEGATIVE: 2
EXPLANATION OF NEGATIVE:
FREUDENBERG: Revisions to examples of equipment covered by the scope should have public comment. Does citing industrial robots suggest NFPA 79 could or should be used in lieu of the product standards for industrial robots?
KIIHR: I agree with the comments in Mr. Freudenberg’s Explanation of Negative vote on Committee action. While this action may be justified, I too think that this change requires additional public review. Although it is included in an Annex, and, therefore, is not a requirement of the standard, this section could be interpreted to affect the scope of the standard. Therefore, I am voting negative on the committee action to Accept in Principle in Part Comment 79-427.

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97-428-(Annex C-6 (3) and (4)) : Accept in Part
SUBMITTER: Gary J. Locke, Lockheed Martin Systems Integration
COMMENT ON PROPOSAL NO: 79-164
RECOMMENDATION: (3) Storage-retrieval machines
(4) Sortation machines
SUBSTANTIATION: As islands of automation are integrated into more effective solutions material handling has become a significant and important element of automated machinery and machinery systems for both processing and manufacturing. NFPA 79 is currently applied to storage-retrieval and sortation machinery and machinery systems. The inclusion of storage-retrieval and sortation machines in Annex C section C.6 is a natural addition reflecting the state of processing and manufacturing technology.
COMMITTEE ACTION: Accept in Part
Accept “Sortation machines” as a new C.5(3).
Do not accept the addition of (3) storage-retrieval machines
COMMITTEE STATEMENT: The addition of (3) storage-retrieval machines to the list was not added because it was added by Comment 79-427 Log #30.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

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NCIA 79 — May 2002 ROC — Copyright, NFPA

79-429-(Annex D): Accept

SUBMITTER: David Fisher, Rockwell Automation/Allen Bradley

COMMENT ON PROPOSAL NO: 79-84

RECOMMENDATION: Revise drawings in annex D as follows:

1. Figure D.1(a) and D.1(g)
2. Figure D.1(b), D.1(c), D.1(d), D.1(e), D.1(h), D.1(i), D.1(j), D.1(k), D.1(l), D.1(m), D.1(n), D.1(o) and D.1(p)

Delete all reference to HS-1738,

3. Figure D.1(q)

Correct as indicated:

1. Number (7) correct Timed Contact to N.C.T.C.
2. Number (8) correct Timed Contact to N.O.T.O.
3. Number (9) delete single contact selector switch.
5. Number (20) delete lines emanating from indicating light symbol.
6. Number (22) add “CR” inside the circle of the control relay coil symbol.
7. Number (23) add “CI” inside the circle of the contactor coil symbol.
8. Number (24) add “MI” inside the circle of the motor starter coil symbol.
9. Number (25) add “TR” inside the circle of the timer coil symbol.
10. Number (27) correct the symbol for electromechanical counter.
11. Number (29) delete or find a symbol for fused terminal block.
12. Include in this symbol table the following:

3.12.1 Symbol of mechanical single throw polyphase disconnecting switch.
3.12.2 Style 2 of capacitor.
3.12.3 Thermal overload relay.
3.12.4 Wire terminals.

Revised drawings have been provided.

SUBSTANTIATION: Drawings were created for use in SAE HS 1738. These revisions make the drawings suitable for use in NFPA 79. These revisions make the drawings suitable for use in NFPA 79. The left-hand symbols for Figure D-17 have been numbered 1 through 15 in column 1 and the corresponding IEEE symbol numbers in column 2. The right-hand IEEE symbols for Figure D-17 have been numbered 16 through 20 in column 3 and the corresponding IEEE symbol numbers are in column 4.

7. The description is wrong, and should be changed to: “TIMED CONTACT, N.C.T.C.” (Timed switch with TD closing.)
8. The description is wrong, and should be changed to: “TIMED CONTACT, N.O.T.O.” (Open switch with TD opening.)
9. Same as (10).
10. Same as (9) except for the number of contacts shown. Delete Number 9 as redundant.
19. This is not an IEEE number. It uses IEEE 4.15.5.1 LIMIT SWITCH in a triangle; however, IEEE 14.4.6 uses 2 vertical lines between the upper and lower points for a proximity (non-touching) indicator. The non-standard symbol should be changed to the IEEE 14.4.6 type.
20. IEEE symbol does not show lines emanating from 45°, 135°, 225°, and 315° and they should be deleted. A letter can be used to show the color, if desired.
22. IEEE 4.5A requires a device designation inside the circle (i.e. CR), with number assigned as needed.

79-430-(Annex D-Figure 5): Accept

SUBMITTER: Melvin K. Sanders, TECo., Inc.

COMMENT ON PROPOSAL NO: 79-84

RECOMMENDATION: Revise drawings in annex D as follows:

315° and they should be deleted. A letter can be used to show the color, if desired.

1. IEEE 4.6.1 & 4.35.1 combined make up the mechanical single throw polyphase disconnecting switch.
2. IEEE 2.2.1 Style 2 symbol for a capacitor.
3. IEEE 4.30.5 Appendix D thermal relay.
4. IEEE 5.1.1.1 wiring terminal.

COMMITTEE ACTION: Accept

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 25

COMMITTEE STATEMENT

NOTE: Supporting Material is available for review at NFPA Headquarters. These revisions make the drawings suitable for use in NFPA 79. Revised drawings have been provided.

SUBSTANTIATION: Drawings were created for use in SAE HS 1738. These revisions make the drawings suitable for use in NFPA 79. Revised drawings have been provided.

RECOMMENDATION: Revise text to read as follows:

This review of Annex D is based upon the publication IEEE 315-1975 and 315A-1986 Supplement (Reaffirmed 1993) Dod adopted 4 Sept. 1975; ANSI Y32.2-1975 (Reaffirmed 1989) Dod adopted 31 Oct. 1975 CSA Z99-1975. The temporarily assigned reference numbers have been added for convenience of discussion only and are not intended to be included in the final version of this Standard.

(See table shown below)

SUBSTANTIATION: Some of the IEEE symbols have incorrect descriptions assigned, and three are not IEEE symbols.

The left-hand symbols for Figure D-17 have been numbered 1 through 15 in column 1 and the corresponding IEEE symbol numbers are in column 2. The right hand IEEE symbols for Figure D-17 have been numbered 16 through 20 in column 3 and the corresponding IEEE symbol numbers are in column 4.

7. The description is wrong, and should be changed to: “TIMED CONTACT, N.C.T.C.” (Timed switch with TD closing.)
8. The description is wrong, and should be changed to: “TIMED CONTACT, N.O.T.O.” (Open switch with TD opening.)
9. Same as (10).
10. Same as (9) except for the number of contacts shown. Delete Number 9 as redundant.
19. This is not an IEEE number. It uses IEEE 4.15.5.1 LIMIT SWITCH in a triangle; however, IEEE 14.4.6 uses 2 vertical lines between the upper and lower points for a proximity (non-touching) indicator. The non-standard symbol should be changed to the IEEE 14.4.6 type.
20. IEEE symbol does not show lines emanating from 45°, 135°, 225°, and 315° and they should be deleted. A letter can be used to show the color, if desired.
22. IEEE 4.5A requires a device designation inside the circle (i.e. CR), with number assigned as needed.

79-431-(Annex D-Figure 17): Accept in Principle

SUBMITTER: Melvin K. Sanders, TECo., Inc.

COMMENT ON PROPOSAL NO: 79-165

RECOMMENDATION: Revise text to read as follows:

This review of Annex D is based upon the publication IEEE 315-1975 and 315A-1986 Supplement (Reaffirmed 1993) Dod adopted 4 Sept. 1975; ANSI Y32.2-1975 (Reaffirmed 1989) Dod adopted 31 Oct. 1975 CSA Z99-1975. The temporarily assigned reference numbers have been added for convenience of discussion only and are not intended to be included in the final version of this Standard.

(See table shown below)

COMMITTEE STATEMENT: See the committee action on Comment 79-429 (Log #323)

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25

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VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

COMMITTEE ACTION: Accept
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 25

79-432-(Annex D-Figure 17): Accept
SUBMITTER: Melvin K. Sanders, TECO, Inc.
COMMENT ON PROPOSAL NO: 79-165
RECOMMENDATION: Change Figure D-17 title “ANSI Y32.2 - IEE 315/315A SYMBOL TABLE” to “ANSI Y32.2 - IEE 315/315A SYMBOL TABLE”.

79-433-(Annex H.1): Accept in Principle
SUBMITTER: Larry D. Munson, Universal Instruments Corporation
COMMENT ON PROPOSAL NO: 79-164
RECOMMENDATION: Add attached cross references:
• "NFPA 79:1997 Cross Referenced to NFPA 79:2002" to Annex H.1
SUBSTANTIATION: These cross references will enable the user of NFPA 9-2002 to:
• see the differences between NFPA 79-1997 and NFPA 79-2002
• new requirements

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| 15.5.4 | Exception | 13.5.4 | Exception |
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**Table 13.2.2** Single conductor characteristic

| 13.2.7 | | 15.2.6 |

**Table 13.3.2** Thickness of single conductor

| 13.3.3 | | 15.4.4 |

**Table 13.5** Conductor ampacity based on copper conductors with 60 degrees C insulation in an ambient temperature of 30 degree C

| 13.5.3(a) | Correction Factors | 15.5.4 |
| 13.5.3(b) | Adjustment Factors for More Than Three Current-Carrying Conductors in a Raceway or Cable | 15.5.4 |

**Table 13.5.4** Maximum Conductor Size for Given Motor Controller Size

| 13.5.5 | Conductor/terminal Compatibility | 15.5.5 |
| 13.6 | Conductor Sizing | 15.3 |
| 13.6.1 | | 15.3 |
| 13.6.1(1) | Exception #1 | 15.3 a) |
| 13.6.1(2) | Exception #2 | 15.3 b) |
| 13.6.1(3) | | 15.3 c) |
| 13.6.1(4) | | 15.3 d) |
| 13.6.1(4a) | Exception | 15.3 d) 1 |
| 13.6.1(4b) | | 15.3 d) 2 |

**Table 9** Single conductor characteristic

| 13.2.7 | | 15.2.6 |

**Table 10** Single Conductor insulation thickness of insulation in mils [average / minimum (jacket)]

| 13.3.3 | | 15.4.4 |

**Table 11** Conductor ampacity based on copper conductors with 60 degrees C insulation in an ambient temperature of 30 degree C

| 13.5.3(a) | Correction Factors | 15.5.4 |
| 13.5.3(b) | Adjustment Factors for More Than Three Current-Carrying Conductors in a Raceway or Cable | 15.5.4 |

**Table 12** Maximum conductor size for given motor controller size

<p>| 13.5.5 | Conductor/terminal Compatibility | 15.5.5 |
| 13.6 | Conductor Sizing | 15.3 |
| 13.6.1 | | 15.3 |
| 13.6.1(1) | Exception #1 | 15.3 a) |
| 13.6.1(2) | Exception #2 | 15.3 b) |
| 13.6.1(3) | | 15.3 c) |
| 13.6.1(4) | | 15.3 d) |
| 13.6.1(4a) | Exception | 15.3 d) 1 |
| 13.6.1(4b) | | 15.3 d) 2 |</p>
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• additional requirements
• the location of NFPA 79-1997 text in NFPA 79-2002
COMMITTEE ACTION: Accept in Principle
Delete “new material” column.
COMMITTEE STATEMENT: Editorial revisions.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 25
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 24
NEGATIVE: 1
EXPLANATION OF NEGATIVE:
WITHROW: I accept in principal proposal 79-433 Log #457 as submitted at the ROC meeting in San Diego. However, there are editorial changes and ROC proposal changes that should be included in Annex H. As a result of these changes, I am submitting a negative ballot on this proposal.
The task group that put this Annex together did an excellent job preparing this cross-reference. After the ROC changes have been accepted, the person responsible for each chapter should review and editorial correct the data in their respective chapters. The NFPA staff can’t make these editorial corrections.
The Annex H data for chapter 10 is enclosed with this negative ballot. It includes all editorial changes and ROC accepted changes.
See Table H.1 below
COMMENT ON AFFIRMATIVE:
The other table is correctly identified as “Cross Reference, Annex H.2: NFPA 79-2002 Cross referenced to NFPA 79: 1997.”
Table column headings are to be shown at the top of each page to better assist the user. Replacement of the all-inclusive “Clause” heading with the more specific “Chapter” heading will not prevent section headings from continuing to be included in the column.


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