Report of the Committee on

National Electrical Code®

James W. Carpenter, *Chair*
International Association of Electrical Inspectors, TX [E]
Rep. International Association of Electrical Inspectors

Mark W. Earley, *Secretary (Staff-NV)*
National Fire Protection Association, MA

Jean A. O'Connor, *Recording Secretary*
National Fire Protection Association, MA

James E. Brunssen, Telcordia, NJ [UT]
Rep. Alliance for Telecommunications Industry Solutions
Michael I. Callanan, National Joint Apprentice & Training Committee, MD [L]
Rep. International Brotherhood of Electrical Workers
William R. Drake, Marinco, CA [M]
John R. Kovacik, Underwriters Laboratories Inc., IL [RT]
Jim Pauley, Square D Company, KY [M]
Rep. National Electrical Manufacturers Association
Michael D. Toman, MEGA Power Electrical Services, Inc., MD [IM]
Rep. National Electrical Contractors Association
John W. Troglia, Edison Electric Institute, WI [UT]
Rep. Electric Light & Power Group/EEI

Alternates

James M. Daly, General Cable, NJ [M]
(Alt. to Jim Pauley)
Jeffrey Boksiner, Telcordia Technologies, Inc., NJ [UT]
(Alt. to James E. Brunssen)
Philip H. Cox, Bigelow, AR [E]
(Alt. to James W. Carpenter)
Stanley J. Folz, Folz Electric, Inc., IL [IM]
(Alt. to Michael D. Toman)
Neil F. LaBrake, Jr., Niagara Mohawk, a National Grid Company, NY [UT]
(Alt. to John W. Troglia)
William M. Lewis, Eli Lilly & Company, IN [U]
(Voting Alt. to ACC Rep.)
Mark C. Ode, Underwriters Laboratories Inc., NC [RT]
(Alt. to John R. Kovacik)
Palmer L. Hickman, National Joint Apprentice & Training Committee, MD [L]
(Alt. to Michael I. Callanan)

Nonvoting

Richard G. Biermann, Biermann Electric Company, Inc., IA [IM]
(Member Emeritus)
D. Harold Ware, Libra Electric Company, OK [IM]
(Member Emeritus)

Staff Liaison: **Mark W. Earley**

Committee Scope: This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.

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

William Anderson, The Proctor & Gamble Company, OH [U]
John F. Bloodgood, JFB Enterprises, WI [SE]
Frank C. DeFelice, Jr., Cytec Industries, Inc., CT [U]
Drake A. Drobnick, Visteon Corporation, MI [U]
Bruce Faust, Earth Tech Microelectronics, CA [RT]
David Fisher, Allen-Bradley Company, Inc., WI [M]
Rep. National Electrical Manufacturers Association
John Freudenberg, Teradyne, MA [M]
Rep. Northeast Product Safety Society, Inc.
Glyn R. Garside, TUV Rheinland of North America, Inc., IL [RT]
Charles A. Goetz, Underwriters Laboratories, Inc., IL [RT]
Mark R. Hilbert, State of New Hampshire, NH [E]
Rep. International Association of Electrical Inspectors
Thomas J. Kiihr, Jr., Delphi Corporation, MI [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]
Melvin K. Sanders, Things Electrical Co., Inc. (TECo., Inc), IA [U]
Lynn F. Saunders, General Motors WFG-Utilities Services, MI [U]

Alternates

Michael H. Appold, Delphi Corporation, MI [U]
(Alt. to Thomas J. Kiihr)
James C. Carroll, Square D Company, TN [M]
(Alt. to David Fisher)
John H. Keinath, General Motors, MI [U]
(Alt. to Lynn F. Saunders)
Loren Mills, Van Dorn Demag Corporation, OH [M]
(Alt. to Robert C. Monteith)
Jim F. Pierce, Intertek Testing Services NA, Inc., OR [RT]
(Alt. to John Knecht)
Paul R. Warndorf, Association For Manufacturing Technology (AMT), VA [M]
(Alt. to Carl E. Padgett)

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. This Committee shall have primary jurisdiction but shall report to the Association through the Technical Correlating Committee of the National Electrical Code.

These lists represent the membership at the time each Committee was balloted on the text of this report. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of the document.

The Report of the Committee on **National Electric Code®** is presented for adoption, as follows:

This Report was prepared by the **Technical Committee on Electrical Equipment of Industrial Machinery** and proposes for adoption, amendments to NFPA 79, **Electrical Standard for Industrial Machinery**, 2002 edition. NFPA 79-2002 is published in Volume 5 of the 2004/2005 National Fire Codes and in separate pamphlet form.

This Report has been submitted to letter ballot of the **Technical Committee on Electrical Equipment of Industrial Machinery,** which consists of 20 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.

79-1 Log #57 **Final Action: Accept in Principle in Part**
(Entire Document)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Replace the terms "can" and "cannot" in the main text as indicated:

Section #	Current text	Change to	Proposed change shown in context:
5.3.1.7	can occur	occurs	**5.3.1.7** 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** occurs.
5.3.3.1(6b)	that can be started	start	**5.3.3.1** Where the supply circuit disconnecting device is one of the types in 5.3.2 (1) through (5), the device shall fulfill all of the following requirements: (6) Be rated for the application as follows: a. The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use. b. Where rated in horsepower, the horsepower rating shall be at least equal that which is defined by Table 430.151(B) of NFPA 70, *National Electrical Code,* for a locked rotor equivalent equal to the largest sum resulting from the locked rotor currents of any combination of motors ~~that **can** be~~ start~~ed~~ simultaneously and the full-load currents of the remaining motor and non-motor loads that ~~**can be**~~ operate~~d~~s at that time.
5.3.3.1((6b)	that can be operated	that operates	**5.3.3.1** Where the supply circuit disconnecting device is one of the types in 5.3.2 (1) through (5), the device shall fulfill all of the following requirements: (6) Be rated for the application as follows: a. The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use. b. Where rated in horsepower, the horsepower rating shall be at least equal that which is defined by Table 430.151(B) of NFPA 70, *National Electrical Code,* for a locked rotor equivalent equal to the largest sum resulting from the locked rotor currents of any combination of motors ~~that **can** be~~ start~~ed~~ simultaneously and the full-load currents of the remaining motor and non-motor loads that ~~**can be**~~ operate~~d~~s at that time.
5.4.1	can create	creates	**5.4.1** Means for removal of power shall be provided when prevention of unexpected start-up is required (e.g., during maintenance where the unexpected start-up of a machine **can** creates a hazard). Such means shall be as follows:
5.4.2	can be accomplished	is accomplished (or "shall be accomplished")	**5.4.2** Removal of power ~~**can** be~~ is accomplished by the use of the supply circuit disconnecting means, additional devices conforming to 5.3.2, or other means (e.g., a contactor switched off by a control circuit).
5.4.4 (2b)	cannot	is not	**5.4.4** Other means of removal of power shall be employed only for situations that include the following: (1) Routine exchange of parts, 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 and burn. b. The switching off means ~~**cannot**~~ is not 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 of de-energizing of circuits.

Section #	Current text	Change to	Proposed change shown in context:
6.2.1	that can only be removed	that is only removed by	**6.2.1 Protection by Insulation of Live Parts.** Live parts protected by insulation shall be completely covered with insulation that ~~**can**~~ is only be removed by destruction. Such insulation shall be capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it ~~**can**~~ is be subjected under normal operating conditions. Paints, varnishes, lacquers, and similar products are inadequate for protection against electric shock under normal operating conditions.
6.2.1	which it can be subjected	which it is subjected	**6.2.1 Protection by Insulation of Live Parts.** Live parts protected by insulation shall be completely covered with insulation that ~~**can**~~ is only be removed by destruction. Such insulation shall be capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it ~~**can**~~ is be subjected under normal operating conditions. Paints, varnishes, lacquers, and similar products are inadequate for protection against electric shock under normal operating conditions.
6.2.2.1	that can be removed	that are capable of being removed	**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~~ that are capable of being removed without the use of a tool.
6.2.3.1	doors can be	doors are	**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 volts dc or more shall be mechanically or electrically interlocked, or both, with the control enclosure doors so that none of the doors ~~**can be**~~ doors are opened unless the power is disconnected. Interlocking shall be reactivated automatically when all the doors are closed.
6.2.3.2(2)	there cannot be any	there is not any	**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 following 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**~~ is not any direct contact with live parts by a test finger.
6.3.2(4)	terminals cannot exceed	terminals do not exceed	**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**~~ do not exceed the values specified in 6.3.1.1(1)
7.2.1.1	can exceed	exceeds	**7.2.1.1** Overcurrent protection shall be provided where the current in a machine circuit ~~**can**~~ exceeds 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.
7.2.9	device can include	device includes	**7.2.9* Short-Circuit Interrupting Rating.** The short-circuit interrupting rating shall be at least equal to the available fault current at the point of application. Where the short-circuit current to an overcurrent protective device ~~**can**~~ includes additional currents other than from the supply (e.g., from motors, from power factor correction capacitors), these shall be taken into consideration.

Section #	Current text	Change to	Proposed change shown in context:
7.2.10.3	where it can be determined	where it is determined	**7.2.10.3** Where the branch-circuit, short-circuit, and ground-fault protective device is selected not to exceed that allowed by 7.2.10.1 for the smallest rated motor, two or more motors or one or more motors and other load(s), with each motor having individual overload protection, shall be permitted to be connected to a branch circuit where it ~~**can be**~~ is determined that the branch-circuit short-circuit and ground-fault protective device will not open under the most severe normal conditions of service that ~~might be~~ is encountered.
7.2.10.3	service that might be encountered	service that is encountered	**7.2.10.3** Where the branch-circuit, short-circuit, and ground-fault protective device is selected not to exceed that allowed by 7.2.10.1 for the smallest rated motor, two or more motors or one or more motors and other load(s), with each motor having individual overload protection, shall be permitted to be connected to a branch circuit where it ~~**can be**~~ is determined that the branch-circuit short-circuit and ground-fault protective device will not open under the most severe normal conditions of service that ~~might be~~ is encountered.
7.3.1.2*	speeds can cause	speeds cause	**7.3.1.2* 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.
7.3.3.2	cannot be adequately	is not adequately	**7.3.3.2** Short-time-rated motors or high-reversing duty motors that ~~**cannot be**~~ is not adequately protected by external overload devices shall be protected by a thermal device mounted in the motor and sensitive to the temperature of the motor, or to both motor temperature and current.
7.4	can cause	causes	**7.4* Abnormal Temperature Protection.** Resistance heating or other circuits that are capable of attaining or causing abnormal temperatures and, therefore, ~~**can**~~ causes a hazardous condition shall be provided with suitable detection to initiate an appropriate control response.
7.5.1	can cause	causes	**7.5.1 General.** Where a supply interruption or a voltage reduction ~~**can**~~ causes a hazardous condition or damage to the machine or to the work in progress, undervoltage protection shall be provided (e.g., to switch off the machine) at a predetermined voltage level. Where only a part of the machine or of the group of machines working together in a coordinated manner is affected by the voltage reduction or supply interruption, the undervoltage protection shall initiate appropriate control responses to ensure coordination.
7.5.2	machine can allow	machine allows	**7.5.2 Undervoltage Protection.** Where the operation of the machine ~~**can**~~ allows for an interruption or a reduction of the voltage for a short time period, delayed undervoltage protection shall be permitted to be provided. The operation of the undervoltage device shall not impair the operation of any stopping control of the machine.
7.5.3	restart can cause	restart causes	**7.5.3 Restarting.** Upon restoration of the voltage or upon switching on the incoming supply, automatic or unintentional restarting of the machine shall be prevented when such a restart ~~**can**~~ causes a hazardous condition.
7.8	voltage can cause	voltage causes	**7.8* Phase Sequence Protection.** Where a phase loss or an incorrect phase sequence of the supply voltage ~~**can**~~ causes a hazardous condition or damage to the machine, protection shall be provided.
8.2.1	that can be caused	that is caused	**8.2.1 Grounding System.** The equipment grounding (protective bonding) circuit shall consist of the following: (1) Equipment grounding (PE) terminal(s) (2) Conductive structural parts of the electrical equipment and the machine (3) Equipment grounding (protective) conductors and equipment bonding jumpers All parts of the equipment grounding (protective bonding) circuit shall be capable of withstanding the highest thermal and mechanical stress that ~~**can be**~~ is caused by fault currents flowing in that part of the circuit. All exposed conductive parts of the electrical equipment and the machine(s) shall be connected to the equipment grounding (protective bonding) circuit. *Exception: Small parts such as screws, rivets, and nameplates that are not likely to become energized shall not be required to be grounded.*

Section #	Current text	Change to	Proposed change shown in context:
9.2.5.2.2	safeguards cannot be applied	safeguards are not applied	**9.2.5.2.2** On those machines where safeguards ~~**cannot be**~~ are not applied for certain operations, manual control of such operations shall be by hold-to-run controls together with enabling devices.
9.2.5.4.2.2	machine cannot tolerate	machine does not tolerate	**9.2.5.4.2.2** Emergency switching off shall be accomplished by disconnecting the incoming supply circuit of the machine effecting a Category 0 stop. Where the machine ~~**cannot**~~ does not tolerate the Category 0 stop, it shall be necessary to provide other protection, (e.g., against direct contact) so that emergency switching off is not necessary.
9.4.1	equipment can cause	equipment causes	**9.4.1* General Requirements.** Where failures or disturbances in the electrical equipment ~~**can**~~ causes a hazardous condition or damage to the machine or the work in progress, measures shall be taken to minimize the probability of the occurrence of such failures or disturbances
9.4.2.2.2	memory can result	memory results	**9.4.2.2.2** Where a memory is used, its functioning in the event of power failure shall be ensured (e.g., by using a non-volatile memory) where such loss of memory ~~**can**~~ results in a hazardous condition.
10.2.3.1	it can be easily read	it is easily read	**10.2.3.1** A legend shall be provided for each operator interface device to identify its function and shall be located so that it ~~**can be**~~ is easily read by the machine operator from the normal operator position. The legends shall be durable and suitable for the operating environment. *Exception: Emergency stop devices require no legend if they meet the requirements of 10.7.4*
10.3.1 (1)	task should be performed	task needs to be performed	**10.3.1 Modes of Use.** Indicator lights and icons of color graphic interface devices shall provide the following information: (1) Indication to attract the operator's attention or to indicate that a certain task ~~should~~ needs to be performed. The colors RED, YELLOW (AMBER), GREEN, and BLUE are normally used in this mode.
11.2.3	which can affect	which affects	**11.2.3 Electrical Noise and Transient Suppression.** Transient suppression, isolation, or other appropriate means shall be provided where the electronic equipment generates electrical noise or transients, which ~~**can**~~ affects the operation of equipment.
12.2.1.1	that they can be identified	that they are identified	**12.2.1.1** All items of control equipment shall be placed and oriented so that they ~~**can be**~~ are identified without moving them or the wiring. Where practicable, items that require checking or adjustment for correct operation or that are liable to need replacement, those actions shall be possible without dismantling other equipment or parts of the machine (except opening doors or removing covers). Terminals not associated with control equipment shall also conform to these requirements.
12.2.2.5	can be readily identified	is readily identified	**12.2.2.5** Terminal groups for power circuits, associated control circuits, and other control circuits shall be permitted to be mounted adjacently, provided that each group ~~**can be**~~ is readily identified (e.g., by markings, by use of different sizes, by use of barriers, by colors).
12.4.11	dust can penetrate	dust penetrates	**12.4.11** Openings shall not be permitted between enclosures containing electrical equipment and compartments containing coolant, lubricating fluids, or hydraulic fluids, or compartments into which oil, other liquids, or dust ~~**can**~~ penetrates. This requirement shall not apply to electrical devices specifically designed to operate in oil (e.g., electromagnetic clutches) nor to electrical equipment in which coolants are used.
12.4.13	can attain	attains	**12.4.13** Equipment that, in normal or abnormal operation, ~~**can**~~ attains a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material shall be as follows:
12.4.13(1)	temperatures as can be generated	temperatures that are generated	**12.4.13** (1) Located within an enclosure that will withstand, without risk of fire or harmful effect, such temperatures ~~as **can be**~~ that are generated
12.4.13(3)	material that can withstand	material that withstands	**12.4.13** (3) Otherwise screened by material that ~~**can**~~ withstands, without risk of fire or harmful effect, the heat emitted by the equipment
13.1.1	that can exist	that exist	**13.1.1* General.** Conductors, cables, and flexible cords shall be selected for the operating conditions and external influences that ~~**can**~~ exist. Conductors, cables, and flexible cords shall be identified for their intended use.

Section #	Current text	Change to	Proposed change shown in context:
14.5.1.2	conductors can come	conductors come	**14.5.1.2** All sharp edges, flash, burrs, rough surfaces, or threads that the insulation of the conductors ~~**can**~~ come in contact with shall be removed from raceways (ducts) and fittings. Where necessary, additional protection consisting of a flame-retardant, oil-resistant insulating material shall be provided to protect conductor insulation.
15.4.1	means can be removed	means are removable	**15.4.1** Each motor and its associated couplings, belts and pulleys, or chains and sprockets shall be mounted so that they are adequately protected from physical damage and are easily accessible for inspection, maintenance, adjustment and alignment, lubrication, and replacement. The motor mounting arrangement shall be so that all motor hold-down means ~~**can be**~~ are remove~~d~~able and all terminal boxes are accessible. An adjustable base or other means of adjustment shall be provided when belt or chain drives are used.
15.7	rotation can produce	rotation produces	**15.7 Direction Arrow.** Where reverse rotation ~~**can**~~ produces an unsafe condition, a direction arrow shall be installed. The arrow shall be adjacent to the motor and plainly visible.
17.4.2	equipment that can be in operation	equipment that is in operation	**17.4.2** The full-load current shown on the nameplate shall not be less than the full-load currents for all motors and other equipment that ~~**can be**~~ is in operation at the same time under normal conditions of use. Where unusual loads or duty cycles require oversized conductors, the required capacity shall be included in the full-load current specified on the nameplate.
17.5.2	where it can be easily read	where it is easily read	**17.5.2** Where a motor nameplate or connection diagram plate is not visible, additional identification shall be provided where it ~~**can be**~~ is easily read.
18.7.5.2	device can be readily located	device is readily located	**18.7.5.2** A cross-referencing scheme shall be used in conjunction with each relay, output device, limit switch, and pressure switch so that any contact associated with the device ~~**can be**~~ is readily located on the diagrams.
18.8.2	equipment can be programmed	equipment is programmable	**18.8.2** Where the operation of the equipment ~~**can be**~~ is programme~~d~~able, detailed information on methods of programming, equipment required, program verification, and additional safety procedures (where required) shall be provided.

Substantiation: Change required per the manual of Style 2003 edition Subsection 2.2.2 Unenforceable Terms.

Committee Meeting Action: Accept in Principle in Part

Accept only the recommended change for 5.4.2; Revise text to read to read as follows:

5.4.2 Removal of power shall be accomplished by the use of the supply circuit disconnecting means, additional devices conforming to 5.3.2, or other means (e.g., a contactor switched off by a control circuit). Reject all other proposed changes.

Committee Statement: Reject all other proposed changes because they all contain enforceable requirements.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:

ANDERSON: The negative vote is not intended to object to the committees AIP to accept the change in 5.4.2 but is an objection to the rejection of the other parts of this proposal to make changes which were needed, based on the Manual of Style 2003 edition Sub section 2.2.2 'Unenforceable Terms', Webster's Collegiate Dictionary 10th (MOS: 2003, sub section 3.2.1.2) and the apparent intended meaning and use of the terms 'can' and 'cannot'

The use of 'can' and 'cannot' in this proposal (79-1) has two possibilities, either as a transitive verb, which is an archaic use or as a verbal auxiliary. As a verbal auxiliary 'can' and 'cannot' take the meanings of either a form of power or potency (e.g. know how, capability, consequence) or a form of permitting or permission (e.g. may) which is not an option (MOS: 2003, subsection 2.2.1 Permissive for Alternative Terms"). In most of the cases where can and cannot is used as verbal auxiliary, as with many verbal auxiliaries, removing it will only improve the clarity of the requirement statement.

It is proposed that this proposal (79-1) be included with the task group work formed to review the proposal 79-3 (Log # 158). The objective of proposals 79-1 (Log#57) and 79-3 (Log #158) is to improve the consistency of structure, understanding and readability of this standard.

79-2 Log #64 **Final Action: Accept**
(Entire Document)

Submitter: John F. Bloodgood, JFB Enterprises
Recommendation: In the Introduction/Origin and Development of NFPA 79, delete the 11th paragraph in its entirety, which reads:
The 1991, 1994, and 1997 editions...efforts in harmonization.
Substantiation: The 11th paragraph is a repeat of the last sentence of the 10th paragraph of this same section.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-3 Log #158 **Final Action: Reject**
(Entire Document)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Replace the Unenforceable and vague terms in the main text as indicated in the following table: **(See Table on the following pages)**
Substantiation: Change required per the Manual of Style 2003 edition Subsection 2.2.2 Unenforceable Terms.
Committee Meeting Action: Reject
Committee Statement: The proposal introduces and raises many issues related to the enforceability of NFPA 79. In many cases these proposed revisions are substantive, not simply editorial. A task group has been formed to review each proposal on its merits and submit comments for the ROC.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
ANDERSON: The acceptance of the committee rejection of the proposal, and the formation of a task group to consider each of the proposed corrections, will fulfill the objective of the proposal, which is to improve the consistency of structure, understanding and readability of this standard.
BLOODGOOD: I strongly support the Committee Action on this proposal. The deletion of such words as adequate, adequately, appropriate, available, care, considerate, consideration, could, easy, easily, etc., does not necessarily improve the understanding and could lead to misinterpretation of the requirement. When another word is used in place of these terms it does not add to the clarity. The proposed new notes (additions to Annex A) do not help with the understanding of the requirement. (See 79-72 (Log #69).
PADGETT: Strongly agree with Committee Action to have a task group review this proposal.

79-4 Log #142 **Final Action: Reject**
(Entire Document)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Define the unenforceable and vague terms used throughout the standard:
Definition: Effective, Sufficient, Sufficiently and Suitable are used in this standard to mean in that the specifications stated match or exceed the conditions stated.
Substantiation: Change required per the Manual of Style 2003 edition Subsection 2.2.2 Unenforceable Terms.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text. Adding a definitions for these terms in NFPA 79 is inappropriate since these terms are used in the context of their common every day meaning.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
ANDERSON: The recommended text (an addition to Chapter 3) is proposing a new and limiting definition for the terms whose common every day meaning is unenforceable and vague and thus inappropriately used in this standard (See: Manual of Style 2003 edition sub section 2.2.2 “Unenforceable Terms”). The proposed definition would limit the meaning of the words “effective, sufficient, sufficiently and suitable” and make the present usage, in most cases within this standard, appropriate to the MOS.

79-5 Log #28 **Final Action: Reject**
(1.1.3 (New))

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.
Recommendation: Add a new 1.1.3 Risk Assessment as follows:
A risk assessment of the electrical system for the machine shall be performed.
Substantiation: Justification: Section 4.1 makes reference to a requirement for the risk assessment of the electrical equipment of a machine; yet no requirement is presently stated in the text of NFPA 79, where it is enforceable.
Committee Meeting Action: Reject
Committee Statement: To be able to perform this task, some guidance needs to be established. There is no document or procedure outlined to perform an electrical risk assessment.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
DEFELICE: Section 4.1 makes reference to a requirement for risk assessment. Insuring that a risk assessment is performed increases safety for both the operator and maintainer of the machine. This proposal would provide the language necessary to enforce the requirement.
FREUDENBERG: I would have preferred an APR and changed “Risk Assessment...shall be performed” to “Risk Assessment...shall be permitted”. All standards lag technology and risk assessment is often the only method available to evaluate new technology and other areas where standards and codes are inadequate or obsolete. Risk Assessment can and is commonly used. It also provides a recognized tool to incorporate “engineering judgment” where alternative methods for conformity exist.

Comment on Affirmative
ANDERSON: The proposal to add the requirement for risk assessment in the administration scope of the standard is not correct and the committee’s action is agreed to be correct.
However, risk assessment is a task that is called for in section 4.1, while in other parts of this standard (e.g. 9.2.5.3.2, 9.2.5.4.1.3) the required action by the electrical system of the industrial machine is based upon information from a risk assessment done on the machine, (mechanical, operational and electrical). Thus from this and other proposals dealing with the risk assessment issue [e.g. 79-77 (Log #2), 79-78 (Log # 21), thru 79-81 (Log # 24), 79-82 (Log # 44), 79-84 (Log # 85),79-88 (Log #151), 79-92 (Log # 153), 79-147 (Log # 148), 79-148 (Log #87), 79-152 (Log # 155)] it is suggested that a task group be formed to establish needed guidance both in performing risk assessment including risk reduction for issues arising from the electrical systems of industrial machines and secondly to develop a suggested strategy for coordinating with other risk assessments (methods) done by others on issues that are beyond this standard but look to this standard to support the solutions from that analysis.

KIIHR: Although I agree with the Committee’s action to reject this specific proposal, I believe that the original intent of the proposer has merit. The document does reference risk assessment several times, and some additional guidance to the user would be beneficial. Several of the actions taken at the ROP will help to address this issue. Specifically the addition of a definition for Risk Assessment 79-8 (Log #CP3), and the addition of the explanatory note in A.4.1 79-147 (Log #148) will aid the user in this regard. Although a task group was formed at one time to address this issue it was disbanded prior to the ROP. Based upon the discussion around this, and numerous other proposals, it may be beneficial to reform this task group to address this issue.

79-6 Log #52 **Final Action: Reject**
(2.3.6)

Submitter: Bob Eugene, Underwriters Laboratories Inc.
Recommendation: Revise to read as follows:
2.3.6 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.
UL 50, Standard for Safety Enclosures for Electrical Equipment, 1995 with revisions through September 2003 .
UL 508, Standard for Safety Industrial Control Equipment, 1999 with revisions through December 2003 .
UL 508A, Standard for Safety Industrial Control Panels, 2001 with revisions through May 2003 .
UL 870, Standard for Safety Wireways, Auxiliary Gutters and Associated Fittings, 1995 with revisions through July 2003 .
UL 1063, Standard for Safety Machine — Tool Wires and Cables, 1998 with revisions through June 2001 .
Substantiation: Update to current editions of the referenced standards.
Committee Meeting Action: Reject
Committee Statement: The proposed text does not comply with the NFPA style manual.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
HILBERT: I support the committee action on this proposal. The proposal as submitted does not contain the necessary information to meet the requirements of 4.3.3(d) of the Regulations Governing Committee Projects as there is no statement of an actual problem with the existing test. Adding the proposed test does not appear to add any clarity to the existing language and may add confusion the the local adoption and enforcement process.

Section #	Current text	Change to	Proposed change shown in context:
Acceptable			
15.4.3	is at an acceptable level	is excluded	**15.4.3** Motor compartments shall be clean and dry, and, when required, shall be ventilated directly to the exterior of the machine. The vents shall be so that ingress of swarf, dust, or water spray is ~~at an acceptable level~~ excluded.
Adequate			
6.2.1	shall not be considered adequate protection	shall not be considered protection	**6.2.1 Protection by Insulation of Live Parts.** Live parts protected by insulation 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. Paints, varnishes, lacquers, and similar products shall not be considered ~~adequate~~ protection against electric shock under normal operating conditions.
12.3.1*	shall be adequate taking into account	shall entail	**12.3.1*** The protection of control equipment against ingress of solid foreign objects and of liquids shall ~~be adequate taking into account~~ entail the external influences under which the machine is intended to operate (i.e., the location and the physical environmental conditions including dust, coolants, and swarf).
13.4.4	and adequate for the voltage on	and rated for the nominal voltage or higher that is placed on	**13.4.4** Wire insulation shall be identified and ~~adequate~~ rated for the nominal voltage or higher that is placed on that conductor. <<Note consider moving the entire phrase after the "and" to after "insulated" in 13.1.2 to improve clarity and organization of the requirements>>
13.7.1.2*	shall be of adequate construction	shall be constructed	**13.7.1.2*** Cables that are subjected to severe duties shall be ~~of adequate~~ construct~~ion~~ ed to protect against the following:
Adequately			
4.4.6*	shall be adequately protected	shall be protected	**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.
7.3.3.2	adequately protected	protected	**7.3.3.2** Short-time–rated motors or high-reversing duty motors that cannot be ~~adequately~~ protected by external overload devices shall be protected by a thermal device mounted in the motor and sensitive to the temperature of the motor, or to both motor temperature and current.
7.6.1*	the speed adequately, drive	the speed, drive	**7.6.1* Motor Overspeed Protection.** Unless the inherent characteristics of the motor or the controller, or both, are such as to limit the speed ~~adequately~~, drive systems motors shall include protection against motor overspeed where overspeed results in a hazardous condition.
12.21.9	drawings, adequately insulated	drawings, insulated	**12.2.1.9** Test points, where provided, shall be mounted to provide unobstructed access, plainly marked to correspond with markings on the drawings, ~~adequately~~ insulated, and sufficiently spaced for connection of test leads.
14.1.5.6 Exception	*is adequately supported*	*is supported*	**14.1.5.6** Connections to frequently moving parts shall be made with conductors for flexing service in accordance with Section 13.7. Cord with conductors for flexing service shall have vertical connections and shall be installed to avoid excessive flexing and straining. *Exception: Horizontal connections shall be permitted where the cord is ~~adequately~~ supported.*
14.4.3.1	conduit is adequately supported	conduit is supported	**14.4.3.1** Connections to moving parts shall be made using conductors in accordance with Section 13.7. Flexible cable and conduit shall have vertical connections and shall be installed to avoid excessive flexing and straining. Horizontal connections shall be permitted where the flexible cable or conduit is ~~adequately~~ supported. Cable with flexible properties and flexible conduit shall be so installed as to prevent excessive flexing and straining, particularly at the fittings.

Section #	Current text	Change to	Proposed change shown in context:
15.4.1	are adequately protected	are protected	**15.4.1** Each motor and its associated couplings, belts and pulleys, or chains and sprockets shall be mounted so that they are ~~adequately~~ protected from physical damage and are easily accessible for inspection, maintenance, adjustment and alignment, lubrication, and replacement. The motor mounting arrangement shall be so that all motor hold-down means can be removed and all terminal boxes are accessible. An adjustable base or other means of adjustment shall be provided when belt or chain drives are used.
Appreciable 6.2.2.1	without appreciable force	with only minimal force	**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, with~~out~~ only minimal ~~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.
Appropriate 5.4.1 (1)	Appropriate for the intended use	Fit for the intended use	**5.4.1** Means for removal of power shall be provided when prevention of unexpected start-up is required (e.g., during maintenance where the unexpected start-up of a machine can create a hazard). Such means shall include all of the following: (1) ~~Appropriate~~ Fit for the intended use
6.3.2 (4)	conforming to appropriate standards	conforming to standards	**6.3.2 Sources for PELV.** The source for PELV shall be one of the following: (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(1)
7.4*	initiate an appropriate control	initiate a control	**7.4* Abnormal Temperature Protection.** Resistance heating or other circuits that are capable of attaining or causing abnormal temperatures and, therefore, can cause a hazardous condition shall be provided with suitable detection to initiate a~~n appropriate~~ control response.
7.5.1	initiate appropriate control	initiate a control	**7.5.1 General.** Where a supply interruption or a voltage reduction can cause a hazardous condition or damage to the machine or to the work in progress, undervoltage protection shall be provided (e.g., to switch off the machine) at a predetermined voltage level. Where only a part of the machine or of the group of machines working together in a coordinated manner is affected by the voltage reduction or supply interruption, the undervoltage protection shall initiate a~~ppropriate~~ control responses to ensure coordination.
9.2.4 (2)	, and where appropriate, an enabling	, and where used, an enabling	**9.2.4 Overriding Safeguards.** Where it is necessary to temporarily override one or more safeguards, a mode selection device or means capable of being secured (e.g., locked) in the desired mode shall be provided to prevent automatic operation. The control circuit for the suspension of a safeguard shall have the same safety requirements as the suspended safeguard itself. In addition, one or more of the following measures shall be provided: (2) A portable control station (e.g., pendant) with an emergency stop device, and where ~~appropriate~~ used, an enabling device. Where a portable station is used, motion shall only be initiated from that station.
9.3.3.1	Appropriate devices (e.g., pressure sensors) shall check	Devices (e.g., pressure sensors) shall be used to check	**9.3.3.1** ~~Appropriate d~~ Devices (e.g., pressure sensors) shall be used to check the correct operation of the auxiliary functions.
11.2.3	Other appropriate means	other effective means	**11.2.3 Electrical Noise and Transient Suppression.** Transient suppression, isolation, or other ~~appropriate~~ effective means shall be provided where the electronic equipment generates electrical noise or transients, which can affect the operation of equipment.
15.3*	or IEC 60072-2, as appropriate.	or IEC 60072-2.	**15.3* Motor Dimensions.** As far as is practicable, the dimensions of the motors shall comply with those given in NEMA MG-1, IEC 60072-1, or IEC 60072-2~~, as appropriate~~.

Section #	Current text	Change to	Proposed change shown in context:
18.1.1	instructions as appropriate.	instructions.	**18.1.1** The information necessary for installation, operation, and maintenance of the electrical equipment of a machine shall be supplied in the form of drawings, diagrams, charts, tables, and instructions ~~as appropriate~~. The information provided shall be permitted to vary with the complexity of the electrical equipment. For very simple equipment, the relevant information shall be permitted to be contained in one document provided this document shows all the devices of the electrical equipment and enables the connections to the supply network to be made.
18.2 (3), (5) and (12)	where appropriate	(delete three times)	**18.2 Information to Be Provided.** The following information shall be provided with the electrical equipment: (3) Overview (block) diagram(s) ~~where appropriate~~ (5) Information ~~(where appropriate)~~ on the following: (12) Reference information ~~(where appropriate)~~ on the following:
18.3.3	Where appropriate, a table	A table	**18.3.3** ~~Where appropriate, a~~ A table of contents shall appear prominently on the first sheet and shall refer to all major sections of the electrical drawings.
18.4 (1)	supply and, where appropriate, the	supply and, the	**18.4* Basic Information.** The technical documentation shall contain, as a minimum, information on the following: (1) Normal operating conditions of the electrical equipment including the expected conditions of the electrical supply and, ~~where appropriate~~, the physical environment
18.5.7	Where it is appropriate, an interconnection	An interconnection	**18.5.7*** ~~Where it is appropriate, an~~ An interconnection diagram or table shall be provided. That diagram or table shall give full information about all external connections. Where the electrical equipment is intended to be operated from more than one source of electrical supply, the interconnection diagram or table shall indicate the modifications or interconnections required for the use of each supply.
18.7.3	Where appropriate, a diagram	A diagram	**18.7.3*** ~~Where appropriate, a~~ A diagram showing the terminals for interface connections shall be provided. Switch symbols shall be shown on the electromechanical diagrams with all supplies turned off (e.g., electricity, air, water, lubricant) and with the machine and its electrical equipment in the normal starting condition and at 20°C (68°F) ambient temperature. Control settings shall be shown on the diagram.
18.10.2 (4)	characteristics where appropriate	characteristics	**18.10.2** The parts list shall show the following for each item: (4) Its general characteristics ~~where appropriate~~
Available			
14.2.4.1* Exception No. 2and 14.2.4.3 Exception No.2	*used is not available in*	*used is not feasible to be obtained in*	*Exception No. 2: Where the insulation used is not ~~available~~ feasible to be obtained in the colors required (e.g., high temperature insulation, chemically resistant insulation).*
Avoid			
14.1.5.6	installed to avoid excessive	installed to prevent excessive	**14.1.5.6** Connections to frequently moving parts shall be made with conductors for flexing service in accordance with Section 13.7. Cord with conductors for flexing service shall have vertical connections and shall be installed to ~~avoid~~ prevent excessive flexing and straining.
14.4.3.1	installed to avoid excessive	installed to prevent excessive	**14.4.3.1** Connections to moving parts shall be made using conductors in accordance with Section 13.7. Flexible cable and conduit shall have vertical connections and shall be installed to ~~avoid~~ prevent excessive flexing and straining. ~~H~~orizontal connections shall be permitted where the flexible cable or conduit is adequately supported. Cable with flexible properties and flexible conduit shall be so installed as to prevent excessive flexing and straining, particularly at the fittings.
Care			
12.4.12	purposes, care shall be taken so that after mounting, the holes do not	purposes, after mounting, the holes shall not	**12.4.12** Where there are holes in an enclosure for mounting purposes, ~~care shall be taken so that~~ after mounting, the holes ~~do~~ shall not impair the required protection.
Considered			

Section #	Current text	Change to	Proposed change shown in context:
4.4.1	user shall be considered.	user shall be achieved.	**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. When the physical environment or the operating conditions are outside those specified, an agreement between the supplier and the user shall be ~~considered~~ achieved.
5.3.4.1	shall be considered as	shall be regarded as	**5.3.4.1** The center of the grip of the operating handle of the disconnecting means, when in its highest position, shall be not more than 2.0 m (6 ft 7 in.) above the floor. A permanent operating platform, readily accessible by means of a permanent stair or ladder, shall be ~~considered~~ regarded as the floor for the purpose of this requirement.
6.2.1	shall not be considered adequate	shall not be deemed adequate	**6.2.1 Protection by Insulation of Live Parts.** Live parts protected by insulation 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. Paints, varnishes, lacquers, and similar products shall not be ~~considered~~ deemed adequate protection against electric shock under normal operating conditions.
7.2.4.1	shall not be considered to be	shall not be deemed to be	**7.2.4.1 General.** A control circuit tapped from the load side of the branch-circuit short-circuit and ground-fault protective device(s) and functioning to control the load(s) connected to that branch circuit shall be protected against overcurrent in accordance with 7.2.4.2. Such a tapped control circuit shall not be ~~considered~~ deemed to be a branch circuit and shall be permitted to be protected by either a supplementary or branch circuit overcurrent protective device(s).
7.2.4.2.2	shall be considered as protected	shall be deemed to be protected	**7.2.4.2.2** Conductors sizes of 18, 16, and 14 AWG shall be ~~considered as~~ deemed to be protected by an overcurrent device(s) of not more than a 20-ampere rating.
7.2.4.2.3	shall be considered protected	shall be deemed to be protected	**7.2.4.2.3** Conductors that do not extend beyond the control cabinet enclosure shall be ~~considered~~ deemed to be protected by the load branch-circuit short-circuit and ground-fault protective device(s) where the rating of the protective device(s) is not more than 400 percent of the ampacity of the control circuit conductor for conductors 14 AWG and larger, or not more than 25 amperes for 18 AWG and 40 amperes for 16 AWG.
7.2.4.2.4	shall be considered protected	shall be deemed to be protected	**7.2.4.2.4** Conductors of 14AWG and larger that extend beyond the enclosure shall be ~~considered~~ deemed to be protected by the load branch-circuit short-circuit and ground-fault protective device(s) where the rating of the protective device(s) is not more than 300 percent of the ampacity of the control circuit conductors.
7.2.4.2.5	shall be considered protected [And] not considered to be protected	shall be deemed to be protected [And] not regarded as being protected	**7.2.4.2.5** Conductors supplied by the secondary side of a single-phase transformer having a 2-wire (single-voltage) secondary shall be ~~considered~~ deemed to be protected by overcurrent protection provided on the primary (supply) side of the transformer, if this protection is in accordance with 7.2.7 and does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary voltage ratio. Transformer secondary conductors (other than 2-wire) are not ~~considered to be~~ regarded as being protected by the primary overcurrent protective device.
7.2.4.2.6	shall be considered protected	shall be deemed to be protected	**7.2.4.2.6** Conductors of control circuits shall be ~~considered~~ deemed to be protected by the motor branch-circuit short-circuit and ground-fault protective device(s) where the opening of the control circuit would create a hazard (e.g., the control circuit of a magnetic chuck).

Section #	Current text	Change to	Proposed change shown in context:
7.2.11.3	shall be considered branch	shall be regarded as branch	**7.2.11.3** The additional overcurrent protective devices shall include all of the following: (1) Installed within or on the machinery or provided as a separate assembly (2) Accessible but need not be readily accessible (3) Suitable for branch-circuit protection The main conductors supplying these overcurrent protective devices shall be ~~considered~~ regarded as branch-circuit conductors.
8.2.3.4	shall not be considered as bonded	shall not be regarded as bonded	**8.2.3.4** Moving machine parts, other than accessories or attachments, having metal-to-metal bearing surfaces shall be considered as bonded. Sliding parts separated by a nonconductive fluid under pressure shall not be ~~considered~~ regarded as bonded.
9.2.5.5.2	shall be considered a jog	shall be regarded as a jog	**9.2.5.5.2** Jog or inch functions shall operate only in the manual mode. Manual reverse shall be ~~considered~~ regarded as a jog function. The prevention of run or automatic operation during jog or inch shall be accomplished by an operator interface and a separate jog or inch selection method.
12.2.2.1	shall not be considered enclosed	shall not be regarded as enclosed	**12.2.2.1** Machine compartments containing control equipment shall be completely isolated from coolant and oil reservoirs. The compartment shall be readily accessible and completely enclosed. The compartment shall not be ~~considered~~ regarded as enclosed where it is open to the floor, the foundation upon which the machine rests, or other compartments of the machine that are not clean and dry.
Table 12.5.1.1 Note	shall not be considered live [And] shall be considered as	shall not be deemed live [And] shall be regarded as	**Condition 1**—Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be ~~considered~~ deemed live parts. **Condition 2**—Exposed live parts on one side and a grounded surface on the other side. Concrete, brick, or tile walls shall be ~~considered~~ regarded as grounded.
14.1.2.2	shall not be considered as splices	shall not be regarded as splices	14.1.2.2 Factory-applied connectors molded onto cables shall be permitted. Such connectors shall not be ~~considered~~ regarded as splices or joints.
Consideration			
7.2.1.2	with proper consideration being given to, but	with specifications supported by, but	**7.2.1.2** All protective devices shall be selected and applied with ~~proper consideration being given to~~ specifications supported by, but not limited to, the following:
Could			
10.1.7	actuation could create	actuation create	**10.1.7 Foot-Operated Switches.** Foot-operated switches used for applications where accidental actuation ~~could~~ create a hazardous situation shall be protected to prevent accidental actuation by falling or moving objects and from unintended operation by accidental stepping onto the switch.
Easy			
10.1.2.2	are within easy reach of the normal	are accessible from the normal	**10.1.2.2 Hand-Operated Control Devices.** The actuators of hand-operated control devices shall be selected and installed as follows: (1) They are not less than 0.6 m (2 ft) above the servicing level and are ~~within easy reach of~~ accessible from the normal working position of the operator. (2) The operator is not placed in a hazardous situation when operating them. (3) The possibility of inadvertent operation is minimized.
14.1.1.9	permit easy disconnection	permit disconnection	**14.1.1.9** Shielded conductors shall be terminated so as to prevent fraying of strands and to permit ~~easy~~ disconnection.
Easily			

Section #	Current text	Change to	Proposed change shown in context:
6.4.1	*displayed at an easily visible*	*displayed at a visible*	**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.*
10.2.3.1	it (~~can be~~) easily read (is) by (items changed in another related proposal)	it (~~can be~~) (is) readable by (items changed in another related proposal)	**10.2.3.1** A legend shall be provided for each operator interface device to identify its function and shall be located so that it (~~can be~~) ~~easily read~~ (is) readable by the machine operator from the normal operator position. The legends shall be durable and suitable for the operating environment.
12.4.10	shall be easily reopened	shall be fitted to be reopened	**12.4.10** All openings in the enclosure, including those toward the floor or foundation or to other parts of the machine, shall be closed by the supplier(s) in a manner ensuring the protection specified for the equipment. Openings for cable entries shall be ~~easily~~ fitted to be reopened on site. A suitable opening shall be permitted in the base of enclosures within the machine so that moisture due to condensation is allowed to drain.
15.4.1	are easily accessible	are accessible	**15.4.1** Each motor and its associated couplings, belts and pulleys, or chains and sprockets shall be mounted so that they are adequately protected from physical damage and are ~~easily~~ accessible for inspection, maintenance, adjustment and alignment, lubrication, and replacement. The motor mounting arrangement shall be so that all motor hold-down means can be removed and all terminal boxes are accessible. An adjustable base or other means of adjustment shall be provided when belt or chain drives are used.
17.5.1	is not easily read	is not readable	**17.5.1** Where equipment is removed from its original enclosure or is placed so that the manufacturer's identification plate is not ~~easily~~ readable, an additional identification plate shall be attached to the machine or enclosure.
17.5.2	it (~~can be~~ is) easily read. (items changed in another related proposal)	it (~~can be~~) (is) read. (items changed in another related proposal)	**17.5.2** Where a motor nameplate or connection diagram plate is not visible, additional identification shall be provided where it (~~can be~~ is) ~~easily~~ read.
Effectively			
8.2.1.1	be effectively grounded (2 times)	be grounded (2 times)	**8.2.1.1 Equipment Grounding.** The machine and all exposed, non-current-carrying conductive parts, material, and equipment likely to be energized shall be ~~effectively~~ grounded. Where electrical devices are mounted on metal mounting panels that are located within nonmetallic enclosures, the metal mounting panels shall be ~~effectively~~ grounded.
8.2.3.3	are effectively penetrated	are penetrated	**8.2.3.3** Bonding of equipment with bolts or other identified means shall be permitted where paint and dirt are removed from the joint surfaces or where the bonded members are ~~effectively~~ penetrated.
11.2.1.2	be effectively bonded	be bonded	**11.2.1.2** Where specified by the manufacturer, components and subassemblies shall be ~~effectively~~ bonded to the equipment grounding (protective bonding) circuit in accordance with the manufacturer's recommendations.
Table 12.5.1.1 Note	sides effectively guarded	sides guarded	**Condition 1**—Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides ~~effectively~~ guarded by insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.

Section #	Current text	Change to	Proposed change shown in context:
14.5.3.1.4	be effectively reduced	be reduced	**14.5.3.1.4** Conduit bends shall be made in such a manner that the conduit shall not be damaged and the internal diameter of the conduit shall not be ~~effectively~~ reduced. The radius of the curve of any field bend to the center line of the conduit shall be not less than shown in Table 14.5.3.1.4.
Equivalent			
5.3.3.1 (6) (b)	rotor equivalent equal	rotor current equal	(b) Where rated in horsepower, the horsepower rating shall be at least equal that which is defined by Table 430.151(B) of NFPA 70, *National Electrical Code,* for a locked rotor current ~~equivalent~~ equal to the largest sum resulting from the locked rotor currents of any combination of motors that can be started simultaneously and the full-load currents of the remaining motor and non-motor loads that can be operated at that time.
6.3.2 (2)	safety equivalent to providing equivalent isolation	safety corresponding to providing isolation	(2) A source of current providing a degree of safety ~~equivalent~~ corresponding to that of the safety isolating transformer (e.g., a motor generator with winding providing ~~equivalent~~ isolation)
8.2.2.3.1	electrically equivalent to	electrically equal to	**8.2.2.3.1** Machine members or structural parts of the electrical equipment shall be permitted to be used in the equipment grounding circuit provided that the cross-sectional area of these parts is at least electrically equal ~~equivalent~~ to the minimum cross-sectional area of the copper conductor required.
9.4.3 (2)	protection equivalent to	protection corresponding to	(2) Provide protection ~~equivalent~~ corresponding to that of control systems incorporating hardwired/hardware components
14.1.2.1 Exception No. 1	*insulation equivalent to*	*insulation corresponding to*	*Exception No. 1: Splices shall be permitted to leads attached to electrical equipment, such as motors and solenoids. Such splices shall be insulated with oil-resistant electrical tape or insulation ~~equivalent~~ corresponding to that of the conductors and installed in a suitable enclosure.*
Frequently			
14.1.5.6	to frequently moving parts shall be made with conductors for flexing	to moving parts shall be made with conductors for the intended flexing	**14.1.5.6** Connections to ~~frequently~~ moving parts shall be made with conductors for the intended flexing service in accordance with Section 13.7. Cord with conductors for flexing service shall have vertical connections and shall be installed to ~~avoid~~ prevent excessive flexing and straining.
Good			
14.1.1.1	ensure a thoroughly good connection	ensure a thorough ~~and~~ sound connection	**14.1.1.1** All connections shall be secured against accidental loosening and shall ensure a thorough~~ly good~~ and sound connection. Thread locking sealants, epoxies, glues, or other similar compounds shall not be used.
Likely			
8.2.1	*are not likely to*	*are implausible to*	*Exception: Small parts such as screws, rivets, and nameplates that are ~~not likely~~ implausible to become energized shall not be required to be grounded.*
8.2.1.1	equipment likely to be energized shall	equipment shall	**8.2.1.1 Equipment Grounding.** The machine and all exposed, non-current-carrying conductive parts, material, and equipment ~~likely to be energized~~ shall be effectively grounded. Where electrical devices are mounted on metal mounting panels that are located within nonmetallic enclosures, the metal mounting panels shall be effectively grounded.
12.4.1	are likely to be encountered	are encountered	**12.4.1** Enclosures shall be constructed and finished using materials capable of withstanding the mechanical, electrical, and thermal stresses, as well as the effects of humidity and corrosion that are ~~likely to be~~ encountered in normal service.
12.5	and likely to require	and will require	**12.5 Spaces Around Control Cabinets and Compartments.** Access and working space for control cabinets and compartments operating at 600 volts, nominal, or less to ground and ~~likely to~~ will require examination, adjustment, servicing, or maintenance while energized shall comply with the provisions of Chapter 12. Sufficient access and working space shall be provided and maintained around all control cabinets and compartments to permit ready and safe operation and maintenance of such control cabinets and compartments.
14.1.4.3	that are likely to be removed	that will be removed	**14.1.4.3** Cables shall not be supported by machinery guards that ~~are likely to~~ will be removed for maintenance access.

Section #	Current text	Change to	Proposed change shown in context:
14.4.5.4	circuit is likely to be opened	circuit will be opened	**14.4.5.4** Attachment plug and receptacle (plug/socket) combinations used for carrying motor loads shall meet the conditions of 5.3.3.3 if the circuit ~~is likely to~~ will be opened under load.
Legible			
13.4.1	if clearly legible through	if it can be read through	**13.4.1** A durable legend printed on the outer surface of the insulation of construction A, on the outer surface of the nylon jacket of construction B, on the outer surface of the insulation under the jacket of construction B (only if ~~clearly legible~~ it can be read through the nylon), or on the outer surface of the jacket of a multiconductor cable shall be repeated at intervals of no more than 610 mm (24 in.) throughout the length of the single conductor or the multiconductor cable.
May			
5.3.3.1 (6) (a)	that may be in	that is in	(a) The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that ~~may be~~ is in operation at the same time under normal conditions of use.
Most			
7.2.10.3	under the most severe	under severe	**7.2.10.3** Where the branch-circuit short-circuit and ground-fault protective device is selected not to exceed that allowed by 7.2.10.1 for the smallest rated motor, two or more motors or one or more motors and other load(s), with each motor having individual overload protection, shall be permitted to be connected to a branch circuit where it can be determined that the branch-circuit short-circuit and ground-fault protective device will not open under ~~the most~~ severe normal conditions of service that might be encountered.
Normal			
5.3.3.1 (6) (a)	normal conditions of use	normal conditions of use [No change in text but add note]	(a)* The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use. A.5.3.3.1 (6) (a) The normal conditions of use is established by the manufacturer of the device. The normal conditions of use for the device applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 “Basic Information”.
6.1	normal operation	normal operation [No change in text but add note]	**6.1* General.** Electrical equipment shall provide protection of persons from electrical hazards during both normal operation and during fault conditions. A.6.1 The normal operation of the electrical equipment applied to the industrial machine is established by the manufacturer of the electrical equipment and its application to the industrial machine is documented per the requirements in 18.8 “Operating Manual”.
6.2	normal operation	normal operation [No change in text but add note]	**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. A.6.2 The normal operation of the electrical equipment applied to the industrial machine is established by the manufacturer of the electrical equipment and its application to the industrial machine is documented per the requirements in 18.8 “Operating Manual”.
6.2.1	normal operating conditions	normal operating conditions [No change in text but add note]	**6.2.1* Protection by Insulation of Live Parts.** Live parts protected by insulation 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. Paints, varnishes, lacquers, and similar products shall not be considered adequate protection against electric shock under normal operating conditions. A.6.2.1 The normal operating conditions for the electrical equipment applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 “Basic Information”.

Section #	Current text	Change to	Proposed change shown in context:
7.2.1.2 (4) (a)	Normal operating current	Normal operating current [No change in text but add note]	(a)* Normal operating current A.7.2.1.2 (4) (a) The normal operating current is established by the manufacturer of the protective device. The normal conditions of use for the protective device applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 “Basic Information”.
7.2.10.3	normal conditions of service	normal conditions of service [No change in text but add note]	**7.2.10.3*** Where the branch-circuit short-circuit and ground-fault protective device is selected not to exceed that allowed by 7.2.10.1 for the smallest rated motor, two or more motors or one or more motors and other load(s), with each motor having individual overload protection, shall be permitted to be connected to a branch circuit where it can be determined that the branch-circuit short-circuit and ground-fault protective device will not open under the most severe normal conditions of service that might be encountered. A.7.2.10.3 The normal conditions of service is established by the manufacturer of the protective device. The normal conditions of use for the protective device applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 “Basic Information”.
9.2.3.1	operating modes (e.g., automatic, manual, normal, and bypass)	operating modes (e.g., automatic, manual, normal, and bypass) [No change in text but add note]	**9.2.3.1*** Each machine shall be permitted to have one or more operating modes (e.g., automatic, manual, normal, and bypass) determined by the type of machine and its application. A.9.2.3.1 The normal operating mode(s) of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
10.1.2.2 (1)	normal working position of the operator	normal working position of the operator [No change in text but add note]	(1)* They are not less than 0.6 m (2 ft) above the servicing level and are within easy reach of the normal working position of the operator. A.10.1.2.2 (1) The intended normal working position of the operator(s) of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
10.1.6.1.2	normal reach	normal reach [No change in text but add note]	**10.1.6.1.2*** Operator interface devices shall be within normal reach of the machine operator and shall be placed so that the operator is not exposed to hazards. A.10.1.6.1.2 Normal reach provides the ability of the operator to manipulate the controls from the normal working position(s). <add ergonomic standard references>
10.1.6.1.3	normal movement of the machine	normal movement of the machine [No change in text but add note]	**10.1.6.1.3*** Operator interface devices shall be located so that unintentional operation by normal movement of the machine, operator, or work will be unlikely. A.10.1.6.1.3 The normal movement of the industrial machine is established by the machine design for the normal operating mode(s) and is established by the manufacturer of the industrial machine.
10.2.3.1	normal operator position	normal operator position [No change in text but add note]	**10.2.3.1*** A legend shall be provided for each operator interface device to identify its function and shall be located so that it can be easily read by the machine operator from the normal operator position. The legends shall be durable and suitable for the operating environment. A.10.2.3.1 The intended normal operator position(s) of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.

Section #	Current text	Change to	Proposed change shown in context:
10.7.3	**Normal Function**	**Normal Function** [No change in text but add note]	**10.7.3* Restoration of Normal Function After Emergency Stop.** It shall not be possible to restore an emergency stop circuit until the emergency stop device has been manually reset. Where several emergency stop devices are provided in a circuit, it shall not be possible to restore that circuit until all emergency stop devices that have been operated have been reset. A.10.7.3 The normal function of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
Table 10.3	Normal - State of the Equipment Normal - Condition of Process Safe – Safety of Persons or Environment	Normal - State of the Equipment Normal - Condition of Process Safe – Safety of Persons or Environment [No change in text but add note]	Table 10.3* (matrix) Normal - State of the Equipment Normal - Condition of Process Safe – Safety of Persons or Environment A. Table .10.3 The normal state of the equipment and the normal condition of process of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
10.8.3	Normal Function	Normal Function [No change in text but add note]	**10.8.3* Restoration of Normal Function After Emergency Switching Off.** It shall not be possible to restore an emergency switching off circuit until the emergency switching off circuit has been manually reset. A.10.8.3 The normal function of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
10.9	normal position of the operator	normal position of the operator [No change in text but add to existing note]	**10.9* Displays.** Displays (e.g., visual display units, alarm annunciators, indicator lights, and the action-initiating icons of graphic interface devices) shall be selected and installed in such a manner as to be visible from the normal position of the operator. (Add to A.10.9) The intended normal working position of the operator(s) of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”. <add ergonomic standard references>
12.2.1.8	normal operation	normal operation [No change in text but add note]	**12.2.1.8*** Attachment plugs and receptacles (plug/socket combinations) that are handled during normal operation shall be located and mounted so as to provide unobstructed access. A.12.2.1.8 The normal operation of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 “Operating Manual”.
12.4.1	normal service	normal service [No change in text but add note]	**12.4.1*** Enclosures shall be constructed and finished using materials capable of withstanding the mechanical, electrical, and thermal stresses, as well as the effects of humidity and corrosion that are likely to be encountered in normal service. A.12.4.1 The normal service for the electrical equipment and enclosures that are applied to the industrial machine is established by the manufacturer of the electrical equipment and there application to the industrial machine is documented per the requirements in 18.8 “Operating Manual”.
12.4.2	normal requirements	normal requirements [No change in text but add note]	**12.4.2 ***Where corrosion protection beyond normal requirements is needed, nonmetallic enclosures identified for the purposes shall be permitted if they meet the requirements ofUL508. A.12.4.1 The normal level of contaminants acceptable for the electrical equipment applied to the industrial machine is established by the manufacturer of the electrical equipment and the application including the type and acceptable level of contaminants for the use of the industrial machine is per the requirements in 4.4.6 “Contaminants” and documented as the physical environment part of 18.8 “Operating Manual”.

12.4.13	Normal or abnormal operation	Normal or abnormal operation [No change in text but add note]	**12.4.13*** Equipment that, in normal or abnormal operation, can attain a surface temperature sufficient to cause a risk of fire or harmful effect to an enclosure material shall be one of the following: A.12.4.13 The normal operation for the industrial machine is established by the industrial machine manufacturer and is documented per the requirements in 18.8 "Operating Manual".
12.6.1	normal machine movements	normal machine movements [No change in text but add note]	**12.6.1*** Control equipment (e.g., limit switches, brakes, solenoids, position sensors) shall be mounted rigidly in a reasonably dry and clean location, 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. A.12.6.1 The normal machine movement(s) of the industrial machine is established by the machine design for the normal operating mode(s) and is established by the manufacturer of the industrial machine.
13.7.3	normal service load	normal service load [No change in text but add to existing note]	**13.7.3* Current-Carrying Capacity of Cables Wound on Drums.** Cables to be wound on drums *(see Table 13.7.3)* shall be selected with conductors of a cross-sectional area such that, when fully wound on and carrying the normal service load, the maximum allowable operating temperature is not exceeded. (Add to A.13.7.3) The normal service load is established by the manufacturer of the electrical utilization equipment (for example drives, motors, process heaters). The normal conditions of use for the utilization equipment as it is applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 "Basic Information".
14.1.4.2 (1)	normal equipment use	normal equipment use [No change in text but add note]	(1)* In such a manner that the cable will not be damaged by normal equipment use A.14.1.4.2 (1) The normal equipment use (for the industrial machine) is established by the industrial machine manufacturer and is documented per the requirements in 18.8 "Operating Manual".
17.4.2	normal conditions of service	normal conditions of service [No change in text but add note]	**17.4.2*** The full-load current shown on the nameplate shall not be less than the full-load currents for all motors and other equipment that can be in operation at the same time under normal conditions of use. Where unusual loads or duty cycles require oversized conductors, the required capacity shall be included in the full-load current specified on the nameplate. A.17.4.2 The normal conditions of service is established by the manufacturer of the electrical equipment The normal conditions of use for the equipment applied to the industrial machine is established by the manufacturer of the industrial machine and documented per the requirements in 18.4 "Basic Information".
18.4	Normal operating conditions	Normal operating conditions [No change this requirement is where some of the various uses of "normal" in this standard are established]	**18.4* Basic Information.** The technical documentation shall contain, as a minimum, information on the following: (1) Normal operating conditions of the electrical equipment including the expected conditions of the electrical supply and, where appropriate, the physical environment
18.7.2	normal starting condition	normal starting condition [No change this requirement is where some of the various uses of "normal" in this standard are established]	**18.7.3*** Where appropriate, a diagram showing the terminals for interface connections shall be provided. Switch symbols shall be shown on the electromechanical diagrams with all supplies turned off (e.g., electricity, air, water, lubricant) and with the machine and its electrical equipment in the normal starting condition and at 20°C (68°F) ambient temperature. Control settings shall be shown on the diagram.
Normally			

6.3.1.1 (1) (a)	normally dry locations	normally dry locations [No change in text but add note]	(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 A.6.3.1.1 (1) (a) For further information see definition 3.3.65.1 Dry Location
10.3.1	The colors RED, YELLOW (AMBER), GREEN, and BLUE are normally used in this mode. [and] The colors BLUE and WHITE are normally used in this mode. GREEN shall be permitted to be used in some cases.	Move to note: A.10.3.1 (1) The colors RED, YELLOW (AMBER), GREEN, and BLUE are normally used in this mode. [and] Move to note: A.10.3.1 (2) The colors BLUE and WHITE are normally used in this mode. GREEN shall be permitted to be used in some cases.	**10.3.1* Modes of Use.** Indicator lights and icons of color graphic interface devices shall provide the following information: (1)* Indication to attract the operator's attention or to indicate that a certain task should be performed. ~~The colors RED, YELLOW (AMBER), GREEN, and BLUE are normally used in this mode.~~ (2)* Confirmation of a command or a condition, or the termination of a change or transition period. ~~The colors BLUE and WHITE are normally used in this mode. GREEN shall be permitted to be used in some cases.~~ A.10.3.1 (1) The colors RED, YELLOW (AMBER), GREEN, and BLUE are normally used in this mode. A.10.3.1 (2) The colors BLUE and WHITE are normally used in this mode. GREEN shall be permitted to be used in some cases.
12.5.2.2	When normally enclosed	When enclosed	**12.5.2.2** When ~~normally~~ enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.
14.1.5.5	to normally stationary	to stationary	**14.1.5.5** Cord shall be permitted for use with connections involving small or infrequent movements. Cord shall also be permitted to complete the connection to ~~normally~~ stationary motors, limit switches, and other externally mounted devices.
Practices			
6.2.3.2	appropriate work practices	appropriate work practices [No change in text but add note]	**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 following conditions shall be met: A.6.3.2 See NFPA 70E, *Standard for Electrical Safety Requirements for Employee Workplaces*, for additional information on work practices.
Preferred			
10.2.2.1	The preferred color	The preferable color	**10.2.2.1 Start or On.** The ~~preferred~~ preferable color of start or on shall be GREEN, except that BLACK, WHITE, or GRAY shall be permitted. RED shall not be used for start or on.
10.2.2.2	The preferred color	The preferable color	**10.2.2.2 Stop or Off.** The ~~preferred~~ preferable color of stop or off shall be RED, except that BLACK, WHITE, or GRAY shall be permitted. GREEN shall not be used for stop or off.
Proper			
4.4.4	by proper design of the equipment or, where necessary, by proper additional	by design of the equipment or, where necessary, by additional	**4.4.4* Relative Humidity.** The electrical equipment shall be capable of operating correctly within a relative humidity range of 20 to 95 percent (non-condensing). Harmful effects of relative humidity outside the permitted range shall be avoided by ~~proper~~ design of the equipment or, where necessary, by ~~proper~~ additional measures (e.g., built-in heaters, air conditioners, humidifiers).
6.4.1 Exception No. 2	*with the proper functioning*	*with the functioning*	*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.*
13.2.7.2	for the proper functioning	for the functioning	**13.2.7.2** Special conductors such as RG -/U transmission cable shall be permitted where necessary for the ~~proper~~ functioning of the equipment.
15.4.2	so that proper cooling	so that cooling	**15.4.2** Motors shall be mounted so that ~~proper~~ cooling is ensured and the temperature rise remains within the limits of the insulation class.

18.8.1	detailing proper procedures	detailing procedures	**18.8.1*** The technical documentation shall contain an operating manual detailing ~~proper~~ procedures for set-up and equipment use.
18.9.1	detailing proper procedures	detailing procedures	**18.9.1*** The technical documentation shall contain a maintenance manual detailing ~~proper~~ procedures for adjustment, servicing and preventive inspection, and repair.
18.9.2	of proper operation	of operation	**18.9.2** Where methods for the verification of ~~proper~~ operation are provided (e.g., software testing programs), the use of those methods shall be detailed.
Ready			
12.5	permit ready and	permit ready access and	**12.5 Spaces Around Control Cabinets and Compartments.** Access and working space for control cabinets and compartments operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the provisions of Chapter 12. Sufficient access and working space shall be provided and maintained around all control cabinets and compartments to permit ready access and safe operation and maintenance of such control cabinets and compartments.
Readily			
11.2.2	be readily removable	be removable	**11.2.2 Subassemblies.** Subassemblies shall be ~~readily~~ removable for inspection or replacement.
12.2.2.5	group (~~can be~~ is) readily identified (items changed in another related proposal)	it (~~can be~~ is) identified (items changed in another related proposal)	**12.2.2.5** Terminal groups for power circuits, associated control circuits, and other control circuits shall be permitted to be mounted adjacently, provided that each group (~~can be~~ is) ~~readily~~ identified (e.g., by markings, by use of different sizes, by use of barriers, by colors).
18.7.5.2	device (~~can be~~ is) readily i located (items changed in another related proposal)	device (~~can be~~ is) located (items changed in another related proposal)	**18.7.5.2** Across-referencing scheme shall be used in conjunction with each relay, output device, limit switch, and pressure switch so that any contact associated with the device (~~can be~~ is) ~~readily~~ located on the diagrams.
Safe			
7.6.2	safe operating speed of the equipment	safe operating speed of the equipment [No change in text but add note]	**7.6.2* Equipment Overspeed Protection.** Where the safe operating speed of the equipment is less than that of the drive motor, means shall be provided to limit the speed of the equipment. A.7.6.2 The safe operating speed of the equipment (for the industrial machine) is established by the industrial machine manufacturer and is documented per the requirements in 18.8 "Operating Manual".
9.2.5.1.1	safe operation of the equipment	safe operation of the equipment [No change in text but add note]	**9.2.5.1.1*** The necessary interlocks shall be provided for safe operation. A.7.6.2 The safe operation of the equipment (for the industrial machine) is established by the industrial machine manufacturer and is documented per the requirements in 18.8 "Operating Manual".
9.4.3 (1) (a)	safe state	safe state [No change in text but add note]	(a)* Lead to the shutdown of the system in a safe state A.9.4.3 (1) (a) The safe state of the equipment (for the industrial machine) is established by the industrial machine manufacturer and is documented per the requirements in 18.8 "Operating Manual".
12.4.13 (2)	allow safe dissipation of heat	allow dissipation of heat without creating a hazard	(2) Mounted and located at a sufficient distance from adjacent equipment so as to allow ~~safe~~ dissipation of heat without creating a hazard.*(see also 12.2.3)*

12.5	and safe operation	and safe operation [No change in text but add note]	**12.5* Spaces Around Control Cabinets and Compartments.** Access and working space for control cabinets and compartments operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the provisions of Chapter 12. Sufficient access and working space shall be provided and maintained around all control cabinets and compartments to permit ready and safe operation and maintenance of such control cabinets and compartments. A.10.8.3 The anticipated safe operation of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 "Operating Manual".
Safety			
6.2.3.1 Exception No.2	*safety sign shall be provided that meets the requirements of 17.2.5.*	*safety sign shall be provided that meets the requirements of 17.2.4.* [incorrect cross-reference]	*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.~~ 17.2.4.*
6.3.2 (1)	safety isolating transformer	safety isolating transformer [No change in text but add note]	(1)* A safety isolating transformer A.6.3.2 (1) For additional information on isolating transformers, refer to IEC 60742 and IEC 61558-1.
6.3.2 (2)	safety isolating transformer	safety isolating transformer [No change in text but add note]	(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) A.6.3.2 (2) For additional information on isolating transformers, refer to IEC 60742 and IEC 61558-1.
9.2.4	shall ~~have~~ the same ~~safety requirements~~ as the suspended safeguard itself.	shall provide at least the same or lower level of residual risk as the suspended safeguard itself provided. [and add note]	**9.2.4* Overriding Safeguards.** Where it is necessary to temporarily override one or more safeguards, a mode selection device or means capable of being secured (e.g., locked) in the desired mode shall be provided to prevent automatic operation. The control circuit for the suspension of a safeguard shall ~~have~~ provide at least the same ~~safety requirements~~ or lower level of residual risk as the suspended safeguard itself provided. In addition, one or more of the following measures shall be provided: A.9.2.4 Residual risk is the acceptable level of risk, determined though analysis, that remains on an industrial machine after the application of the safeguard(s) and includes the safety control circuit(s).
9.2.7.5	the safety requirements of the machine	the safe operation of the machine [and add note]	**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~~ safe operation of the machine. A.9.2.7.5 The anticipated safe operation of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 "Operating Manual".
9.3.4.3	for safety or for continuous operation, coordination	for safeguarding or for continuous operation, their coordination	**9.3.4.3** Where certain functions on the machine are required to be interrelated for ~~safety~~ safeguarding or for continuous operation, their coordination shall be ensured by interlocks. For a group of machines working together in a coordinated manner and having more than one controller, provision shall be made to coordinate the operations of the controllers as necessary.
18.2(8)	for safety lockout	for safety lockout [No change in text but add note]	(8)* Information for safety lockout procedure A.18.2 (8) See NFPA 70E, *Standard for Electrical Safety Requirements for Employee Workplaces*, for additional information on lockout practices.

18.8.2	additional safety procedures (where required) shall be provided	additional safety measures (where required) shall be provided	**18.8.2** Where the operation of the equipment can be programmed, detailed information on methods of programming, equipment required, program verification, and additional safety ~~procedures~~ measures (where required) shall be provided.
Satisfactory			
5.3.5.1 (4)	for satisfactory operation	for satisfactory operation [No change in text but add note]	(4)* Circuits supplying equipment that are required to remain energized for satisfactory operation [e.g., temperature controlled measuring devices, product (work in progress) heaters, program storage devices] A.5.3.5.1 (4) The anticipated satisfactory operation of the industrial machine is established by the manufacturer of the industrial machine and is documented per the requirements in 18.8 "Operating Manual".
Secure			
12.2.1.5	maintain secure mounting	maintain secure mounting [No change in text but add note]	**12.2.1.5*** Threaded fasteners with machine threads shall be used to attach components to a sub-plate and shall provide sufficient thread engagement to maintain secure mounting. A.12.2.1.5 The requirements for installation of the threaded fasteners is established by the threaded fastener manufacturer. The normal conditions of use for the fasteners applied to the industrial machine is established by the manufacturer of the industrial machine and documented where required needed for installation or maintenance by the user of the industrial machine per the requirements in 18.5 "Installation Diagram" and 18.9 "Maintenance Manual".
12.4.6	to secure doors shall be	to hold doors close shall be	**12.4.6*** Fasteners used to ~~secure~~ hold doors close shall be of the captive type.
Securely			
12.4.9	shall be securely attached	shall be attached	**12.4.9** The joints or gaskets of doors, lids, covers, externally mounted accessories, interconnect panels, and enclosures shall withstand the deleterious effects of liquids, vapors, or gases used on the machine. The means used to maintain the enclosure's degree of protection on doors, lids, and covers that require opening or removal for operation or maintenance shall be ~~securely~~ attached to either the door/cover or the enclosure and not deteriorate due to removal or replacement of the door or the cover, which would impair the degree of protection.
14.5.1.4	be securely fastened	be fastened	**14.5.1.4** Raceways shall be ~~securely~~ fastened in place and supported.
14.5.3.2.1.1	be securely held	be held	**14.5.3.2.1.1** Conduits shall be ~~securely~~ held in place and supported at each end.
14.5.3.2.1.2	be securely fastened	be fastened	**14.5.3.2.1.2** Fittings shall be compatible with the conduit and identified for the application. Fittings and conduits shall be threaded using an electrical conduit die unless structural difficulties prevent assembly. Running threads shall not be used on conduit for connection at couplings. Metallic tubing shall not be threaded. Where thread-less fittings are used, the conduit shall be ~~securely~~ fastened to the equipment.
14.5.3.3.2	be securely held be securely fastened	be held be fastened	**14.5.3.3.2** Conduit shall be ~~securely~~ held in place and supported as specified in Table 14.5.3.3.2. In addition, conduit shall be ~~securely~~ fastened within 900 mm (3 ft) of each box, enclosure, or other conduit termination.
Several			
7.2.10.2	Several motors	More than one motor,	**7.2.10.2** ~~Several motors~~ More than one motor, each not exceeding 1 hp in rating shall be permitted on a nominal 120-volt branch circuit protected at not over 20 amperes or a 600-volt nominal or less branch circuit, protected at not over 15 amperes, where all of the following conditions are met:
10.7.3	Where several emergency	Where more than one emergency	**10.7.3 Restoration of Normal Function After Emergency Stop.** It shall not be possible to restore an emergency stop circuit until the emergency stop device has been manually reset. Where ~~several~~ more than one emergency stop devices are provided in a circuit, it shall not be possible to restore that circuit until all emergency stop devices that have been operated have been reset.
Significant			

5.4.4 (1)	no significant dismantling	no significant dismantling [No change in text but add note]	(1)* Routine exchange of work pieces, fixtures, and tools requiring no significant dismantling of the machine A.5.4.4.1 (1) The term "no significant dismantling of the machine", refers to a level of disassembly which presents no increase in risk either by limiting the degree of dismantling or by using additional measures to mitigate the hazards presented by the activity of disassembly. Generally hazards are identified and the risk is evaluated though risk assessment methods and the establishment of a work plan based on the risk assessment, is followed for the disassembly and the maintenance or operator task that is to be performed. More information on example risk assessment methods see: ANSI B11.TR3, *Risk Assessment and Risk Reduction—A Guide to Estimate, Evaluate and Reduce Risks Associated with Machine Tools*, 2000.

79-7 Log #CP1 **Final Action: Accept in Principle**
(Chapter 3 (GOT))

TCC Action: The committee action of "Accept in Principle" for a committee generated proposal is not clear. The Technical Correlating Committee assumes that the committee intends to only modify the definitions for Bonding, Dwelling Unit, Liquidtight Flexible Nonmetallic Conduit and Overcurrent as shown in a portion of the Committee Action. The Technical Correlating Committee directs that the committee consider the comments expressed in the voting. This action will be considered by the committee as a Public Comment.
Submitter: Technical Committee on Electrical Equipment of Industrial Machinery
Recommendation: Adopt the preferred definitions from the NFPA Glossary of Terms for the following terms:
Bonding. (preferred) NFPA 70, 2002 ed.
The permanent joining of metallic parts to form an electrically conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed.
Bonding (Bonded). (secondary) NFPA 79, 2002 ed.
The permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct any current likely to be imposed.

Cable Tray System. (preferred) NFPA 70, 1999 ed.
A unit or assembly of units or sections and associated fittings forming a rigid structural system used to securely fasten or support cables and raceways.
Cable Tray System . (secondary) NFPA 79, 2002 ed.
A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.

Dwelling Unit. (preferred) NFPA 5000, 2002 ed.
One or more rooms arranged for the use of one or more individuals living together, providing complete, independent living facilities, including permanent provisions for living, sleeping, eating, cooking, and sanitation.
Dwelling Unit. (secondary) NFPA 79, 2002 ed.
One or more rooms for the use of one or more persons as a housekeeping unit with space for eating, living, and sleeping, and permanent provisions for cooking and sanitation.

Equipment . (preferred) NFPA 820, 2003 ed.
A general term that includes items such as material, fittings, devices, appliances, and fixtures and apparatus, used as part of, or in connection with, a mechanical, instrumentation, or electrical installation.
Equipment. (secondary) NFPA 79, 2002 ed.
A general term including material, fittings, devices, appliances, luminaires (fixtures), apparatus, and the like used as a part of, or in connection with, an electrical installation.

Liquidtight Flexible Metal Conduit. (preferred) NFPA 70, 1999, ed.
A listed 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 and approved for the installation of electric conductors.
Liquidtight Flexible Metal Conduit (LFMC). (secondary) NFPA 79, 2002 ed.
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 for the installation of electric conductors.

Liquidtight Flexible Nonmetallic Conduit (LFNC). (preferred) NFPA 70, 1999 ed.
A listed raceway of circular cross section of various types as follows:
(1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and cover, designated as Type LFNC-A
(2) A smooth inner surface with integral reinforcement within the conduit wall, designated as Type LFNC-B
(3) A corrugated internal and external surface without integral reinforcement within the conduit wall, designated as Type LFNC-C
This conduit is flame resistant and, with fittings, is approved for the installation of electrical conductors.
Liquidtight Flexible Nonmetallic Conduit (LFNC). (secondary) NFPA 79, 2002 ed.
A nonmetallic raceway of circular cross section of oil-, water-, and flame-resistant construction and fittings for the installation of electrical conductors.
Live Parts. (preferred) NFPA 70, 1999 ed.
Electric conductors, buses, terminals, or components that are uninsulated or exposed and a shock hazard exists.
Live Parts. (secondary) NFPA 79, 2002 ed.
Energized conductive components.

Overcurrent. (preferred) NFPA 70 1999, ed.
Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.
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.
Overcurrent. (secondary) NFPA 79, 2002 ed.
One or more rooms for the use of one or more persons as a housekeeping unit with space for eating, living, and sleeping, and permanent provisions for cooking and sanitation.

Protective Conductor. (preferred) NFPA 70B, 2002 ed.
A conductor required by some measures for protection against electric shock for electrically connecting any of the following parts: exposed conductive parts, extraneous conductive parts, or main (grounding) earthing terminal. Also identified in some instances as the protective external (PE) conductor.
Protective Conductor. (secondary) NFPA 79, 2002 ed.
A conductor required by some measures for protection against electric shock for electrically connecting exposed conductive parts, extraneous conductive parts, or main earthing terminal.

Qualified Person. (preferred) NFPA 1451, 2002 ed.
A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project.
Qualified Person. (secondary) NFPA 79, 2002 ed.
One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved.

Receptacle . (preferred) NFPA 70 1999, ed.
A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.
Receptacle. (secondary) NFPA 79, 2002 ed.
A contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

Relative Humidity. (preferred) NFPA 97, 2003 ed.
The amount of water vapor or moisture held in suspension by gas or air and expressed as a percentage of the amount of moisture that would be held in suspension at the same temperature if saturated.
Relative Humidity . (secondary) NFPA 79, 2002 ed.
The ratio between the amount of water vapor in the gas at the time of measurement and the amount of water vapor that could be in the gas when condensation begins, at a given temperature

Risk. (preferred) NFPA 1451, 2002 ed
A measure of the probability and severity of adverse effects that result from an exposure to a hazard.
Risk. (secondary) NFPA 79, 2002 ed.
A combination of the probability and the degree of possible injury or damage to health in a hazardous situation.

Safety Control Circuit. (preferred) NFPA 97, 2003 ed.
A circuit involving one or more safety controls.
Safety Control Circuit. (secondary) NFPA 79, 2002 ed.
The part of the control circuit that incorporates safety related components.
Substantiation: Adoption of preferred definitions will assist the user by providing consistent meaning of defined terms throughout the National Fire Codes.
The following procedure must be followed when acting on defined terms (extract from the Glossary of Terms Definitions Procedure):
2.1 Revising Definitions.
2.1.1 Prior to revising Preferred definitions, the Glossary of Terms should be consulted to avoid the creation of additional Secondary definitions.
2.1.2 All Secondary definitions should be reviewed and eliminated where possible by the following method (in order of preference):
a) adopt the preferred definition if suitable.
b) modify the secondary term and/or definition to limit its use to a specific application within the scope of the document.
c) request that the Standards Council determine responsibility for the term .
d) request that the Standards Council authorize a secondary definition.
(extract from the NFPA Manual of Style):
2.3.2.6 Existing general definitions contained in the NFPA Glossary of Terms shall be used where technically accurate and correct.
Committee Meeting Action: Accept in Principle
The following definition will be extracted from the 2005 edition of the National Electrical Code.
3.3.8* Bonding (Bonded). The permanent joining of metallic parts to form an electrically conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed. [70:100]
3.3.12 Cable Tray System. A unit or assembly of units or sections and

associated fittings forming a structural system used to securely fasten or support cables and raceways. [70:392.2]

3.3.30 Dwelling Unit. A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation. [70:100]

3.3.40 Equipment. A general term including material, fittings, devices, appliances, luminaires (fixtures), apparatus, and the like used as a part of, or in connection with, an electrical installation. [70:100]

3.3.17.3 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 for the installation of electric conductors. [70:350.2]

3.3.17.4* Liquidtight Flexible Nonmetallic Conduit (LFNC). A raceway of circular cross section of various types as follows:

(1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and cover, designated as Type LFNC-A

(2) A smooth inner surface with integral reinforcement within the conduit wall, designated as Type LFNC-B

(3) A corrugated internal and external surface without integral reinforcement within the conduit wall, designated as Type LFNC-C

LFNC is flame resistant and, with fittings, is approved for the installation of electrical conductors. [70: 356.2]

A.3.3.17.4 FNMC is an alternate designation for LFNC

3.3.6.4 Live Parts. Energized conductive components. [70:100]

3.3.70* Overcurrent. Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault. [70:100]

3.3.78 Qualified Person. One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved. [70:100]

3.3.80 Receptacle . A contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke. [70:100]

The following definition (marked as secondary) will continue to be based on the previous edition of NFPA 79.

3.3.77 Protective Conductor. A conductor required by some measures for protection against electric shock for electrically connecting exposed conductive parts, extraneous conductive parts, or main earthing terminal.

3.3.83 Relative Humidity . The ratio between the amount of water vapor in the gas at the time of measurement and the amount of water vapor that could be in the gas when condensation begins, at a given temperature

3.3.84* Risk. A combination of the probability and the degree of possible injury or damage to health in a hazardous situation.

3.3.87 Safety Control Circuit. The part of the control circuit that incorporates safety related components.

Committee Statement: NFPA 79-2002 states in Section 1.5* that "On any point for which specific provisions are not made in this standard the provisions of NFPA 70, National Electrical Code, shall be observed." Therefore, definitions outside the machinery industry, will primarily be taken from the NEC. See also Proposal 79-17 (Log #CP2).

Number Eligible to Vote: 20

Ballot Results: Affirmative: 14 Negative: 6

Explanation of Negative:

ANDERSON: The report on committee action has several obvious typographical errors, though the intent has been indicated, the corrections should be made during the comment period before the proposed changes are accepted.

BLOODGOOD: The negative vote supports the position of Dave Fisher. This definition is incorrect in that a safety control circuit is surely defined by its function; not its components. Secondly, this definition is not used in the present text or in any of the proposed revisions to the text. Therefore, it should be deleted from the list of definitions. (Also could not find where this term is used either in the current edition or in accepted proposals.)

FISHER: The negative vote is only because of the selected definition of "Safety Control Circuit." This definition is incorrect in that a safety control circuit is surely defined by its function; not its components. Secondly, this definition is not used in the present text or in any of the proposed revisions to the text. Therefore, it should be deleted from the list of definitions.

LOCKE: I concur with the Explanation of Negative votes from Mr. Bloodgood, Mr. Fisher and Mr. Sanders.

PADGETT: The negative vote supports the position of Dave Fisher.

SANDERS: "Safety control circuit" appears in the 2002 NFPA 79 document in two locations; first in Chapter 3 as a definition and second in the index pointing to the location of the phrase in Chapter 3, which creates a round-robin that goes nowhere. There were no proposals to provide usage of this text for the 2005 edition, and this is not in accordance with NFPA MOS 1.6.3.3.

Comment on Affirmative

GOETZ: It is understood that the only definitions revised by this proposal are for bonding (3.3.9), dwelling unit (3.3.30), Liquidtight Flexible Nonmetallic Conduit (LFNC) (3.3.17.4), and Overcurrent (3.3.70).

79-8 Log #CP3 **Final Action: Accept**
(3.3.xx Risk Assessment (New))

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery

Recommendation: Add a new definition for Risk Assessment to read as follows:

3.3.xx Risk Assessment. The process by which the intended use of the machine, the tasks and hazards, and the level of risk are determined.

Substantiation: NFPA 79 needs a definition of Risk Assessment to eliminate confusion. The term is used in the document. This definition is from ANSI B11.TR3.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-9 Log #90 **Final Action: Reject**
(3.3.x Cable (New))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration

Recommendation: Add a new definitions to read:

3.3.x Cable. A single-conductor, or a combination of conductors insulated from one another, with a common covering that is Listed Type MTW, or has a trade name inclusive of the word "cable" that is identified in ANSI/NFPA 70 Chapter 3, and is Listed per the applicable UL standard.

3.3.x.x Cable With Flexible Properties. A cable or special cable that is malleable but not manufactured with flexing or constant flexing properties per ANSI/ASTM B 174-02 or ANSI/ASTM B 8.

3.3.x.x Flexible Cable. A cable or special cable manufactured with flexing or constant flexing properties per ANSI/ASTM B 174-02 or ANSI/ASTM B 8.

3.3.x.x Special Cable. A single-conductor, or a combination of conductors insulated from one another, with a common covering that has a trade name inclusive of the word "cable" that is identified in ANSI/NFPA 70 Chapters 4, 6, 7 or 8 and is Listed per the applicable UL standard.

Substantiation: NOTE: This proposal is submitted as part 1 of a 2 part series of proposals relating to the definitions of "cable", "cable with flexible properties", "flexible cable", and "special cable".

Substantial confusion exists as to precisely what might constitute a "cable", a "cable with flexible properties", a "flexible cable", or a "special cable"- all of which are all terms used in NFPA 79. It is the intent of this proposal to provide a crisp definition of each of these aforementioned terms so as to readily distinguish the differences in construction. This proposal seeks to provide a crisp serviceable definition of "cable" et al by melding definition elements from commonly referenced sources combined with very specific identification location, identification criteria, and construction verification pointers.

As neither NFPA 70 nor NFPA 79 currently offer definitions of "cable" – per the NFPA Manual of Style – such terms must be considered general terms or technical terms defined in other standards.

A review of Webster's Colligate 10th Editions indicates that there are no serviceable definitions of "cable" for the purposes of NFPA 79 thereby indicating that "cable" should be considered a technical term defined in other standards.

A query of cognizant engineers at two NRTLs indicates that there is no general definition of "cable" available in related product standards, thereby leaving a user at a dead end relative to determining specifically what constitutes a "cable", generally speaking, relative to NFPA 79.

Commonly referenced definitions for "cord", however, include:

American Electrician's Hand Book:

"Cable. (1) A stranded conductor (single-conductor cable) or (2) a combination of conductors insulated from one another (multiconductor cable). The component conductors of the second kind of cable may be either solid or stranded, and this kind may or may not have a common insulating covering. The first kind of cable is a single conductor, while the second kind is a group of several conductors. The term cable is applied by some manufacturers to a solid wire heavily insulated and lead-covered; this usage arises from the manner of the insulation, but such a conductor is not included under this definition of cable. The term cable is a general one, and in practice is usually applied only to the larger sizes. A small cable is called a standard wire or a cord, both of which are defined below. Cables may be bare or insulated, and insulated cables may be armored with lead or with steel wires or bands." IEEE Standard Dictionary of Electrical and Electronics Terms;

"Cable (1)(electric power). Either a stranded conductor (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable). Note: the first kind of cable is single conductor, while the second kind of is a group of several conductors. The component conductors of the second kind of cable may be either solid or stranded, and this kind of cable may or may not have a common insulating covering. The term cable is applied by some manufacturers to a solid wire heavily insulated and lead covered; this usage arises from the manner of the insulation, but such a conductor is not included in this definition of cable. The term cable is a general one, and in practice, it is usually applied only to larger sizes. A small cable is called a stranded wire or a cord. Cables may be bare or insulated, and the latter may be sheathed with lead, or armored with wires or bands."

These commonly reference definition are far broader than is desirable relative to the purpose of NFPA 79 but elements of these definition can serve as a baseline from which to expound.

The proposed definition for "cable", derived from these aforementioned reference definitions, establishes a baseline of what - generally speaking constitutes - a "cable." Coupling the baseline definition to specific "cable" identification types (i.e.; MTW) and identification locations, identification criteria, and construction verification requirements further enhances clarity. The references to cable types identified in NFPA 70 Chapter 3 and a product Listing to the applicable UL standard, crisply defines and effectively bounds the baseline definition of "cable." Such bounding eliminates confusion, misunderstanding and contention.

The proposed definition for "cable with flexible properties", based on the proposed definitions of "cable" and "special cable" identifies construction that is malleable but not of the construction and performance associated with "flexible cable". Such coupling eliminates confusion, misunderstanding and contention.

The proposed definition for "flexible cable", based on the proposed definitions of "cable" and "special cable" is coupled to construction and performance criteria (i.e.; ANSI/ASTM B 174-02 or ANSI/ASTM B 8) identified in Table 13.2.2 Single Conductor Characteristics. Such coupling eliminates confusion, misunderstanding and contention.

The proposed definition for "special cable", derived from the aforementioned reference definitions, establishes a baseline of what - generally speaking constitutes - a "cable." Coupling the baseline definition to specific "special cable" identification locations, identification criteria, and construction verification requirements further enhances clarity. As Section 13.2.7.1 references RG -/U transmission cable as an example of a "special conductor or cable" it is thereby plausible to ascertain that those cable types identified in chapters of NFPA 70 other than Chapter 3 would constitute "special cables." The references to cable types identified in NFPA 70 Chapters 3, 6, 7 and 8, and a product Listing to the applicable UL standard, crisply defines and effectively bounds the baseline definition." Such bounding eliminates confusion, misunderstanding and contention.

This proposal will substantially improve the user serviceability of NFPA 79 by mitigating confusion over the issue of what constitutes a "cable", a "cable with flexible properties" a "flexible cable", and a "special cable."

Committee Meeting Action: Reject

Committee Statement:

The proposed text does not comply with the NFPA style manual by referencing other standards and by including requirements within the definition.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 18 Negative: 2

Explanation of Negative:

GARSIDE: Surely this should be an AIP. It is very obvious that a definition (or some other guidance) is needed (cable vs. cord), and since the users have not managed to guess what we meant, the committee must do it. The proposal (log 90) was a possible starting point.

LOCKE: No discernible boundaries relative to what constitutes a cable have been identified. A definition for the word "cable" suitable for the purposes of NFPA must be established. In the interest of safety it is incumbent upon the technical committee to do so after having expressly permitted the application of cable on industrial machinery. Guidance for the NFPA 79 user community must be provided in the form of definitions for cables as they are currently referenced in the standard – some way, some how.

This proposal should not be rejected as it can serve as a baseline for defining cables. This proposal should be accepted in principle and used to establish a suitable definition of cable acceptable to the technical committee. The technical committee, so as to bring the proposed text into compliance with the manual of style, might revise this proposal to read as follows.

3.3.x * Cable. A single-conductor, or a combination of conductors insulated from one another with a common covering other than a cord or Type AWM Appliance Wiring Material.

3.3.x.x * Cable With Flexible Properties. A cable or special cable that is malleable but not manufactured with flexing or constant flexing properties.

3.3.x.y * Flexible Cable. A cable or special cable manufactured with flexing or constant flexing properties.

3.3.x.z * Special Cable. A cable intended for specific limited purposes.

A3.3.x For addition information on types of cable refer to ANSI/NFPA 70 Chapter 3.

A3.3.x.x See 13.2.2.

A3.3.x.y See 13.2.2.

A3.3.x.z For addition information on types of special cables refer to ANSI/NFPA 70 Chapters 4, 6, 7 and 8.

Acceptance in principle with the aforementioned revision is consistent with the intent of the submitter and satisfies the need to define cable.

Comment on Affirmative

ANDERSON: As is noted in the substantiation a definition for Cable used in and industrial machine is needed, possibly as a comment; the proposed definition needs to be in the definition and the requirements included in part of the proposed Chapter 12 Conductors, Cables and Flexible Cords" (old chapter 13).

79-10 Log #97 **Final Action: Reject**

(3.3.x Cable (New))

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation: Provide the following new definition into Chapter 3.

3.3.x Cable. Single or multiple flexible conductors insulated with a thermosetting compound and are enclosed in a flexible covering that provides mechanical protection and may also provide additional insulating qualities. The outer covering has an embedded reinforcing webbing intended to provide strength for portable use.

Substantiation: At present, there is no definition for cables even though the word is used singly or in conjunction with, or interchangeably with, cords. Definitions should be generic enough to stand along and not depend upon the use or industry standards for recognition. These definitions should instead serve as the foundation that industry can use to build a product that can then be evaluated by nationally recognized testing laboratories as to whether they meet this NFPA 79 definition.

This will also allow users of NFPA 79 to more properly evaluate the intended application when making the approval decision allowed in this Standard.

Cables may be single conductor or multiple conductor, and the wire sizes start at 8 AWG and go up through 1,000 kcmil, with the preponderance going to 4/0 AWG. These cables are intended for portable use in addition to being suitable for the flexing conditions associated with normal building movement.

The thermosetting compound property is important in order to reduce the opportunity for wires that are heated from carrying current to sag or melt down through the insulation over time, which thermoplastic does allow.

Pipe and wire assemblies use thermoplastic compounds to allow the needed flexibility of pull-in, and recognizes these conductors are supported along their length and not at selected intervals as the cord is wont to do. For instance, type MTW is stranded but is not intended to withstand the flexing operations associated with either cord or cable anticipated activities. It is entirely too stiff and will result in repeated failures, it has thermoplastic based insulating compound (hence the "T" in all NFPA 70 Chapter 3 wiring methods). Cable assemblies employing the thermoplastic compounds will allow the wire within to sag down through the insulation due to the minimal support points typically given to a cord or cable as opposed to the expected support along its length when installed within raceway systems, or the support provided by flexible wiring methods recognized in NFPA 70-2005 for building type construction where the flexing is limited to only that necessary to train the cable assembly into place.

Committee Meeting Action: Reject

Committee Statement: Cables may be manufactured in other than thermosetting compounds. Requirements in 14.1.4 require cables to be supported along their entire length and are not limited to portable use.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-11 Log #11 **Final Action: Reject**

(3.3.x Cable, Cord (New))

Submitter: David W. Muska, Eveready Battery Company

Recommendation: Add new definitions:

14.1.4 Cable = add definition.

14.1.5 Cord = add definition.

Substantiation: Both terms are used and the understanding as to what is the difference between a cord and a cable should be clarified.

Committee Meeting Action: Reject

Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

ANDERSON: A definition for Cable and for Cord used in and industrial machine is needed, also the requirements would need to be included in part of the proposed Chapter 12 Conductors, Cables and Flexible Cords" (old chapter 13).

FREUDENBERG: I would like to encourage the submitter to provide definitions of cable and cord that will clearly differentiate cable and cord.

GARSIDE: The standard desperately needs some guidance as to what a cord is vs. a cable. The result of the present lack is that cords are often used in machinery where they should not be.

KIIHR: While the submitter did not provide specific language, his proposal to add a definition for "cable" was a valid point. The term "cable" is used in excess of 50 times in the document, yet it is not defined. This debate is not new, as it was discussed during the last cycle as well.

Two proposals were submitted 79-9 (Log #90) and 79-10 (Log #97), which attempted to define the term cable. Both of these proposals were rejected for technical reasons. However, the fact that numerous proposals were submitted on this topic indicates that the user community sees a need for this definition. I would recommend that the Committee Chair appoint a Task Group to work on this issue before the ROC.

79-12 Log #89 **Final Action: Reject**
(3.3.x Disconnecting Means (New))

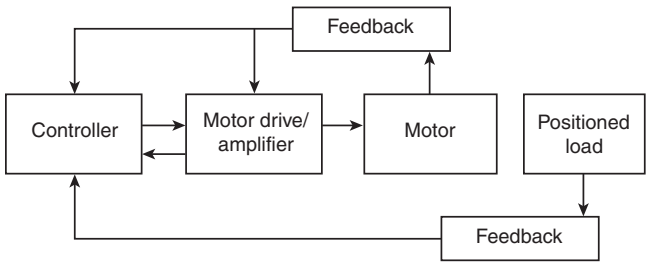
Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Add a new definition to read:
3.3.x Disconnecting Means, Main Supply Circuit. The disconnecting means for the predominant power system supply circuit feeding an industrial machine.
Substantiation: NOTE: This proposal is submitted as part 5 of a 5 part series of proposals relating to Sections 14.2.4.1, A14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
Proposed editorial changes to Sections 14.2.4.1 and 14.2.31 in proposals 1 of 5 and 3 of 5 of this series (respectively) relative to the consistent use of the term "main supply circuit disconnecting means" as presented therein and in Section 5.3.5 mitigate confusion and facilitate user serviceability. The addition of a definition for the term "main supply circuit disconnecting means" further mitigates confusion and facilitates user serviceability by providing a crisp definition of the term as it relates to uses in Sections 5.3.5.1, 14.2.3.1 and 14.2.4.1 (and of which there are no there uses in the standard) thereby making it easier for a user to apply excepted circuits safely.
Committee Meeting Action: Reject
Committee Statement: The proposed definition does not add clarity and refers to the "predominant power system supply circuit" which is undefined and can lead to misunderstanding and misapplication in the field.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-13 Log #20 **Final Action: Reject**
(3.3.x Disconnecting Means, Main Supply Circuit (New))

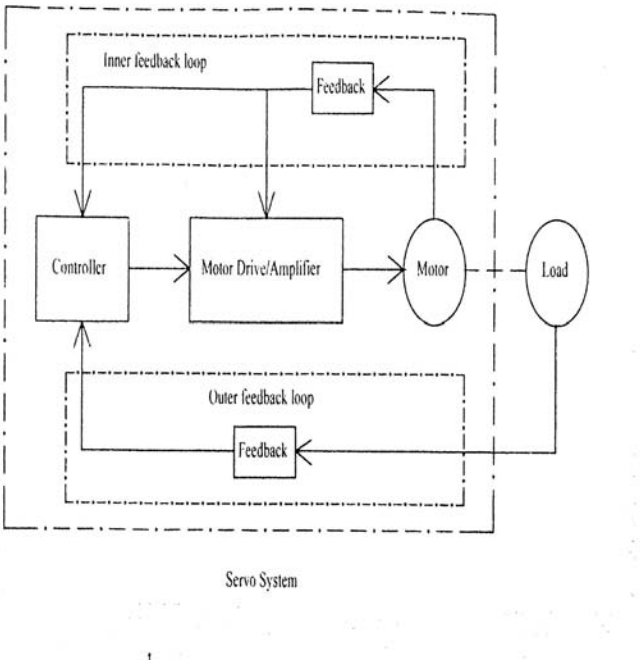
Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Add a new definition to read:
3.3.x Disconnecting Means, Main Supply Circuit. The disconnecting means for the predominant power system supply circuit feeding an industrial machine.
Substantiation: NOTE: This proposal is submitted as part 5 of a 5 part series of proposals relating to Sections 14.2.4.1, A.14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
Proposed editorial changes to Sections 14.2.4.1 and 14.2.3.1 in proposals 1 of 5 and 3 of 5 of this series (respectively) relative to the consistent use of the term "main supply circuit disconnecting means" as presented therein and in Section 5.3.5 mitigate confusion and facilitate user serviceability. The addition of a definition for the term "main supply circuit disconnecting means" further mitigates confusion and facilitates user serviceability by providing a crisp definition of the term as it relates to uses in Sections 5.3.5.1, 14.2.3.1 and 14.2.4.1 (and of which there are no uses in the standard) thereby making it easier for a user to apply excepted circuits safely.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on Proposal 79-12 (Log #89).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-14 Log #43 **Final Action: Accept in Principle**
(3.3.x Servo System (New))

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: New definition to read as follows:
Servo System: An Adjustable Speed Drive that has motion control by intentional command and is monitored by a feedback loop system.
Substantiation: To provide a common definition of term.
This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Accept in Principle
Revise the recommendation to read as follows:
New definition to read as follows:
3.X. Servo Drive System*. A system consisting of a controller, servo amplifier, motor, and feedback device(s) providing for the positioning control of a motion axis through the use of velocity, acceleration, and deceleration.
Add an annex A3.x.



Committee Statement: The committee made editorial corrections to more clearly convey the application of the definition. An annex item was added also.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
BLOODGOOD: A.3.X Add a dashed line between the motor and the positioned load to show the mechanical link.
MONTEITH: Change the committee action accepted wording to read as follows with revised artwork and new definition of servo system:
3.X Electrical Servo Drive System. A system consisting of a controller, servo amplifier, motor, and feedback device(s) ~~providing for the positioning control of a motion axis through the use of velocity, acceleration, and deceleration.~~
Add an annex A3, (revised artwork)



3.3.X.1 Servo System: A class of automatic regulators that perform the basic function of keeping a regulated quantity matched to a reference quantity.
The added word "electrical" is required to emphasize that it is an electrical servo system not another type such as a hydraulic servo system. Feedback can take many forms not just position or speed.
The revised artwork provides a more generic system.
The new definition is required to define the servo system.
PADGETT: The affirmative with comment vote supports the positions of John Bloodgood and Bob Monteith.

79-15 Log #95 **Final Action: Reject**
(3.3.25 Cord)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise definition to read as follows:
3.3.25 Cord. One or a group of flexible conductors substantially insulated to withstand wear, that is enclosed in a flexible insulating covering, and that is identified with a Trade Name that inclusive of the word "cord" in ANSI/NFPA 70 Table 400.4, and which is Listed per ANSI/UL 62.
Substantiation: NOTE: This proposal is submitted as part 1 of a 2 part series of proposals relating to the definitions of "cord".
Substantial confusion exists as to precisely what might constitute a "cord", a "cable", a "flexible cable", a "cable with flexible properties" and a "special cable"(e.g.; 37 strand 500 KCM THHN, per the criteria of Table 13.2.2 Single Conductor Characteristics, would satisfy the current NFPA 79 definition of a "cord".) It is the intent of this proposal to provide a crisp definition of "cord" so as to readily distinguish such construction from that of "cable", "flexible cable", "cable with flexible properties" and "special cable." This proposal seeks to provide a crisp serviceable definition of "cord" by melding definition elements from commonly referenced sources combined with very specific identification location, identification criteria, and construction verification requirement pointers.
Commonly referenced definitions for "cord" include:
American Electrician's Hand Book;
"Cord. A small cable, very flexible and substantially insulated to withstand wear. (There is no sharp dividing line in respect to size between a cord and a cable and likewise no sharp dividing line in respect to the character of

insulation between a cord and a stranded wire.)"

IEEE Standard Dictionary of Electrical and Electronics Terms;

"Cord. One or a group of flexible insulated conductors, enclosed in a flexible insulating covering and equipped with terminals."

The proposed definition for "cord", based on existing text, and these aforementioned reference definitions, establishes a baseline of what - generally speaking constitutes - a "cord." Coupling the baseline definition to specific "cord" identification locations, identification criteria, and construction verification requirements further enhances clarity. The references to NFPA 70 Table 400.4, the use of the identifier "cord" in the table's Trade Name column, and a product Listing to the applicable UL standard, crisply defines and effectively bounds the baseline definition of "cord." Such bounding eliminates confusion, misunderstanding and contention.

This proposal will substantially improve the user serviceability of NFPA 79 by mitigating confusion over what constitutes a "cord" relative to a "cable", a "flexible cable", a "cable with flexible properties" and a "special cable."

Committee Meeting Action: Reject

Committee Statement: The proposed text does not comply with the NFPA style manual by referencing other standards and by including requirements within the definition.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-16 Log #98 **Final Action: Accept in Part**

(3.3.25 Cord)

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation: Revise present 3.2.25 as follows.

3.3.25 Cord. ~~One or a group of~~ Two or more flexible ~~insulated~~ conductors ; insulated with a thermosetting compound and are enclosed in a flexible ~~insulating~~ covering that provides mechanical protection and may also provide additional insulating quality. The outer covering may or may not be applied over a continually closely wound thread serving that contains the core conductor assembly for outer covering application.

Substantiation: At present, there is no satisfactory method to judge whether the flexible assembly is a cord or a cable, and to properly judge its suitability for the intended usage. This will also help differentiate between the flexible by construction kind of cable and those cables that are intended at the most for limited single time flex or bending and not the type of flexing contemplated by most users of these assemblies.

The present definition text was changed from "One or a group of" to "Two or more" because cord assemblies are not provided as a single conductor. "Thermosetting compound" was added because it is necessary to retain the mechanical shape and integrity of the physical package during the continual heating that occurs while current is flowing, regardless of the amount of current involved.

The thermosetting compound property is important in order to reduce the opportunity for wires that are heated from carrying current to sag or melt down through the insulation over time, which thermoplastic does allow.

In contrast, pipe and wire assemblies use thermoplastic compounds to allow the needed flexibility for pull-in, and recognizes these conductors are supported along their length and not at selected intervals as the cord is.

"Insulating" was deleted in regard to the covering. While the overall outer jacket is made of materials that are insulators to some degree, they are not all evaluated for that purpose since their primary goal is to protect the internal core arrangement. The threaded serving may or may not be colorized for identification purposes.

Wire sizes for cords range in size from 18 AWG through 2 AWG, but normal usage sizes are 18 AWG through 10 AWG. The larger sizes tend to be special order, and most would likely turn to a cable for greater mechanical damage protection. Flexible cords are not fully intended for portable use, rather for flexing conditions that might arise associated with normal building movement.

In addition, definitions should be generic enough to stand alone and should not depend upon the use or industry standards for recognition. These definitions should instead serve as the foundation that industry can use to build a product that can then be evaluated by nationally recognized testing laboratories as to whether they meet this NFPA 79 definition.

Committee Meeting Action: Accept in Part

Revise present 3.2.25 as follows.

3.3.25 Cord. ~~One or a group of~~ Two or more flexible insulated conductors enclosed in a flexible ~~insulating~~ covering that provides mechanical protection.

Committee Statement: The committee did not accept the inclusion of the reference to thermosetting compound because all cord constructions do not utilize thermosetting insulation. The proposed additional reference to "additional insulating quality" was not accepted because the outer jacket of a cord is not evaluated for the voltage rating of the individual conductors. The last sentence refers to optional construction that is unnecessary in a definition.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-17 Log #CP2 **Final Action: Accept**

(3.3.26 Device, 3.3.39 Energized, 3.3.98 Supplementary Over, A.3.3.78)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery

Recommendation: Revise the existing definitions to read as follows:

3.3.26 Device. A unit of an electrical system that is intended to carry or control but not utilize electric energy. [70:100]

3.3.39 Energized. Electrically connected to, or is, a source of voltage. [70:100]

3.3.98 Supplementary Overcurrent Protective Device. A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as found within industrial machines. This limited protection is in addition to the protection provided in the required branch circuit by the branch circuit overcurrent protective device. [70:100]

A.3.3.78 Add a explanatory text in Appendix A.3.3.78 to read as follows: Refer to NFPA 70E-2004, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Substantiation: These changes will maintain alignment with definitions in Article 100 of NFPA 70-2005, The National Electrical Code.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-18 Log #136 **Final Action: Accept**

(3.3.100.1 System Isolation Equipment (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Add new definition for "System Isolation Equipment":

3.3.100.1 System Isolation Equipment. A redundantly monitored, remotely operated contactor - isolation system, packaged to provide the disconnecting/ isolation function, capable of verifiable operation from multiple remote locations by means of lockout switches, each having the capability of being padlocked in the OFF (open) position. [NFPA 70-2005, 430.2, System Isolation Equipment]

Substantiation: A new definition of "system isolation equipment" is proposed for inclusion in NFPA 79 using the same text as new definition in Section 430.2 of the 2005 NEC. The addition of the definition correlates with a companion proposal to revise the text of 5.5.4(3) that utilizes the defined term.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-19 Log #65 **Final Action: Accept in Principle**

(Chapter 4)

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Revise text to read:

Chapter 4 General Operating Conditions

4.1* General Considerations. This chapter describes the general requirements and conditions for the operation of the electrical equipment of the machine. The risks associated with the hazards relevant to the electrical equipment shall be assessed as part of the overall requirements for risk assessment of the machine.

A.4.1 A sample inquiry form is provided in Annex B for use in facilitating an agreement between the supplier and the user.

Hazards can include, but are not limited to, the following:

(1) Failures or faults in the electrical equipment resulting in the possibility of electrical shock or electrical fire

(2) Failures or faults in control circuits (or components and devices associated with these circuits) resulting in malfunctioning of the machine

(3) Disturbances or disruptions in power sources as well as failures or faults in the power circuits resulting in the malfunctioning of the machine

(4) Loss of continuity of circuits that depend upon sliding or rolling contacts resulting in a failure of a safety function

(5) Electrical disturbances (e.g., electromagnetic, electrostatic, or radio interference) either from outside the electrical equipment or internally generated , resulting in the malfunctioning of the machine

~~(6) Stored energy (either electrical or mechanical)~~

(6) Release of electrical or mechanical stored energy resulting in, for example, electric shock or unexpected movement that can cause injury

(7) Audible noise at levels that cause health problems to persons

(8) Surface temperatures that can cause injury

Safety measures are a combination of the measures incorporated at the design stage and those measures required to be implemented by the user.

Design and development should be the first consideration in the reduction of risks. Where this is not possible, safeguarding should be considered. Safeguarding includes the use of safeguards, awareness means, and safe working procedures.

4.2 Electrical Components and Devices. Electrical components and devices shall be installed and used assuming the operating conditions of ambient temperature, altitude, humidity, and supply voltage outlined in this chapter, and within their design ratings, taking into account any derating stipulated by the component or device manufacturer. Listed or labeled equipment shall be permitted to be used with or without modifications, on or with industrial machines, where approved for the location and use.

4.4.2* Electromagnetic Compatibility (EMC).

A.4.4.2 The electrical interferences generated by the equipment itself should not exceed levels specified in the relevant equipment standards and others dealing with electromagnetic compatibility (EMC) levels. The levels allowed should be determined for the specific application.

Generated interference signals can be kept to a minimum by the following:

(1) Suppression at the source by using capacitors, inductors, diodes, Zener diodes, varistors, or active devices, or a combination of these

(2) Equipment screening in a bonded electrically conductive enclosure to provide segregation from other equipment

Undesirable effects of electrostatic discharge, radiated electromagnetic energy, and supply conductor (mains borne) interference should be avoided (e.g., use of appropriate filters and time delays, choice of certain power levels, suitable wiring types and practices).

The effects of interference on equipment can be reduced by the following:

(1) Reference potential circuit or common connections. Each common connection treated as a single circuit and connected to one of several central reference points that are connected to ground (wired to earth) by insulated conductors of large cross-sectional area.

(2) Frame connections. In each piece of equipment all frame connections are to be taken to a common point with a conductor of large cross-sectional area (e.g., braided conductors, foil strips having a width much greater than the thickness) used between slides and enclosures. The connections to the frame are to be as short as possible.

(3) Transmission of signals. Electrostatic screens, electromagnetic shields, twisted conductors, and orientation (i.e., crossing cable runs at as near to 90 degrees as practicable) as necessary to ensure that the low level signal wiring is not affected by interference from control or power cables, or running the connections parallel to the ground plane as necessary.

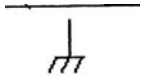
(4) Separation of equipment. Separating and/or shielding sensitive equipment (e.g., units working with pulses and/or at low signal levels) from switching equipment (e.g., electromagnetic relays, thyristors). Separation of low level signal wiring from control and power cables.

Measures to limit the generation of electromagnetic disturbances, i.e., conducted and radiated emissions include:

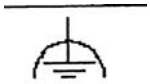
– power supply filtering
– cable shielding
– enclosures designed to minimize RF radiation
– RF suppression techniques.

Measures to enhance the immunity of the equipment against conducted and radiated RF disturbance include:

– Design of functional bonding system taking into account the following:
– connection of sensitive electrical circuits to the chassis. Such terminations should be marked or labeled with the symbol IEC 60417-5020 (DB: 2002-10) (see also Figure 3);



– connection of the chassis to earth (PE) using a conductor with low RF impedance and as short as practicable;
– connection of sensitive electrical equipment or circuits directly to the PE circuit or to a functional earthing conductor (FE) (see Figure 3), to minimize common mode disturbance. This latter terminal should be marked or labeled by the symbol IEC 60417-5018 (DB: 2002-10);



– separation of sensitive circuits from disturbance sources,
– enclosures designed to minimize RF transmission,
– EMC wiring practices:
– using twisted conductors to reduce the effect of differential mode disturbances,
– keeping distance between conductors emitting disturbances and sensitive conductors,
– using cable orientation as close to 90° as possible when cables cross,
– running the conductors as close as possible to the ground plane,
– using electrostatic screens and/or electromagnetic shields with a low RF impedance termination.

4.4.2.1 Transient suppression, isolation, or other appropriate means shall be provided where the ~~electronic~~ equipment generates electrical noise or transients, which can affect the operation of equipment.

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

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

A.4.1(5) This addition defines the hazard.

A.4.1(6) This provides an explanation on the result of the hazard.

A.4.1(8) An additional hazard has been identified.

4.2 Adds clarification in Section 4.2 of existing requirements for listed or labeled items. This addition was moved from 11.1.3 of NFPA 79 (2002) Chapter 11. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed because industrial electronic equipment has evolved such that they are readily available to meet most conditions generally found in and by industrial machinery. This will allow any electrical equipment where not specifically listed for a location to be utilized if adequate protection is provided by the machine design by placement inside enclosures that are themselves suitable for the application, and the like. This will supplement the general directions of NFPA 79 Section 1.5 that directs users to NFPA 70 (such as 110.3) when topics are not specifically addressed in NFPA 79.

A.4.4.2(4) This provides additional technical guidance for the builder.

4.4.2.1 A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. These requirements were moved from 11.2.3 of NFPA 79 (2002).

This is a general existing requirement that is consistent with NFPA 70:2002 and the existing requirements throughout NFPA 79:2002. This would then apply to any electrical equipment that was part of the industrial machine [reference NFPA 70:2002 Article 110.3(B)]. The level of interference to the operation of electrical control equipment is evaluated as part of the listing process. Elimination of the word "electronic" generalizes the requirements and correlates to IEC 60204-1.

4.7 This language reflects the intent of the topic covered in this clause.

Committee Meeting Action: Accept in Principle

1) Remove the term "with or" from 4.2, last sentence to the 2002 NFPA 79 Text.

2) Revise A.4.1 first part of the second Sentence "Hazards can include, but are not limited to, the following:" to read as follows "Hazardous situations can result from, but are not limited to, the following causes:"

Committee Statement: 1) The phrase "with or" was removed because it was not part of the text or requirement in 11.1.3 of the 2002 NFPA 79 document.

2) This change reflects the current understanding of the definition of hazard in 3.3.52.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-20 Log #60 **Final Action: Reject**

(4.1)

Submitter: William Anderson, The Procter & Gamble Company

Recommendation: Revise to read as follows:

4.1* General Considerations. This chapter describes the general requirements and conditions for the operation of the electrical equipment of the machine. The risks associated with the hazards relevant to the electrical equipment, as well as those hazards associated with safeguarding functions, shall be assessed as part of the overall requirements for risk assessment of the machine.

Substantiation: Since risk assessment is required for Electrical Safety, the extension to safeguarding functions is a logical step. Requirements relating to machine or functional safeguarding action already exist within the current standard, specifically, requirements within 9.2, 9.3 and 9.4 deal with this issue. In addition, there are several requirements within Chapter 10 that deal with things like unintended operation of actuating devices. The current wording of section 4.1 does not specifically consider the risk issues associated with hazard mitigation when that is done using electrically related safeguarding functions; these hazards introduced on the machine by the electrical equipment need to be considered in the requirement for risk assessment.

Committee Meeting Action: Reject

Committee Statement: The proposed text incorrectly implies that failures of functional safety creates hazards.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 17 Negative: 3

Explanation of Negative:

ANDERSON: Safeguarding functions (3.3.86) in the proposal is referring to the failure of safeguarding that is used to mitigate or reduce risk of possible injury from hazard. If the safeguarding fails to function the risk from the hazard in question re-appears and thus the failure of the safeguarding to function does in fact change the risk of injury form a hazard and need to be included in the risks with the hazards relevant to the electrical equipment.

DEFELICE: A risk assessment must include both the functionality of the electrical power system components and the electrically operated safeguarding components, for reliability, failure mode and operator notification.

KIIHR: The intent of this proposal was to indicate that risks on a machine are not limited to those hazards associated with the electrical equipment. The risks associated with other hazards on the machine (e.g., pinch points, moving members, etc.) also have an impact on the electrical design of the machine. As Mr. Anderson stated in his substantiation, requirements relating to these types of hazards already exist within the document. It would be disingenuous to ignore the risks associated with these hazards, as they relate to the electrical control system of the machine.
The Committee Statement for reject states: "The proposed text incorrectly implies that failures of functional safety creates hazards." This statement is misleading at best. The failure of a functional safety system may very well lead to the exposure to a hazard. This is exactly the point that was attempting to be addressed by the submitter. The risk assessment will enable the machine designer to evaluate the risks associated with the hazards, and to design the electrical control circuitry appropriately to prevent exposure to these hazards based upon that associated risk.

79-21 Log #105 **Final Action: Reject**
(4.1)

Submitter: David Fisher, Rockwell Automation / Rep. NEMA
Recommendation: Revise text to read:
4.1* General Considerations. This chapter describes the general requirements and conditions for the operation of the electrical equipment of the machine. The risks associated with the hazards relevant to the electrical equipment shall be assessed as part of the overall requirements for risk assessment of the machine. Particular attention shall be given to the need to quantify those machine related risks that are to be mitigated by means of functional safety.
Substantiation: The need here is sensitivity to the needs related to risk mitigation by means of functional safety. Whereas some risks can be sufficiently mitigated by a given means where scaling of the risk is not formally required because of traditions of given "fixes" for given risks, scaling or quantification of the risk is necessary for the correct functional safety means to be selected or designed.
Committee Meeting Action: Reject
Committee Statement: The proposed text is unnecessary and unenforceable.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
KIIHR: See my Explanation of Negative on 79-20 (Log #105).

79-22 Log #147 **Final Action: Reject**
(4.1)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise 4.1 as follows:
4.1* General Considerations. This chapter describes the general requirements and conditions for the operation of the electrical equipment of the machine. The risks associated with the hazards relevant to the electrical equipment , as well as those hazards associated with the functional safety of the machine, shall be assessed as part of the overall requirements for risk assessment of the machine.
Substantiation: Since risk assessment is required for Electrical Safety, the extension to functional safety is a logical step. Requirements relating to machine or functional safety already exist with the current standard. Specifically, requirements within 9.2, 9.3 and 9.4 deal with this issue. In addition, there are several requirements with Chapter 10 that deal with things like unintended operation of actuating devices The current wording of Section 4.1 does not consider these functional safety issues in the requirement for risk assessment.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on Proposal 79-20 (Log # 60).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
KIIHR: See my Explanation of Negative on 79-20 (Log #105).
PILZ: In my opinion, it is necessary to point out to the user of this documnet that we have adopted wording covering the functional safety aspect of control circuitry in Chapter 9. The reference to risk assessement reflects best industry practice. I believe the committee should accept this proposal.

79-23 Log #55 **Final Action: Reject**
(4.2)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Revise to read as follows:
4.2 Electrical Components and Devices. Electrical components and devices shall be installed and used assuming the operating conditions of ambient temperature, altitude, humidity, and supply voltage outlined in this chapter, and within their design ratings, taking into account any derating stipulated by the component or device manufacturer. The electrical equipment of the machine shall satisfy the electrical safeguard requirements identified by the risk assessment of the machine.
Substantiation: The addition connects the risk assessment requirement in 4.1 with the electrical equipment on the machine. The addition also sets the general requirement that is consistent with the requirements throughout the standard to mitigate risks, e.g. from NFPA 79:2000, 5.5.1, 9.2.5.3.2, 12.4.13.
Committee Meeting Action: Reject
Committee Statement: The proposed text incorrectly mixes environmental application requirements for components with system requirements that belong in Chapter 6 or Chapter 9.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
ANDERSON: Though the proposed action on the proposal might have been AIP and place the requirement in a sub clause 4.2.1, the proposed location is suitable because the electrical safeguarding requirements are as much of the environmental aspects of the equipment application as the other requirements that exist in 4.2 for the electrical components and devices.
DEFELICE: Criteria for selection of electrical components must consider not only environmental criteria; but also the reliability, failure mode and operator notification features of safeguarding components.

79-24 Log #56 **Final Action: Accept**
(4.4.5)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Revise to read as follows:
4.4.5* Altitude. Electrical equipment shall be capable of ~~operating correctly~~ correct operation at altitudes up to 1000 m (3300 ft) above mean sea level.
Substantiation: Operate means to perform a function while operation means performance of practical work or of something involving the practical application of principles or processes. The latter is closer to the intended meaning of the requirement.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-25 Log #126 **Final Action: Accept in Principle**
(4.8 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Add new 4.8 as follows:
4.8 Available fault current.
The available fault current at the point of the supply to the machine shall not be greater than the short-circuit current rating marked on the control equipment nameplate.
Substantiation: The proposed new 4.8 is based on the current 5.3.3.2 and is revised to reference the nameplate short circuit current rating of the control equipment to be consistent with new short circuit current rating required by 670.3 of the 2005 NEC. As the short circuit current rating applies to entire control panel and not just the disconnecting means, the proposal relocates the requirement to Chapter 4. The introductory clause of the current 5.3.3.2 is deleted as the overall sort circuit current rating applies to all of the disconnecting means permitted by NFPA 79, including attachment plugs and receptacles. For an equipment manufacturer, the available fault current is a part of the equipment specifications. As the actual available current at installation is not controlled by the equipment manufacturer and may differ, the requirement also provides a means for enforcement at the installation of the equipment.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Revise the proposed text to read as follows:
The available fault current at the point of the supply to the machine shall not be greater than the short-circuit current rating marked on the industrial control panel ~~equipment~~ nameplate.
Committee Statement: The term industrial control panel nameplate is a more appropriate term and matches the language in the NEC Article 670.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
MONTEITH: The scope of NFPA 79-2002, 1.1.1, indicates the standard applies to machinery "...commencing at the point of connection of the supply to the electrical equipment of the machine". This proposal is beyond the scope of NFPA 79-2002.
PADGETT: Change Committee Action revised wording to read:
4.8 Available Fault Current. The available fault current at the point of the supply to the machine shall ~~not be greater than the short-circuit current rating marked on the industrial control panel nameplate~~ meet the requirements of Article 670 of NFPA 70, National Electric Code .
Substantiation: This requirement is outside the scope of NFPA 79 as defined in paragraph 1.1.1. Therefore, this requirement is an informational requirement placed in NFPA 79 pointing to NFPA 70.

79-26 Log #66 **Final Action: Accept in Principle**
(Chapter 5)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:
Chapter 5 Incoming Supply Circuit Conductor Terminations and Devices for Disconnection and Removing Power
5.3.2 Type. The supply circuit disconnecting device shall be one of the following types:
(1) A listed motor circuit switch (switch disconnector) rated in horsepower
(2) A listed, branch circuit rated, molded case circuit breaker
(3) A listed molded case switch
(4) An instantaneous trip circuit breaker that is part of a listed combination motor controller
(5) A listed self-protected combination controller limited to single motor applications
(6) An attachment plug and receptacle (plug/socket combination) for cord connection ~~to motor loads totaling 2 hp or less~~
5.3.3 Requirements.
5.3.3.1* Where the supply circuit disconnecting device is one of the types in 5.3.2(1) through 5.3.2(5), the device shall fulfill all of the following requirements:
(1) Isolate the electrical equipment from the supply circuit and have one off (open) and one on (closed) position only. Circuit breakers are permitted to have a reset (tripped) position between off (open) and on (closed).
A.5.3.3.1 For additional information see IEC 61310-3 or NEC Article 404.7 for direction of operation of the disconnecting actuator.
(2) Have an external operating means (e.g., handle).
Exception: Power-operated switchgear need not be operable from outside the enclosure where there are other means to open it.
(3) Be provided with a permanent means permitting it to be locked in the off (open) position only (e.g., by padlocks) independent of the door position. When so locked, remote as well as local closing shall be prevented.
(4) Simultaneously disconnect all ungrounded conductors of the power supply circuit.
(5) Be operable, by qualified persons, independent of the door position without the use of accessory tools or devices.
(6) Be rated for the application as follows:
(a) The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use.
(b) Where rated in horsepower, the horsepower rating shall be at least equal that which is defined by Table 430.151(B) of NFPA 70, National Electrical Code, for a locked rotor equivalent equal to the largest sum resulting from the locked rotor currents of any combination of motors that can be started simultaneously and the full-load currents of the remaining motor and nonmotor loads that can be operated at that time.
(c) The voltage rating shall be at least equal to the nominal supply circuit voltage.
5.3.3.3 When the supply circuit disconnecting device is an attachment plug and receptacle (plug/socket combination), it shall fulfill all of the following requirements:
(1) Have a load-break rating or be interlocked with a switching device that is load-break rated, capable of interrupting the locked rotor current of the largest motor plus the sum of the remaining load that is operating at that time.
Attachment plug and receptacle (plug/socket combination) rated greater than 20 A or 2 HP, shall be listed as switch-rated plug and receptacle (plug/socket combination).
(2) Be of such a type and be so installed as to prevent unintended contact with live parts at any time even during insertion or removal of the connectors
(3) Have a first make, last break grounding (earthing) contact
(4) Have a retaining means to prevent unintended or accidental disconnection where rated at more than 20 amperes
(5) Be located within sight from the operator station and be readily accessible
5.4 Means for Removal of Power for Prevention of Unexpected Start-Up.
5.4.1 Means for removal of power shall be provided when prevention of unexpected start-up is required (e.g., during maintenance where the unexpected start-up of a machine or part of the machine can create a hazard). Such means shall include all of the following:
(1) Appropriate for the intended use
(2) Conveniently located
(3) Readily identifiable as to their function and purpose
(4) Provided with permanent means for locking in the off position only
5.4.3* Where other means of removal of power are used, a single failure of any of its components shall not result in an inadvertent or unexpected start-up.
A.5.4.3 The selection of other means is dependent on many factors, taking into account those persons for whom its use is intended. See ANSI B11-TR3 and ISO 14121.
Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.
5.3.2 This section addresses disconnecting means only for incoming supply conductors.
5.3.3.1 Provides further guidance for the user.
5.3.3.3 This clarifies that higher rated devices are permitted when listed.
5.4.1 Provides further clarification.
5.4.3 Provides guidance for requirement in 5.4.3.
Committee Meeting Action: Accept in Principle
Modify 5.4.1 to read as follows:
Means for removal of power shall be provided when prevention of unexpected startup is required (e.g., during maintenance where the unexpected startup of a machine or part of the machine can result in a hazardous situation ~~create a hazard~~).
Committee Statement:
Section 5.4.1 was modified to reflect the correct understanding of the meaning of the term hazard.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-27 Log #115 **Final Action: Accept in Principle**
(5.1.2)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.1.2 as follows:
5.1.2 The incoming supply conductors shall be terminated at the supply circuit disconnecting means, where practicable. Connections to ~~guarded~~ terminal blocks ~~or other devices~~ ahead of the disconnecting means shall be permitted for excepted circuits according to 5.3.5 or where the supply conducts are other than those identified for the supply circuit disconnecting means. Terminals for more than one conductor shall be so identified.
Substantiation: The current 5.1.2 only applies to incoming supply circuit conductor terminations for excepted circuits and does not address such terminations when excepted circuits are not present. The addition of a new sentence addressing incoming supply conductors terminated at the supply circuit disconnecting means specifically addresses the expected supply arrangement when excepted circuits are not present and the addition correlates to similar text in IEC 60204, clause 5.1. The term “guarded” has been deleted in order to not conflict or cause confusion with other similar requirements addressing live parts on the line side of supply circuit disconnecting means (A companion proposal has been submitted to cover the topic of guarding under a new 5.1.7). Deleted “other devices” as only terminal blocks or terminals of disconnecting means are to be used for incoming supply circuit conductors. Added text to permit terminal block to be used when the incoming supply conductors cannot be terminated at the supply circuit disconnecting means due to use of conductor size larger or smaller than can be retained by the terminal or due to use of paralleled conductors where an insufficient number of terminals per pole are available at the supply circuit disconnecting means.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Apold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kampa, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Accept the proposed revisions except revise 5.1.2 as follows: In the first sentence, revise “The incoming supply conductors …” to “The incoming supply circuit conductors…” and in the second sentence, revise ”… or where the supply conducts …” to ”… or where the incoming supply circuit conductors …”
Committee Statement: The correct term for the conductors is “incoming supply circuit conductors” and the revisions clarify the requirement by using consistent terminology.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-28 Log #116 **Final Action: Accept**
(5.1.4)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.1.4 as follows:
5.1.4 All terminals for each ~~the~~ incoming supply circuit connection shall be legibly marked to correspond with markings on the interconnection diagrams as in 18.5.7.
Substantiation: The current 5.1.4 is incomplete and does not provide an indication of the intended content of the marking requirement. The revision clarifies the requirement by describing the intended marking, as identification of the supply circuit connections for each set of incoming terminals, and to distinguish this marking requirement from other similarly worded marking requirements found elsewhere in Chapter 5, such as 5.3.1.1.1. The addition of a reference to applicable marking requirement in chapter 18 provides a linkage between the two requirements for clarity.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Apold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kampa, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:
PADGETT: Disagree with Committee Action to accept wording as proposed. Change wording to read as follows:
All terminals for each incoming supply circuit connection shall be legibly marked to correspond with markings on the interconnection diagrams ~~as in~~ when provided as described in 18.5.7.
Substantiation: The use of the words "as in" in this sentence can be interpreted to mean "as an example." The recommended language clarifies the meaning that the requirement is only when interconnection diagrams are provided.

79-29 Log #117 **Final Action: Accept in Principle**
(5.1.5 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: New text to read as follows:
5.1.5 The wire bending space provided between the terminals of the supply circuit disconnecting means (or terminals described in 5.1.2) and the wall of the enclosure shall not be less than required by 430.10(B) of NFPA 70, National Electrical Code. Space shall be determined by maximum wire size of incoming lines or not smaller than the conductors required by 670.4(A) of NFPA 70, National Electrical Code. When the wire bending space is based on more than one conductor per phase, the intended conductor size and number shall be so identified on inter connection diagrams as in 18.5.7.
Substantiation: The current 5.3.1.5 contains three different requirements that all pertain to the incoming supply circuit conductors, which is the subject of Section 5.1 rather than Section 5.3 for supply circuit disconnecting means. This proposal addresses wire bending space requirements (Companion proposals have been submitted to cover the topic of guarding under a new 5.1.7 and the topic of separation of incoming supply circuit conductors under a new 5.1.6).
The new 5.1.5 relocates the wire bending space requirements for incoming supply circuit conductors to Section 5.1 so that the requirements are located under a logical heading and to clarify the wire bending space also applies to other terminals for incoming supply circuit conductors permitted in Section 5.1. The text of 5.1.5 consists of revised text from the first line of the current 5.3.1.5 with additional descriptive text of the wire bending space and referencing the NEC for minimum incoming supply circuit conductor size requirements. The last sentence of the new 5.1.5 is intended to provide an indication of the intended incoming conductors anticipated when the bending space is not adequate for a single conductor per phase.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Accept the proposed revisions except revise 5.1.5 as follows: In the second sentence, revise "… incoming lines …" to "… incoming supply circuit conductors …"
Committee Statement: The correct term for the conductors is "incoming supply circuit conductors" and the revisions clarify the requirement by utilizing consistent terminology.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-30 Log #119 **Final Action: Accept in Principle**
(5.1.6 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Add new 5.1.6 as follows:
5.1.6 Each set of incoming supply circuit conductors on the line side of the disconnecting means shall be separated from all other internal conductors, including conductors of other supply circuits by either of the following:
(1) Mounting the supply circuit disconnect as near as practicable to the top of the enclosure while dedicating sufficient wire bending space as in 5.1.5; or
(2) Mounting the supply circuit disconnect other than at the top of the enclosure and by separating the supply circuit conductors from other internal conductors by the use of a barrier.
Substantiation: The current 5.3.1.5 contains three different requirements that all pertain to the incoming supply circuit conductors, which is the subject of Section 5.1 rather than Section 5.3 for supply circuit disconnecting means. This proposal addresses requirements for the separation of incoming supply circuit conductors (companion proposals have been submitted to cover the topic of guarding under a new 5.1.7 and the top of wire bending space under a new 5.1.5).
The new 5.1.6 requirement consists of revised text from current 5.3.1.5 that refers to the separation of incoming supply circuit conductors on the line side of the supply circuit disconnecting means. Text related to the guarding of the line side terminals has been deleted so that the requirement in 5.1.6 applies to maintaining clear separation of all line side conductors.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goethe, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Accept the proposed revisions except revise 5.1.6 as follows:
In sub-item (1), revise "while dedicating sufficient wire bending space…" to "…with dedicated wire bending space…"
Committee Statement: The revision removes the word "sufficient" because the wire bending space is already specified in accordance with the National Electrical Code.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-31 Log #120 **Final Action: Accept in Part**
(5.1.7 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Add new 5.1.7 as follows:
5.1.7 All live parts on the line side of the supply circuit disconnecting means shall be protected from unintentional direct contact by use of insulation or obstacle(s) when the disconnecting means is in the open (off) position and the enclosure door is open. An obstacle is permitted to have openings that a 2.5 mm diameter test rod cannot penetrate.
Substantiation: The current 5.3.1.5 contains three different requirements that all pertain to the incoming supply circuit conductors, which is the subject of Section 5.1 rather than Section 5.3 for supply circuit disconnecting means. This proposal addresses requirements for the guarding of line side parts (Companion proposals have been submitted to cover the topic of wire bending space as new 5.1.5 and segregation of incoming supply circuit conductors as new 5.1.6).
The new 5.1.7 is intended to clarify and consolidate references to direct contact/guarded/accidental contact requirements pertaining to the line side of disconnecting means currently found in 5.1.2, 5.3.1.5, 5.3.1.6. The new text of the proposed 5.1.7 replaces current 5.3.1.6 so as to apply to all live parts on the line side of the disconnect, including disconnect terminals, conductors, and terminal blocks. The new 5.1.7 also replaces isolated unspecified references to the topic of guarding, including the word "guarded" from 5.1.2 and "accidental contact" from the second sentence of 5.3.1.5.
The new 5.1.7 defines the conditions used to determine when insulation or obstacles are required. This requirement makes allowance for openings in obstacles to permit access by test equipment or tools by qualified persons and is equivalent to IP3X protection which is also compliant with direct contact requirements currently in NFPA 79.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Lock, and Marten Robinson.
Committee Meeting Action: Accept in Part
Accept only the first sentence of proposed 5.1.7.
Committee Statement: The Committee does not accept the second sentence because the specified performance criteria for the openings in the obstacle are more stringent than the criteria for the obstacle itself.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
MONTEITH: Change the committee action accepted wording to read as follows:
All live parts on the line side of the supply circuit disconnecting means shall be protected from unintentional direct contact by use of insulation or obstacle(s) ~~when the disconnecting means is in the open (off) position and the enclosure door is open.~~
Line side guarding should not be affected by the on or off position of the disconnecting means.
PADGETT: The affirmative with comment vote supports the position of Bob Monteith.

79-32 Log #122 **Final Action: Reject**
(5.3.1.1)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.1.1 as follows:
5.3.1.1 A supply circuit disconnecting means shall be provided with the equipment for the following:
(1) Each incoming supply circuit to a machine
(2) The supply circuit to a feeder system using collector wires, collector bars, slip-ring assemblies, or flexible cable systems (reeled, festooned) to a machine or a number of machines
(3) Each onboard power source (e.g. generator)
Substantiation: The current 5.3.1.1 does not specify whether the supply circuit disconnecting means are a required part of the electrical equipment or not. The revision clarifies the supply circuit disconnecting means is required to be supplied as part of the control equipment.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Reject
Committee Statement: Not all industrial machines are provided with a disconnecting means. The disconnecting means may be provided by the facility.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-33 Log #123 **Final Action: Accept**
(5.3.1.1.1 and A.5.3.1.1.1)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.1.1.1 and add Annex A note A..3.1.1.1 as follows:

5.3.1.1.1 * Each disconnecting means required by 5.3.1.1 shall be legibly marked to indicate t he equipment it disconnects. ~~its purpose.~~

A.5.3.1.1.1 When a single disconnecting means is provided, a marking such as "main machine disconnect" is sufficient to convey the purpose. Where multiple supplies are present, a descriptive marking is necessary to clearly indicate the controlled supply voltage or equipment that is disconnected, such as "main disconnect — 480V, 3ph", or "main disconnect - Drive motors".
Substantiation: When read as a stand-alone requirement, the current text of 5.3.1.1.1 is not clear as to the exact "purpose" that is the subject of the marking requirement. The revision and addition of an Annex A note is intended to clarify that he purpose of the marking is identificatiion of the disconnected equipment. Where multiple disconnecting means are supplied with the equipment, a unique marking is necessary so that the proper disconnect is readily identifiable from all other disconnects. The inclusion of the note is intended to provide examples of such markings to facilitate understanding of the requirement.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
FREUDENBERG: When a single disconnect is provided the label "main machine disconnect" is unnecessary.

79-34 Log #8 **Final Action: Reject**
(5.3.1.4)

Submitter: David W. Muska, Eveready Battery Company
Recommendation: Add new text to read:

Where mounted within the control enclosure, the disconnecting means shall be maintained at the top of the control panel, with no other equipment mounted directly above it.

Substantiation: The above statement, to be inserted was in the 1997 edition of NFPA 79. Omitting this statement opens a dangerous area for the mounting of components.
Committee Meeting Action: Reject
Committee Statement: The issue is already covered in 5.3.1.5 of NFPA 79-2002. See also the action on Proposal 79-30 (Log #119) which relocated that text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-35 Log #124 **Final Action: Accept**
(5.3.1.4)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.1.4 as follows:

5.3.1.4 Each 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 shall comply with 6.2.3.2 ~~door~~ and a safety sign ~~label~~ shall be provided in accordance with 17.2. ~~attached to that door warning of dangerous voltage inside and advising disconnection.~~

Substantiation: The current requirement for use of a tool to open a noninterlocked enclosure door is more restrictive than currently allowed in 6.2.3.2, which includes alternate equivalent means to prevent access to the enclosure or direct contact with live parts. The safety sign is required regardless of the means selected from 6.2.3.2. The proposal revises text of 5.3.1.4 to replace current requirement for use of a tool to open noninterlocked enclosure with a reference 6.2.3.2, which permits other options in addition to the use of a tool. The description of the label marking currently in 5.3.1.4 is replaced by a reference to safety sign marking requirements from Chapter 17, which clarifies the requrement by use of consistent terminology (safety sign vs warning label) and by removing different descriptions of the marking content.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Committee Statement: See Proposal 79-60 (Log # 80) for correct cross references
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
ANDERSON: The proposal contains a cross referenced in the revised text to 6.2.3.2, given 79-60 (Log # 80), the cross reference should now read 6.2.4

79-36 Log #118 **Final Action: Accept**
(5.3.1.5)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Delete 5.3.1.5:

~~5.3.1.5 Wire bending space shall be provided for the supply circuit disconnecting means in accordance with 30.10(B) of NFPA 70, National Electrical Code. Space shall be determined by maximum wire size of incoming lines. accidental contact with the line side live pats shall be inhibited. The supply circuit conductors to the disconnecting means shall be separated from other internal conductors by either of the following:~~

~~(1) Mounting the disconnect as near as practicable to the top of the enclosure while dedicating sufficient space between the top of the enclosure and the disconnect for the supply circuit conductors.~~

~~(2) Mounting the disconnect other than at the top of the enclosure and guarding its line side live parts against accidental contact, and by separating the supply circuit conductors from other internal conductors by the use of a barrier.~~

Substantiation: The current 5.3.1.5 contains three different requirements that all pertain to the incoming supply circuit conductors, which is the subject of Section 5.1 rather than Section 5.3 for supply circuit disconnecting means. This proposal deletes 5.3.1.5 from Section 5.3 to complete the relocation of requirements to clause 5.1 as covered by companion proposals to add a new 5.1.5 for wire bending space, a new 5.1.6 for separation of incoming supply circuit conductors, and a new 5.1.7 for guarding of terminals.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-37 Log #121 **Final Action: Accept**
(5.3.1.6)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Delete 5.3.1.6:

~~5.3.1.6 there shall be no exposed live parts with the disconnecting means in the open (off) position.~~

Substantiation: The current 5.3.1.6 applies to exposed terminals of the disconnecting means but does not address exposed live parts of other terminations permitted in Section 5.1. This proposal deletes 5.3.1.6 from Section 5.3 to correlate with a companion proposal to add a new 5.1.7 for guarding of terminals to clause 5.1.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
SAUNDERS: This section should not be deleted. I do not agree with the substantiation "The current 5.3, 1.6 applies to exposed terminals of the disconnecting means but does not address exposed live parts of other terminations permitted in Section 5.1." The existing statement "-there shall be no exposed live parts with the disconnecting device in the open (off) position" also covers the guarding of potentially energized components or devices such as mini-UPS packages or capacitors located within the enclosure.

79-38 Log #125 **Final Action: Accept**
(5.3.3.1)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.3.1 as follows:

5.3.3.1 Where the supply circuit disconnecting device is one of the types in 5.3.2(1) through 5.3.2(5), the device shall fulfill all of the following requirements:

(1) Isolate the electrical equipment from the supply circuit and have one off (open) and one on (closed) position only. Circuit breakers, molded-case switches and self protection combination motor controllers are permitted to have a reset (tripped) position between off (open) and on (closed).

(2) Have an external operating means (e.g., handle) that complies with 5.3.4.

Exception: Power-operated switchgear need not be operable from outside the enclosure where there are other means to open it.

(3) Be provided with a permanent means permitting it to be locked in the off (open) position only (e.g., by padlocks) independent of the door position. When so locked, remote as well as local closing shall be prevented.

(4) Simultaneously disconnect all ungrounded conductors of the power supply circuit.

(5) Be operable, by qualified persons, independent of the door position without the use of accessory tools or devices.

(6) Be rated for the application as follows:

(a) The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use.

(b) Where rated in horsepower, the horsepower rating shall be at least equal to that which is defined by Table 430.151(B) of NFPA 70, National Electrical Code, for a locked rotor equivalent equal to the largest sum resulting from the locked rotor currents of any combination of motors that can be started simultaneously and the full-load currents of the remaining motor and nonmotor loads that can be operated at that time.

(c) The voltage rating shall be at least equal to the nominal supply circuit voltage.

Substantiation: The current text of 5.3.3.1(1) only permits a tripped handle position for circuit breakers. However, the handle positions of other permitted disconnecting means, namely molded - case switches and self-protected combination motor controllers currently covered by 5.3.2, also includes a tripped position and would be excluded by the current provisions of 5.3.3.1(1). The revision to 5.3.3.1(1) adds other disconnecting means provided with a tripped handle position to remove a conflict with 5.3.2.

The current text of 5.3.3.1(2) and 5.3.3.1(3) include requirements for the operating handle of the disconnecting means, however, additional operating requirements are found in the current 5.3.4. The revision to 5.3.3.1(2) adds a reference 5.3.4 which includes the additional requirements applicable to operating handles.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Committee Statement: The Committee understands that this proposal modifies the action on Proposal 79-26 (Log # 66) by adding “molded case switches and self protected combination motor controllers” to second sentence of 5.3.3.1(1) and by adding the phrase “ that complies with 5.3.4” to the end of the sentence of 5.3.3.1(2). The term “protection” is editorially corrected to “protected” in 5.3.3.1(1).

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-39 Log #108 **Final Action: Reject**
(5.3.3.1(3) and (5))

Submitter: Todd F. Lottmann, Cooper Bussmann

Recommendation: Revise the existing wording in Section 5.3.3.1 to read:

(3) Be provided with a permanent means permitting it to be locked in the off (open) 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: There was no substantiation provided on a safety issue with products that use door mounted handles. The issues that were presented to support the need for this change were not based on a product standard deficiency rather on the misuse of a product. This is a safety document and after this has settled in, it seems that the wording we create to “fix” a safety issue has created a larger one. This language contradicts product testing and use by the fact that all devices are evaluated within an enclosure with the door closed. There has been no substantiation provided to assess what will happen when a listed product is operated with the door open. Is it still within the principles of “safety of people and property?” Therefore, I recommend that the indication of operating a device with the door open should be removed from this safety standard.

Committee Meeting Action: Reject

Committee Statement: The words “... independent of the door position ... ” should be retained because they require locking capability when the door is in the open position.

For a control enclosure with a lockable door mounted handle, any electrical work being performed within the compartment containing the supply circuit disconnecting means will require the door to be open. The requirement of 5.3.3.1(3), to provide a means to lock the disconnecting means in the off position with the door open addresses a safety concern where multiple service operations are being performed in the disconnect cabinet at the same time as other work being performed on another part of the machine.

The current NFPA 79 requirements in 6.2.3.1.1 and 6.2.3.1.2 permit qualified persons to open the door of an enclosure containing the disconnecting means without removing power. When these conditions apply to an enclosure with a door mounted handle, the requirement of 5.3.3.1(5) requires a readily accessible, secure handle and is intended to address an electric shock hazard related to the use of uninstalled metal tools as a makeshift operating handle. Operation of the disconnect with the door open requires deliberate action to work with the equipment while energized. It is recognized that safe working practices are required to be in place to address the safety of the qualified persons who will service the machine. An operating handle for the disconnecting means accessible while the door open alone may be the subject of the safe work practice where NFPA 70E provides additional guidance,

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:

LOCKE: The submitter is correct in that a hazard exists when an exposed disconnecting means is actuated with the enclosure door in an open position. Such actuation is inconsistent the product safety evaluations which anticipate the closed enclosure doors containing an arc fault. Reliance on deliberate human action and administrative control for safety is insufficient when sound engineering can eliminate any probability of hazard. A requirement that disconnecting means must be capable of containing an arc fault independent of the door position might constitute such a solution. Until at which time the technical committee might consider such a requirement, it would be appropriate not to encourage the actuation of a disconnect independent of enclosure door position.

Considering the Committee Statement this proposal should be Accepted in Part with the retention of 5.3.3.1(5) as identified by the submitter. Such an acceptance in part is consistent with the Committee Statement and the intent of the submitter.

79-40 Log #61 **Final Action: Reject**
(5.3.3.1(5))

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Revise as follows:

5.3.3.1 Where the supply circuit disconnecting device is one of the types in 5.3.2(1) through 5.3.2(5), the device shall fulfill all of the following requirements:

(1) Isolate the electrical equipment from the supply circuit and have one off (open) and one on (closed) position only. Circuit breakers are permitted to have a reset (tripped) position between off (open) and on (closed).

(2) Have an external operating means (e.g., handle).

Exception: Power-operated switchgear need not be operable from outside the enclosure where there are other means to open it.

(3) Be provided with a permanent means permitting it to be locked in the off (open) position only (e.g., by padlocks) independent of the door position. When so locked, remote as well as local closing shall be prevented.

(4) Simultaneously disconnect all ungrounded conductors of the power supply circuit.

~~(5) Be operable, by qualified persons, independent f the door position without the use of accessory tools or devices.~~

(6) Be rated for the application as follows:

(a) The ampere rating shall be at least 115 percent of the sum of the full-load currents required for all equipment that may be in operation at the same time under normal conditions of use.

(b) Where rated in horsepower, the horsepower rating shall be at least equal that which is defined by Table 430.151(B) of NFPA 70, National Electrical Code, for a locked rotor equivalent equal to the largest sum resulting from the locked rotor currents of any combination of motors that can be started simultaneously and the full-load currents of the remaining motor and nonmotor loads that can be operated at that time.

(c) The voltage rating shall be at least equal to the nominal supply circuit voltage.

Substantiation: Under many conditions, disconnects can be cycled on and off without any danger presented to the user. This safe condition is so common it is easily overlooked that under a high current fault condition outgassing can create pressure waves powerful enough to blow doors off enclosures, emit dangerous arc flashes and release enough heat to burn flesh. One or more of these can cause serious harm and even death. This is one of the reasons that enclosures are required. The practical effect of NFPA 79 paragraph 5 is to allow users to be exposed to the deadly effect of a poorly timed disconnect operation. We propose that paragraph 5 should be removed for the follows reasons:

(1) Paragraph 5 allows for a product design that lets a user change the state of a disconnect (turn the unit on or off) with the enclosure door open. An enclosure with the door open is ineffective in protecting a user from danger of electrocution, burns, projectiles or arc flash. In practice, this paragraph annuls the effectiveness of even the best enclosure.

(2) Through-door rotary operating mechanisms currently allow an individual to perform diagnostics while the enclosure is energized, but only after the disconnect has been operated (turn the unit on or off) with the door closed. Operating a disconnect without the safeguard of the door being closed is therefore only a time saving procedure at the risk of personal safety. Taking risks to save time is not within the accepted practices of qualified individuals.

(3) Operating a disconnect can create a hazard when (1) it is changing state and (2) an operator is directly in front of it. Unlike a flange mounted disconnect which allows a user to stand aside of an open enclosure door and keep their arms and hands out of the way of any blast, a rotary disconnect is located within the enclosure. By default therefore, the operator that this paragraph allows for exposes a user to these two hazards without any protection.

(4) A handle or knob allowed by paragraph 5 is a visually obvious method to operate the disconnect. Because it's part of the disconnect design, it may appear to be a safe operation. This handle consequently is a foreseeable invitation to be used by a person who may not understand the inherent danger or required safeguards.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on Proposal 79-39 (Log #108).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-41 Log #145 **Final Action: Accept**
(5.3.3.1.(7) (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new subsection to 5.3.3.1 as follows:
(7) The disconnecting means shall plainly indicate whether it is in the open (off) or closed position.
Substantiation: This text was originally included in the 1997 version of NFPA 79. It was removed as part of Proposal 79-33. The substantiation for this section of the proposal stated:
Recommendation: Add this new subclause paragraph which embodies all of the requirements of 7.3 and 7.4 and some of the requirements of 7.5 and 7.10 of NFPA 79-1997 either in whole or in part.
The new text in the Proposal 79-33 (which eventually became requirement 5.3.3.1 in NFPA 79-2002) makes no reference whatsoever to the requirement to indicate the position of the disconnecting means, which was previously required in NFPA 79-1997, 7.4. I do not believe that there was adequate substantiation to remove this requirement, and therefore it should be replaced.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-42 Log #127 **Final Action: Accept**
(5.3.3.2)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Delete 5.3.3.2:
~~5.3.3.2 Where the supply circuit disconnecting device is one of the types in 5.3.2(1) through 5.3.2(5),the available fault current at the point of the supply to the machine shall not be greater than the short circuit current rating of the disconnecting device.~~
Substantiation: The current 5.3.3.2 is no longer needed due to the inclusion of a short circuit current rating encompassing all parts of the control equipment. The deletion of 5.3.3.2 is a companion proposal to correlate with proposed addition of new 4.8 and to be consistent with new short circuit current rating required by 670.3 of the 2005 NEC.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-43 Log #128 **Final Action: Accept in Principle**
(5.3.3.3 and A.5.3.3.3)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.3.3 and add new Annex A note A.5.3.3.3 as follows:
5.3.3.3 * When the supply circuit disconnecting device is an attachment plug and receptacle (plug/socket combination), it shall fulfill all of the following requirements:
(1) Have a load-break rating or be interlocked with a switching device that is load-break rated, and complies with 5.3.3.1(6) ~~capable of interrupting the locked rotor current of the largest motor plus the sum f the remaining load that is operating at that time.~~ Attachment plug and receptacle (plug/socket combination) rated greater than 20 A or 2 HP, shall be listed as a switch-rated plug and receptacle (plug/socket combination).
(2) Be of such a type and be so installed as to prevent unintended contact with live parts at any time even during insertion or removal of the connectors.
(3) Have a first make, last break grounding (earthing) contact.
(4) Have a retaining means to prevent unintended or accidental disconnection where rated at more than 20 amperes.
(5) Be located within sight from the operator station and be readily accessible.
A.5.3.3.3 A suitably rated attachment plug and receptacle listed to UL 498 or UL1682 meets the requirements of 5.3.3.3(2) and 5.3.3.3(3).
Substantiation: The current 5.3.3.3(1) includes criteria to determine whether the rating of a plug/socket combination is suitable for the application, however, the criteria are abbreviated over those for other disconnecting means. As the plug/socket combination and other disconnecting means serve the same purpose, the revision to 5.3.3.3(1) makes reference to the rating requirements in 5.3.3.1(6) for clarity and a consistent use of established requirements.
The revision also includes provisions for use of listed switch-rated plug/socket combinations to be used for disconnecting equipment rated greater than 2 hp or 20A as they are not interlocked and are subjected to additional performance testing similar to motor circuit switches and motor disconnects. The requirements for listing these devices are contained in Subject 2682, Outline of Investigation for Switch-Rated Plugs and Receptacles.
The requirements in 5.3.3.3(2) and 5.3.3.3(3) are also requirements for listed attachment plugs and receptacles. The addition of the note provides information on listed components that meet requirements in 5.3.3.3. The requirements for listing these devices are contained in UL 498, Attachment Plugs and Receptacles, and UL 1682, Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type. The addition of the note is based on a similar reference to IEC attachment plug standards in the next edition of IEC 60204.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Revise the Annex A material to read as follows:
A.5.3.3.3 A suitably rated attachment plug and receptacle listed to UL 498 or UL 1682 is a method of meeting the requirements of 5.3.3.3(2) and 5.3.3.3(3).
Committee Statement: The Committee understands that this proposal modifies the action on Proposal 79-26 (Log # 66) by revising 5.3.3.3 (1) and by adding a new Annex A note to 5.3.3.3. The text of the note was modified to comply with the NFPA Manual of Style.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-44 Log #129 **Final Action: Accept in Principle**
(5.3.3.3.1)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.3.3.1 as follows:
5.3.3.3.1 In addition to the requirements in 5.3.3.3, a n additional switching device ~~on the machine~~ shall be provided for routine power switching operations of the machine on and off.
Substantiation: When read as a stand-alone requirement, the current text of 5.3.3.3.1 is not clear as to the purpose of the switching device and what disconnecting means it is "in addition" to. The revision adds a reference to 5.3.3.3 to clarify which requirement it is in addition to. Revised text of 5.3.3.3.1 to clarify the purpose of additional switching means is for routine power switching. The additional switch is not required to be a disconnecting means as this is the function of the attachment plug and receptacle as covered in 5.3.3.3.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept in Principle
Revise 5.3.3.3.1 as follows:
In addition to the requirements in 5.3.3.3, a n additional switching device on the machine shall be provided for routine power switching operations of the machine on and off.
Committee Statement: Leaving the switching device requirement "on the machine" is necessary for limiting the possible location of the switching device. There was insufficient technical data provided to warrant the deletion of the requirement.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-45 Log #16 **Final Action: Reject**
(5.3.4.1)

Submitter: Drake A. Drobnick, Visteon Corp
Recommendation: Revise text to read:
5.3.4.1 The center of the grip of the operating handle of the disconnecting means ~~, when in its highest position, shall not be more than 2.0 m (6 ft 7 in.) above the floor.~~ shall be located between 0.6 m (2 ft) and 2.0 m (6 ft 7 in.) above the servicing level. A permanent operating platform, readily accessible by means of a permanent stair or ladder shall be considered as ~~the floor~~ the servicing level for the purpose of this requirement.
Substantiation: The added language aligns the NFPA 79 document with the SAE HS-1738, 2002 edition and provides guidance parameters for mounting equipment disconnecting means.
Committee Meeting Action: Reject
Committee Statement: The addition of a minimum height requirement is overly restrictive. There is no technical substantiation to provide a minimum height requirement.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
DROBNICK: The committee should accept this proposal because the lower limit of .6m (2 ft.) is already a requirement of IEC 60204, Section 5.3.4, Operating Handle and acceptance would add to document harmonization.

79-46 Log #33 **Final Action: Reject**
(5.3.4.2)

Submitter: Drake A. Drobnick, Visteon Corp
Recommendation: Revise text to read:
5.3.4 Operating Handle.
5.3.4.2 An operating handle of the disconnecting means shall meet the following criteria:
Proposed language
Add new bullet:
(4) Be in control of the disconnect at all times, independent of the position of the associated door
Substantiation: The additional language aligns the NFPA 79 document with the SAE HS-1738, 2002 edition and ensures that the operator has control of the disconnect at all times.
Committee Meeting Action: Reject
Committee Statement: The requirement is already contained 5.3.3.1(5).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
DROBNICK: The committee should accept this proposal because it is already a requirement of IEC 60204, Section 5.3.4, Operating Handle and acceptance would add to document harmonization. I disagree with the committee's statement that the proposal is already covered by 5.3.3.1(5).

79-47 Log #130 **Final Action: Accept**
(5.3.4.2)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.4.2 as follows:
5.3.4.2 An operating handle of the disconnecting means required by 5.3.3.1 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 to the degree necessary for the application when installed through the control enclosure.
(3) Not be restricted by the enclosure door when the door is in the open position.
Substantiation: The requirements of 5.3.4.2 are intended to address the operating handles of the disconnecting means other than attachment plugs. The additiion of a reference to 5.3.3.1 clarifies that attachment plugs are not reqired to comply with 5.3.4.2. The current 5.3.4.2(2) refers to situations where an operating handle is installed by the control equipment manufacturer through an opening in an enclosure that is not supplied with the disconnecting means or its handle mechanism. Enclosed motor circuit switches, such as a safety switch, are not required to comply with 5.3.4.2(2) when they are mounted adjacent to the control equipment. The revision to 5.3.4.2(2) clarifies the intent of the requirement.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-48 Log #146 **Final Action: Reject**
(5.3.4.2)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise as follows:
5.3.4.2 ~~An~~ The operating handle of the disconnecting means shall meet the following criteria:
(1) Be readily accessible with the doors in the open or closed position.
(2) Maintain the environmental rating of the enclosure to the degree necessary for application.
(3) Not be restricted by the enclosure door when the door is in the open position
(4) Shall remain in control of the disconnecting means at all times
Substantiation: The intent here is to provide immediate operability of the disconnecting device and to have the provision for locking the disconnecting device in the off position, independent of the door position.
Under the existing language of NFPA 79-2002, disconnect switches have come onto the market which incorporate 2 operating handles, one inside of the enclosure, and the other outside. By this design, a lockout/tagout can be performed on either one of the handles to isolate the electrical energy to the equipment. The drawback with this arrangement, is that if the lockout/tagout is performed on the outside handle, and the door is opened, the power can be returned to the equipment by means of the inside handle, regardless of the presence of the lockout/tagout device. This presents the opportunity for a very serious injury to occur, if the affected employee is unaware that his lockout/tagout has been defeated.
By requiring that a single handle exists, and that it remain in control of the disconnecting means at all times, this situation will not be able to exist.
The proposed addition of the fourth bullet item as originally proposed during the last cycle of NFPA 79. Proposal 79-33 of the May 2002 ROP included the addition of these words. The committee action on this proposal deleted this bullet, and added two additional ones (bullets 1, and 3 of the current wording). However, the committee statement in the published ROP gives no justification for the removal of this requirement. The text was apparently removed as a result of the committee action on Proposal 79-41. Again however, the committee statement gives no justification for this removal.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on Proposal 79-46 (Log #33) that meets the intent of the submitter. The current 5.3.3.1(3) includes a statement that when locked, local and remote closing of the disconnect is prohibited and addresses the hazardous condition being cited.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-49 Log #62 **Final Action: Reject**
(5.3.4.2(3))

Submitter: Laurie Tennant, Schneider Electric North America/Square D company
Recommendation: Revise to read 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 to the degree necessary for the application
~~(3) Not be restricted by the enclosure door when the door is in the open position~~
Substantiation: This is a companion proposal to the one submitted on 5.3.3.1.(5). See substantiation for 5.3.3.1(5) on Log #61.
Committee Meeting Action: Reject
Committee Statement: Accessibility of an operating handle should not be reduced due to the door position. The requirement in 5.3.4.2(3) is intended to address the accessibility of the operating handle. The proposed revision to 5.3.4.2(1) is in conflict with the present requirement in 5.3.3.1(5).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-50 Log #131 **Final Action: Accept**
(5.3.5.2)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.5.2 as follows:
5.3.5.2 The s upply circuits for excepted circuits shall be provided ~~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 in an enclosure ~~either~~ adjacent to the main control enclosure or within the control enclosure, adjacent to the main supply circuit disconnecting means.
(2) ~~Have~~ line side (of the supply circuit disconnect) supply circuit ~~connections~~ conductors, when internal to the control enclosure, that are separate from and do not share a raceway with other conductors and that are encased in rigid or flexible conduit if longer than 460 mm (18 in.)
Substantiation: The current text of 5.3.5.2 implies that the primary overcurrent protection is not required, however, this is in conflict with the current control transformer overcurrent protection requirements in 7.2.7.1 of NFPA 79. The proposed revision to 5.3.5.2(1) eliminates references to primary and secondary that are no longer necessary. Other revisions are to improve the language of the requirement to improve clarity and readability.
This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-51 Log #132 **Final Action: Accept**
(5.3.5.4)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.
Recommendation: Revise 5.3.5.4 as follows:
5.3.5.4 Where circuits are not disconnected by the supply circuit disconnecting means, all of the following requirements shall be met:
(1) Permanent safety sign ~~warning label~~ (s) shall be placed adjacent to the supply circuit disconnecting operating handle(s) ~~means~~ indicating that it does not de-energize all exposed live parts when it is in the open (off) (isolated) position as in 17.2.4.
(2) A ~~corresponding~~ statement containing the information 17.2.4 shall be included in the machine documentation .
(3) A permanent warning label shall be placed on a nonremovable part inside the control enclosure in proximity to each excepted circuit, or shall be identified by color as defined in 14.2.4.
Substantiation: The current text of 5.3.5.4 does not provide a clear indication of the purpose of the various markings, their location on the equipment or both. The revision to 5.3.5.4(1) provides consistent terminology (safety sign vs

warning label), clarifies the location of the marking and links this requirement to 17.2.4 which provides additional details. The revision to 5.3.5.4(2) clarifies the information that is intended to be included in the machine documentation is also found in 17.2.4. The revision to 5.3.5.4(3) clarifies this marking is internal to the enclosure and is different than the marking required by 5.3.5.4(1).

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Committee Statement: Editorially correct the phrase in Section 5.3.5.4(2) to read as " containing the information from 17.2.4"

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

PADGETT: Requirements now in 5.3.5.4(1) are the same as 17.2.4. Recommend changing 5.3.5.4(1) to read, " Permanent safety sign shall be provided in accordance with 17.2.4."
Accept changes to (2) and (3).
Substantiation: 5.3.5.4(1) states the same requirements as defined in 17.2.4. It was the position of the committee to minimize the repeating of requirements in NFPA 79 and the reference to 17.2.4 accomplishes the committee's position. This also provides additional clarity to 5.3.5.4(2) in its reference of the requirements of 17.2.4.

79-52 Log #133 **Final Action: Accept**
(5.4.2)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Revise 5.4.2 as follows:

5.4.2 Removal of power can be accomplished by the use of: (1) the supply circuit disconnecting means, or (2) additional devices conforming to 5.3.2 or 5.5.4, or (3) other means (e.g., a contractor switched off by a control circuit) that meet the requirements of 5.4.3 and 5.4.4.

Substantiation: The current 5.4.2 does not permit isolation devices covered in Section 5.5 to be used as a means for removal of power and includes a provision for other means without qualification. The proposed revision is to clarify there are 3 possible means for removal of power, includes a reference to additional isolation devices covered in 5.5.4 as suitable devices and clarifies the "other means" are subject to other applicable requirements that define the conditions for its use.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Committee Statement: Editorially correct "contractor" to "contactor" in the proposed text.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

PADGETT: Agree with the Committee Actions on this proposal, however the following is recommended:
Add the words "one of the following" to 5.4.2.
Add a title to 5.4.3 to read " Other Means of Removal of Power for Prevention of Unexpected Start-Up ."
Move text of 5.4.3 to a new paragraph 5.4.3.1
Renumber 5.4.4 to 5.4.3.2
Delete the reference number 5.4.4 in 5.4.2(3).
Text to read:
5.4.2 Removal of power shall be accomplished by the use of one of the following:
(1) the supply circuit disconnecting means, or
(2) additional devices conforming to 5.3.2 or 5.5.4, or
(3) other means (e.g., a contactor switched off by a control circuit) that meet the requirements of 5.4.3 ~~and 5.4.4~~ .
5.4.3 Other Means of Removal of Power for Prevention of Unexpected Start-Up
5.4.3.1 Where other means of removal of power are used, a single failure of any of its components shall not result in an inadvertent or unexpected start-up.
5.4.4.3.2 Other means of removal of power shall be employed only for situations that include the following:
(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 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 addition of the words "one of the following" to 5.4.2 follows the basic format of the identification of items in this document. The recommended renumbering and order of paragraphs does not change the requirements of the paragraphs, but provides clarity to the topic of "Other means of removal of power."

79-53 Log #134 **Final Action: Accept**
(5.5.1)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Revise 5.5.1 as follows:

5.5.1 Devices shall be provided for disconnecting (isolating) electrical equipment to enable work to be performed ~~without a risk from electric shock or burn~~ when it is de-energized and isolated.

Substantiation: The current text of 5.5.1 was adopted based on its inclusion in the current edition of IEC 60204. The proposed revision is intended to more accurately describe the purpose of the isolating means. The revised text also correlates with similar revisions being included in the next edition of IEC 60204.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

PADGETT: With the Committee Action to accept changes to 5.5.1 it is recommended to modify the requirement to read "Devices shall be provided for disconnecting (isolating) electrical equipment to enable work to be performed ~~when it is~~ in a de-energized and isolated state .
Substantiation: The wording brings clarity to the requirement that the equipment should be de-energized and isolated.

79-54 Log #135 **Final Action: Accept**
(5.5.4)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Revise 5.5.4 as follows:

5.5.4 The following devices shall be permitted to fulfill the isolating function of 5.5.3:
(1) Devices described in 5.3.2.
(2) A manual motor controller marked "suitable as ~~for~~ motor disconnect " ~~disconnecting~~ and compliance with UL508 where located on the load side of the last short-circuit protective device (in the branch)
(3) ~~Redundantly monitored, remotely operated contractor isolating system~~ System isolation equipment that incorporates control lockout stations ~~provisions~~ and is listed for disconnection purposes where located on the load side of the main supply circuit disconnecting means and overcurrent protection.

Substantiation: The current text of 5.5.4(2) is similar to Section 430.109(A)(6) but does not specify the suitable as motor disconnect as a product marking necessary to differentiate from other manual motor controllers that are not intended as motor disconnecting means. The revision utilizes text from Section 430.109(A)(6) and clarifies that it is necessary to select parts that display the required text marking to comply with 5.5.4(2).

The text of 5.5.4(3) is proposed to be revised to correlate with the addition of system isolation equipment into the 2005 NEC as new section 430.109(A)(7).

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Committee Statement: Editorially correct "compliance" to "compliant."

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-55 Log #137 **Final Action: Accept**
(5.5.5)

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Revise 5.5.5 as follows:

5.5.5 Each operating means of the isolation ~~The~~ devices in 5.5.4 shall be ~~include all of the following:~~
(1) Readily accessible and comply with 5.3.4
(2) Within sight of the part of the machine requiring disconnection
(3) Readily identifiable as an isolating means and marked to identify the equipment that is disconnected, and
(4) For other than attachment plugs, provided with permanent means for locking in the off position only

Substantiation: When read as a stand-alone requirement, the current text of 5.5.5 is not clear as to subject or application of the requirement. The revision clarifies that all of the subparts apply to the operating means, adds a reference to 5.3.4 for other requirements applicable to operating means, and clarifies the requirement "readily identifiable" to be consistent with a similar requirement, 5.3.1.1.1, for the supply circuit disconnecting means.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
MONTEITH: Not all devices listed in 5.5 comply with 5.3.4, (e.g., all devices do not have an operating handle).
PADGETT: Agree to Committee Action to change 5.5.5 and 5.5.5(3), but disagree with changes to 5.5.5(1). Do not incorporate changes to 5.5.5(1). Text to read:
5.5.5 Each operating means of the isolation devices in 5.5.4 shall be:
(1) Readily accessible ~~and comply with 5.3.4~~ .
(2) Within sight of the part of the machine requiring disconnection
(3) Readily identifiable as an isolating means and marked to identify the equipment that is disconnected, and
(4) For other than attachment plugs, provided with permanent means for locking in the off position only.
Substantiation: The requirement in 5.5.5(1) to comply with 5.3.4 is not enforceable. Requirement 5.3.4 addresses disconnecting means that have handles, but not all devices identified in 5.5.4 contain handles. Therefore, can not meet the requirements of 5.3.4 (i.e., device defined in 5.5.4(2)).

79-56 Log #30 **Final Action: Reject**
(Chapter 6)

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.
Recommendation: Revise the title of Chapter 6 Protection from Electric Shock as follows:
Chapter 6 Protection for Personnel
Substantiation: Justification: Electric shock is but one of the hazards which require protection. Other hazards include Arc-Flash and Arc-Blast. This new title clarifies the fact that the contents of this chapter include not only a means for protecting against electric shock (separation, interlocking); but also for using energy-limiting methods to provide safety for personnel (PELV).
Committee Meeting Action: Reject
Committee Statement: This title change will broaden the scope of the intended purpose of NFPA 79, Chapter 6, which is to provide methods to limit shock exposure, and the stated purpose to include are-flash and arc-blast is beyond these responsibilities. The current title identifies the specific topic of the section as it relates to the scope of the standard. The proposed title change would broadened the scope to include non-electrical hazards.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
DEFELICE: Electric shock is only one of the hazards associated with electricity; arc-flash and arc-blast are equally deadly hazards. This change would also better align the document with NFPA 70; which now recognizes this hazard.

79-57 Log #67 **Final Action: Accept**
(Chapter 6)

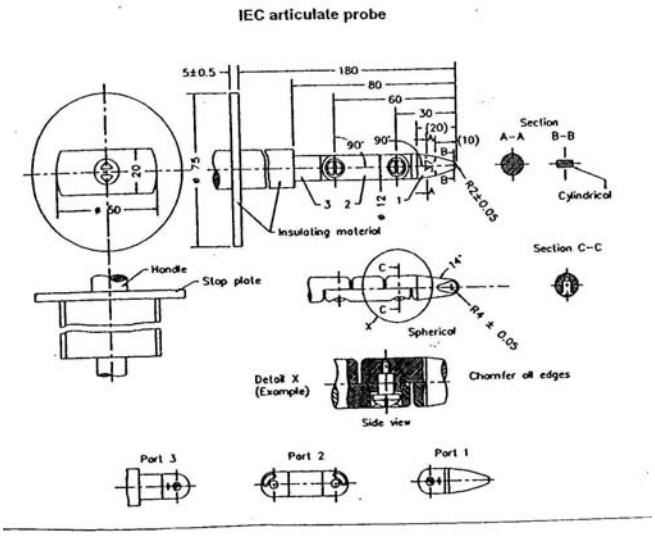
Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:
Chapter 6 Protection from Electric Shock
6.1 General. Electrical equipment shall provide protection of persons from electric shock from direct and indirect contact. ~~electrical hazards during both normal operation and during fault conditions.~~
6.2* Protection ~~from Electric Shock During Normal Operation~~ Against Direct Contact. Live parts operating at 50 volts rms ac or 60 volts dc or more shall be guarded against ~~accidental~~ contact.
A.6.2 Outside the USA the voltage is limited to 30 volts rms ac or 60 volts dc ripple free.
6.2.2 Protection by Enclosures.
6.2.2.1 Direct Contact from Outside an Enclosure. Equipment enclosures and enclosure openings shall meet the requirements of UL 508, UL 508A, UL 50 or NEMA 250.
Exception: 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. The test finger shall not encounter live parts in any direction.
Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.
6.1 The committee understands that direct and indirect contact include the concepts of "normal operation" and "fault conditions".
We changed "electrical hazards" to "electric shock" to better define the hazards associated with Chapter 6.
6.2 This provides consistent terminology and useful information for people using this standard
6.2.2.1 This clarifies requirements for rated enclosure openings.
The sentence added to the exception clarifies the expected test results.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-58 Log #99 **Final Action: Reject**
(6.x (New))

Submitter: Melvin K. Sanders, TECo., Inc.
Recommendation: Insert the proposed new text into Chapter 3, immediately ahead of present 6.3. This would require incremental numbering of the present sections. Provide new text as follows.
6.x Functional Extra Low Voltage (FELV).
6.x.1 General Requirements. The use of FELV, as described in 6.X, is to provide guidance on the use of circuits not exceeding 50 volts ac (rms value) or 120 volts dc (ripple free) that can not meet the requirements of 6.3 for PELV or where PELV is not necessary, and the provisions of 6.X.2 and 6.X.3 shall be applied to ensure protection against direct contact during normal and fault conditions.
6.x.2 Requirements for Protection During Normal Conditions. Conductors shall be fully insulated for the nominal voltage of the branch circuit supplying the source of FELV, or measure taken to guard against accidental contact by the use of guards, barriers, or enclosures.
6.x.3 Requirements for Protection During Fault Conditions. The exposed conductive parts of the FELV circuit shall be connected to the equipment grounding (equipotential bonding) conductor of the branch circuit supplying the FELV, and the branch circuit automatic disconnecting means meets the requirements of 6.X.
6.x.4 Sources. The source of the FELV shall be either an isolation transformer or a safety isolation transformer meeting the requirements for a PELV source.
6.x.5 Plugs and Receptacles (Socket-outlets). Plugs and receptacles (socket-outlets) shall comply with all the following requirements.
(1) Plugs shall be uniquely polarized to prevent insertion into other nominal voltage systems.
(2) Receptacles (socket-outlets) shall not admit plugs of other nominal voltage systems.
(3) Plugs and receptacles (socket-outlets) shall have an equipment grounding (protective) conductor terminal or pin.
Substantiation: This proposed new text will help clarify the use of lower voltage circuits that are not suitable for operating under the restrictions contained in present 6.3 for PELV circuits, or do not present the same degree of electrical hazard.
This will address circuits that more closely resemble the ones contained in NFPA 70 Article 720 and 725, and are not to be confused with PELV electrical shock avoidance safety circuits.
Note: In proposed new 6.x.3, the branch circuit automatic disconnecting means Section number will have to be determined by Staff.
Committee Meeting Action: Reject
Committee Statement: The submitter has not demonstrated the need for such FELV requirements. The committee is unaware of their acceptance and use in the international community and how these requirements differ from PELV requirements. The committee is not aware of these requirement in 60204-1. The term "fully insulated" is not defined.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-59 Log #58 **Final Action: Accept in Principle**
(6.2.2.1)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Revise Figure 6.2.2.1 as follows:
Add missing dimension for finger diameter of 12.5, dimension arrows already present
Substantiation: Missing dimension value 12.5 mm (0.5 inches) is typical dimension for standard test finger diameter for IP2 or other "finger safe" requirements. Also typical for dimension already used in existing text, NFPA 79:2002, 12.5.1.1 Exception No. 4, Table F.5.2 Degrees of Protection Against Access to Hazardous Parts Indicated by the First Characteristic Numeral, Table F.5.3 IP Code Elements and Their Meaning.
Committee Meeting Action: Accept in Principle
Committee Statement: Several dimensions are missing from the figure that need to be added from the IEC articulate probe. A hard copy of the corrected figure accompanies this committee statement. The corrected figure includes the appropriate dimensions that were inadvertently omitted from the present published figure.



Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-60 Log #80 **Final Action: Accept in Principle**
(6.2.3)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: <Correct the 6.2.3's referrals to 6.2.3.2 and 6.2.3.3, because neither referral is directly addressing the enclosure interlocking issue. Following the MOS this change reduces the level of the requirement in subsection 6.2.3 :>

6.2.3 Enclosure Interlocking . Enclosure interlocking as described in 6.2.3.1 ~~through 6.2.3.3~~ 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 volts 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 unless the power is disconnected. Interlocking shall be reactivated automatically when all the doors are closed.

<Correct the exceptions incorrect cross reference for safety sign requirements from 17.2.5 to 17.2.4 in the 2002 edition: >

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 requirements of 17.2. ~~5~~ 4.

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~~ 4.

<Continuing the reduction of requirement levels>

6.2.3 ~~.1~~ .1* Means shall be permitted to be provided for qualified persons, using 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

(3) Prevent closing of the disconnecting means while the enclosure door is open, unless an interlock is operated by deliberate action

---

<Correcting the note for 6.2.3.1.1>

A.6.2.3 ~~.1~~ .1 See NFPA 70E, *Standard for Electrical Safety Requirements for Employee Workplaces* , for additional information on work practices.

<Correct the incorrect impression that all enclosures on a machine have disconnects by placing those related requirements in there own subsection. This will more clearly address the prevention from shock issues for accessing enclosures that do not have disconnects.>

~~6.2.3.2~~ 6.2.4 Enclosure Access Where a qualified (skilled) person, using appropriate work practices, needs to enter an enclosure that does not have a disconnect, one of the following 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.

<Paragraph 6.2.3.3 requirements are not principally addressing only the issue of possible protection from electric shock. Paragraph 6.2.3.3 is more germane to the topic in sub section 5.3 "Supply Circuit Disconnecting (Isolation) Means". Move 6.2.3.3 to after 5.3.1.7 to become a new 5.3.1.8.?

~~6.2.3.3~~ 5.3.1.8 Where the equipment has two or more sources of power or two or more independent disconnecting means, power wiring from each disconnecting means shall be run in separate raceway and shall not terminate in or pass through common junction boxes.

Substantiation: The requirements in subsection 6.2.3 "Enclosure Interlocking" contains requirements that are not pertinent to the subsections stated issue. The following revisions are proposed to correct the problem that has caused confusion in this matter. But the proposed changes are not intended to remove existing requirements nor add new ones.

Committee Meeting Action: Accept in Principle

1) Correct the title of NFPA 70E to read as follows: See NFPA 70E, *Standard for Electrical Safety in the Workplace* .

2) Remove the text from 6.2.3 ~~Enclosure interlocking as described in 6.2.3.1 through 6.2.3.3 shall be provided.~~

3) Relocate the proposed ~~6.2.3.3~~ **5.3.1.8** to the a new 14.1.3.1 and add a new title "Conductors Supplied from Separate Disconnects."

Committee Statement: 1) Editorially correct title of NFPA 70E.

2) Inadvertent proposal error.

3) Relocation of text to Chapter 14, Wiring Practices to better place the requirement in a more suitable location.

Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

Comment on Affirmative

PADGETT: Agree with Committee Actions on this proposal and on Proposal 79-61 (Log #45) and Proposal 79-62 (Log #1). Due to the combination of actions, it is recommended to restructure and renumber the paragraphs. It is also recommended adding the words "i.e., defeat mechanisms" to 6.2.3.3.1 as follows:

6.2.3 Enclosure Interlocking.

6.2.3.1 When required by 5.3.1.4, each disconnecting means mounted within or adjacent to a control enclosure that contains live parts operating at 50 volts ac (rms value) or 60 volts 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 unless 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 requirements of 17.2.4.

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 17.2.4.

6.2.3.2 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

(3) Prevent closing of the disconnecting means while the enclosure door is open, unless an interlock is operated by deliberate action.

6.2.3.3 Enclosure Access

6.2.3. 3 .1* Means shall be permitted (i.e., defeat mechanism) to be provided for qualified persons, using appropriate work practices, to gain access without removing power.

6.2.3.3.2 Where a qualified (skilled) person, using appropriate work practices, needs to enter an enclosure that does not have a disconnect, one of the following 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. (Log #80)

6.2.3.4. 3.3 When provided with a defeat mechanism in 6.2.3.1. ~~1~~ , all live parts within 150 mm (6 in.) of parts likely to be touched when resetting or adjusting devices intended for such operation while the equipment is still connected, (such as operating handles, reset buttons, or adjusting devices) shall be protected from direct contact by the jointed test finger in Figure 6.2.2.1 and other live parts operating at over 50 volts mounted on the inside of doors shall be protected from unintentional direct contact from a 50 mm (2 in.) sphere by means of an obstacle.

Substantiation: The recommended restructuring and renumbering does not change any requirements, but reorganizes the requirements for clarity.

The addition of the words "i.e., defeat mechanisms" to renumbered 6.2.3.3.1 aids in understanding the introduction of the term in the last paragraph renumbered 6.2.3.3.3.

79-61 Log #45 **Final Action: Accept in Principle**
(6.2.3.1 Exception No. 3 (New))

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Add new exception as follows:
Exception No. 3: Where nominal 115 vac single phase is the only power supplied to the equipment, where the total load supplied is 24 amps or less, and where a disconnect switch is used, the disconnect switch need not be interlocked with the door.
Substantiation: Problem: The current wording does not require interlocking for an attachment plug as the disconnect (120V 2hp x amp) yet requires interlocking for a disconnect switch applied to an equivalent system/load.
Substantiation: NFPA 79 item 5.3.2(6) allows an attachment plug and receptacle as the supply circuit disconnecting means for loads under 2 hp (approx. 24 amps at 115 vac). NFPA 79 item 5.3.1.3 Exception also allows remote disconnects for 2hp or less loads. NFPA 79 item 6.2.3.1 (first sentence) does not require interlocking for these remote disconnects and attachment plug disconnects, in that they are not "mounted within or adjacent to...". We propose that the added exception clarifies that: should a "local" disconnect switch be applied to a system consistent with the voltage and amperage limits for remote (non-interlocked) disconnects or attachment plug disconnects, then the local disconnect switch need not require interlocking.
Committee Meeting Action: Accept in Principle
The recommended text is not accepted. Instead, revise basic requirement of 6.2.3.1 as follows: "When required by 5.3.1.4, each disconnecting means mounted…." The remainder of this section is to remain.
Committee Statement: The proposed exception to 6.2.3.1 would eliminate the interlocking requirement for disconnects of small loads regardless of their location and would be misleading to users of NFPA 79 into assuming there are no applicable requirements for protection against electric shock that apply to the excepted disconnects. The enclosure interlocking requirement of 6.2.3.1 is linked to the requirements in 5.3.1.4 which details the circumstances when the disconnect must be interlocked with the door and the other requirements for protection from electric shock when not interlocked with the door. The panel action clarifies the requirement in 6.2.3.1 by calling for a direction from 5.3.1.4. The disconnect for small 2 hp or less loads are already exempted from having to be mounted on or adjacent to the control enclosure by 5.3.1.3.
The Committee understands that this action on proposal 79-61 (Log #45) modifies the action on proposal 79-60 (Log #80) by revising the text in new Section 6.2.3.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
KIIHR: The action of the committee, to Accept in Principle, does not meet the intent of the submitter. The committee action simply adds a pointer in 6.2.3 back to 5.3.1.4. This pointer accomplishes nothing new, as 5.3.1.4 is already a requirement. The committee statement points out that, for small loads, a disconnect is exempt from particular mounting requirements, but does not address the issue of interlocking.
Comment on Affirmative
ANDERSON: To clarify the committee statement the impact of the AIP of this proposal and proposal 79-62 (Log # 1), 79-60 (Log # 80) and 79-35 (Log # 124) would have 6.2.3 through 6.2.4 read as follows:
6.2.3 Enclosure Interlocking . When required by 5.3.1.4, each disconnecting means mounted within or adjacent to a control enclosure that contains live parts operating at 50 volts ac (rms value) or 60 volts 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 unless the power is disconnected. Interlocking shall be reactivated automatically when all the doors are closed.
6.2.3.1* Means shall be permitted to be provided for qualified persons, using appropriate work practices, to gain access without removing power.
6.2.3. 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.
6.2.3.2 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
(3) Prevent closing of the disconnecting means while the enclosure door is open, unless an interlock is operated by deliberate action
6.2.3.3 When provided with a defeat mechanism in 6.2.3. 1 , all live parts within 150 mm (6 in.) of parts likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, (such as operating handles, reset buttons, or adjusting devices) shall be protected from direct contact by the jointed test finger in figure 6. 1 and other live parts operating at over 50 volts mounted on the inside of doors shall be protected from unintentional direct contact from a 50 mm (2 in.) sphere by means of an obstacle.
6.2.4 Enclosure Access _Where a qualified (skilled) person, using appropriate work practices, needs to enter an enclosure that does not have a disconnect, one of the following 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.
Note: The proposal, 79- 35 (Log # 124), contains a cross referenced in the revised 5.3.1.4 to 6.2.3.2 and given 79-60 (Log # 80), the cross reference in 5.3.1.4 should now read 6.2.4

79-62 Log #1 **Final Action: Accept in Principle**
(6.2.3.1.1.1 (New))

NOTE: This Proposal appeared as Comment 79-122 (Log #55) which was held from the A2002 ROC on Proposal 79-28 .
Submitter: Gordon C. Davis, Moeller Electric Corp.
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. Freudenberg'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 defeats. They are, therefore, appropriate and suitable 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 Meeting Action: Accept in Principle
Add as new 6.2.3.4 as follows:
When provided with a defeat mechanism in 6.2.3.1.1, all live parts within 150 mm (6 in.) of parts likely to be touched when resetting or adjusting devices intended for such operations while the equipment is still connected, (such as operating handles, reset buttons, or adjusting devices) shall be protected from direct contact by the jointed test finger in figure 6.2.2.1 and other live parts operating at over 50 volts mounted on the inside of doors shall be protected from unintentional direct contact from a 50 mm (2 in.) sphere by means of an obstacle.
Committee Statement: The modified text addresses the safety concern of the submitter for service personnel by providing means to protect direct contact with live parts when the door interlocking feature is defeated without removal of power. Additionally, the revision reflects further harmonization with IEC 60204-1, clause 6.2.2(b). The committee understands that this action on 79- (Log #1) modifies the action on Proposal 79- (Log #80) by adding the text as a new section 6.2.3.1.1.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2

Explanation of Negative:
BLOODGOOD: This comment supports Dave Fisher's position on this proposal.
First, the proposal does not provide specific OSHA data that indicates the need for the proposed protection against electrical shock inside the control enclosure.
Secondly, the Committee Action went way beyond the proposal to require protection against unintentional contact and, in fact, required protection against deliberate contact. The requirement to protect live parts against contact by the articulating finger, essentially equivalent to protection against deliberate contact, is unnecessarily demanding. Controls suppliers commonly provide plastic shields for mounting over motor starters and disconnects that provide protection against unintentional or inadvertent contact. However, these shields do not prevent contact with the articulating finger. To meet this requirement would require customized shields that would basically cover the starter or disconnect completely with slits for the incoming and load power conductors. For larger equipment it may be necessary to cover the slits under the conductors. It is possible to provide such shielding, but it is not practical and it is difficult to believe that such shielding would remain on the equipment during the course of normal maintenance.
It should be remembered that the requirements of NFPA 70E and the OSHA regulations prohibit access to a live panel without appropriate personal protection.
FISHER: First, the proposal does not provide specific OSHA data that indicates the need for the proposed protection against electrical shock inside the control enclosure.
Secondly, the Committee Action went way beyond the proposal to require protection against unintentional contact and, in fact, required protection against deliberate contact. The requirement to protect live parts against contact by the articulating finger, essentially equivalent to protection against deliberate contact, is unnecessarily demanding. Controls suppliers commonly provide plastic shields for mounting over motor starters and disconnects that provide protection against unintentional or inadvertent contact. However, these shields do not prevent contact with the articulating finger. To meet this requirement would require customized shields that would basically cover the starter or disconnect completely with slits for the incoming and load power conductors. For larger equipment, it may be necessary to cover the slits under the conductors. It is possible to provide such shielding, but it is not practical and it is difficult to believe that such shielding would remain on the equipment during the course of normal maintenance.
It should be remembered that the requirements of NFPA 70E and the OSHA regulations prohibit access to a live panel without appropriate personal protection.
Comment on Affirmative
ANDERSON: The AIP proposal of the proposal to add 6.2.3.1.1.1 needs to be editorially revised to 6.2.3.1.1 and the committee proposed text as a new 6.2.3.4 needs to read 6.2.3.3 both revisions are due to the renumbering by the other related proposals 79-61 (Log # 45), 79-60 (Log # 80) and 79-35 (Log # 124) (See comment for 79-61 Log # 45 (6.2.3.1 Exception No.3 (New)) for proposed corrected numbering according to related proposal's impact on numbered text).

79-63 Log #109 **Final Action: Reject**
(6.2.3.1.2(3))

Submitter: Todd F. Lottmann, Cooper Bussmann
Recommendation: Deleted text:
~~(3) Prevent closing of the disconnecting means while the enclosure door is open, unless an interlock is operated by deliberate action.~~
Substantiation: This proposal is in conjunction with my proposal to revise Section 5.3.3.1. Switching devices are not tested for operation when the door is in the open position and this wording could create a situation that is unsafe.
Committee Meeting Action: Reject
Committee Statement: The current text of this requirement, 6.2.3.1.2(3), already addresses the submitters stated safety concern as the primary purpose of the interlock is to prevent closing of the disconnect while the door is open. While the same requirement allows a defeat mechanism, it requires a deliberate action by qualified persons where safe work practices are required to allow the equipment to be energized.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
HILBERT: I voted with the committee as I believe that immediate compliance with a change of this nature would be difficult. However, I do agree with the submitter's intent which is to reduce the exposure to arc flash. During the committee meetings I had several conversations relative to electrical safety and I was generally impressed with the desire of the committee members to consider requirements that would establish a safer working environment. Perhaps it is time for consideration of control panel designs that would, as much as possible, reduce the exposure to live parts while disconnects where being operated and testing or maintenance functions are being performed.

79-64 Log #114 **Final Action: Accept**
(6.3 (New))

Submitter: Glen Kampa, Hoffman
Recommendation: Add a new section 6.3 called "Protection against electric shock from indirect contact" to Chapter 6, inserting this as 6.3 and changing current 2002 6.3 and 6.4 to future 2005 6.4 and 6.5.
6.3 Protection against electric shock from indirect contact (fault conditions).
6.3.1 General. Protection against indirect contact (3.3.18.2) is intended to prevent hazardous conditions to continue in the event of a fault condition. (e.g. insulation failure between live and exposed conductive parts).
6.3.1.1* Protection against indirect contact shall be achieved by:
(1) measures to prevent the occurrence of a hazardous touch voltage by means of double insulation (see 6.3.2); or
(2) automatic disconnection of the supply (interruption of one or more of the ungrounded conductors affected by the automatic operation of a protective device in case of a fault) (see 6.3.3).
A.6.3.1.1 The following measures need to be considered:
(1) the type of supply and grounding system;
(2) the impedance values of the different elements of the protective bonding system (equipment grounding system); and
(3) the characteristics of the protective devices used to detect insulation failure.
6.3.2 Measures to prevent the occurrence of a hazardous touch voltage by means of double insulation.
Protection by use of double insulation is intended to prevent the occurrence of hazardous touch voltages on the accessible parts through a failure in the basic insulation.
When this means is used to prevent a hazardous touch voltage the equipment shall be listed to be protected by a system of double insulation, or its equivalent. Where such a system is employed, the equipment shall be distinctively marked.
6.3.3 Protection by automatic disconnection of supply. Automatic disconnection of the supply of any circuit affected by the particular circuit overcurent protective device in the event of a fault is intended to prevent an exposure to a continuous hazardous touch voltage.
This protective measures comprises both:
(1) protective bonding of exposed conductive parts (see 8.2.3); and
(2) the use of overcorrect protection devices for the automatic disconnection of the supply in the event of a fault.
Substantiation: The addition of the new text section "Protection against electric shock from indirect contact" is to address the means of protection of contact of persons with exposed conductive parts that have become live under fault conditions as defined in 3.3.18.2. This also correlates Chapter 6 better with IEC 60204. 6.3.1 - measures to reduce the risk of indirect contact are to reduce the chances of touch voltage due to insulation failure or reduce the risk by automatic disconnection of power (removal of power due to a fault) if conductive parts become energized. It is not possible to prevent the shock from occurring when the failure happens. It is possible to reduce its effect over time by adequate protective measures involving equipment grounding (equipotential bonding) conductors and low resistance mechanical machine joints. 6.3.2 references a means to reduce touch voltage by double insulation. NFPA 70 - 250.110 Exception No. 2 provides language of not requiring an equipment ground if the Listed equipment is protected by a system of double insulation.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
PADGETT: Agree with the Committee Action except for the words included in the parentheses in paragraph 6.3.1.1(2) and the inclusion of 6.3.3.
Delete the text "interruption of one or more of the ungrounded conductors affected by the automatic operation of a protective device in case of a fault (see 6.3.3)" in 6.3.1.1.
Change 6.3.3 to a note to 6.3.1.1(2). Therefore, renumber 6.3.3 to a.6.3.1.1(2).
Substantiation: The text to be deleted in 6.3.1.1 is confusing as to the intent and may conflict with requirement 5.3.3.1(4).
The text to be deleted in 6.3.1.1 is confusing as to the intent and may conflict with requirement 5.3.3.1(4).
The text in 6.3.3 is informational material to the requirement in 6.3.1.1(2).

79-65 Log #68 **Final Action: Accept in Principle**
(Chapter 7)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:
Chapter 7 Protection of Equipment
7.1 General. Chapter 7 shall detail the measures to be taken to protect equipment against the effects of the following:
(1) Overcurrent arising from a short circuit
(2) Overload ~~currents~~ or loss of cooling of motors
(3) Ground faults
(4) Overvoltages due to lightning and switching surges

(5) Abnormal temperatures
(6) Loss of or reduction in the supply voltage
(7) Overspeed of machines/machine elements
(8) Incorrect phase sequence

7.2.3 Power Circuits. Feeder and branch-circuit conductors shall be protected against overcurrent in accordance with their ampacities as specified in Section 13.5. In power circuits for motors, devices for detection and interruption of overcurrent, selected in accordance with 7.2.10, shall be applied to each ungrounded phase conductor.

The grounded (neutral) conductor shall not be disconnected unless (1) all ungrounded and grounded conductors open with no pole operating independently, or (2) the overcurrent protection is additionally relied upon for overload protection.

7.7 (Reserved)

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

7.1(2) This clarifies the wording that motors are affected by more than just overloads and aligns with IEC 60204.

7.2.3 This paraphrases NFPA 70, 2002 240.22 to reflect USA practices, and aligns with IEC 60204.

7.7 If nobody proposes any content for this clause, the Task Group recommends that this no longer be reserved.

A place holder is not needed any longer. This was deemed useful due to the massive restructuring of NFPA 79-2002.

Committee Meeting Action: Accept in Principle

The grounded conductor shall not be disconnected unless (1) all ungrounded and grounded conductors open with no pole operating independently, or (2) the overcurrent protection is additionally relied upon for motor overload protection in accordance with Section 430.36 and 430.37 of NFPA 70.

Committee Statement: The addition of the word motor is to specify the application of the second part to motor overload protection. The term neutral is deleted because the grounded phase of a "corner" grounded delta system is not a neutral.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-66 Log #106 **Final Action: Accept**
(7.2.xx (New))

Submitter: Todd F. Lottmann, Cooper Bussmann

Recommendation: New text to read as follows:

7.2.xx A circuit breaker or motor controller marked with a slash rating, such as 120/240v or 480Y/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: This change would provide guidance for the proper application of circuit breakers and motor controllers with slash voltage ratings. This wording matches that of the NEC Sections 240.85 and 430.83(E) (2005 NEC CHANGE). Since machinery can be moved around and encounter different types of electrical systems with different types of characteristics, it is important that this change occur.

Committee Meeting Action: Accept

Committee Statement: The recommended text should be placed in Section 7.2.1.4.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:

FREUDENBERG: Equipment with multiple rated voltages or rated voltage ranges needs circuit breakers and motor controllers suitable for all allowable input voltages. The uses of multiple rated voltages or rated voltage ranges needs to be addressed, however, the proposal as written lacks clarity or worse may imply circuit breakers and motor controllers do Not have to be suitable for all allowable input voltages.

The marking shall include the following:

• rated voltage(s) or rated voltage range(s) , in volts.

The voltage range shall have a hyphen(-) between the minimum and maximum rated voltages. Where multiple rated voltages or rated voltage ranges are given, they shall be separated by a solidus (/).

Note 1. Some examples of rated voltage markings are:

Rated voltage range 220-240 V. This means that the equipment is designed to be connected to a mans supply having any voltage between 220 V and 240 V.

Multiple rated voltage: 120/220/240 V. This means that equipment is designed to be connected to a mains supply having a voltage of 120 V or 220 V or 240 V, usually after internal adjustment.

Comment on Affirmative

GOETZ: It is understood that the motor controllers with slash ratings referred to in the proposal are self-protected combination motor controllers and manual motor controllers for tap conductor protection in group installations. Subsequent references to "circuit breakers" in the text also apply to motor controllers with slash ratings. The proposal could be improved by inclusion of additional text to indicate when such products are used in industrial machinery intended for connection to the higher voltage rating, the slash voltage rating shall appear on the machine nameplate as the supply voltage rating per 17.4.1(3), to reflect the restriction.

PADGETT: Agree with Committee Action, and recommend the addition of a note to read "A.7.2xx When slash rated components are used for this purpose refer to UL 508A for proper nameplate requirements.

Substantiation: In some situation the slash marking must be placed on the machine nameplate.

79-67 Log #29 **Final Action: Accept in Principle**
(7.2.4)

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.

Recommendation: Revise the title of 7.2.4 Control Circuits as follows:

7.2.4 Protection of Control Circuits

Substantiation: Justification: (Editorial in nature) This new title clarifies for the user that this section is directed towards the protection of control circuits; helping to reduce confusion with other areas of the document, which address the requirements for control circuit operation.

Committee Meeting Action: Accept in Principle

Revise the title to read Control Circuit Protection.

Committee Statement: This change is editorial and it meets the intent of the submitter.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-68 Log #CP4 **Final Action: Accept**
(7.2.4.2)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery

Recommendation: Insert the words "Control circuit" before the first word "Conductors" in Sections 7.2.4.2.1 through 7.2.4.2.5. Revise 7.2.4.2.6 to read Control Circuit Conductors shall ..."

Substantiation: This change is a result of an editorial task group effort. The addition of Control Circuits more aptly describes the stated conditions within Section 7.2.4.2.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-69 Log #CP5 **Final Action: Accept**
(7.2.5)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery

Recommendation: Revise the heading of 7.2.5 "Receptacle (Socket) Outlets and Their Associated Conductors." to "Receptacle (Socket) Outlets and Their Associated Conductors for Accessory Circuits.

Substantiation: This change is a result of an editorial task group effort. The addition "Accessory Circuits" more aptly describes the stated conditions of Section 7.2.5.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-70 Log #26 **Final Action: Reject**
(7.3.2.1 (New))

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.

Recommendation: Add a new 7.3.2.1 as follows:

Pushbuttons and actuators used to reset overload devices shall be operable from the exterior of the electrical enclosure.

Substantiation: Justification: We have seen instances where the resetting of motor overload devices has required the opening of enclosure doors; exposing operators and maintenance personnel to danger from contact with potentially live parts. This statement will help to clarify that the resetting of these devices must be able to be accomplished safely from the exterior of the electrical enclosure.

Committee Meeting Action: Reject

Committee Statement: The submitters concern has merit however there are situations where the accessibility of an overload resetting device outside of the enclosure would introduce an equal or greater hazard. There is no current requirement for a resetting device to be located outside of the enclosure contained in 7.3.2. If an overload occurs it means there is an issue. It is an unsafe practice to permit an individual to continually reset an overload without correction of the problem.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:
DEFELICE: We agree that the practice of repeatedly resetting an overload device without identifying the cause of the overload is unacceptable; however, not requiring that reset devices be operable from the exterior of the electrical control compartment (where they are accessible to the operator) results in the practice of removing protective covers or guards and exposes the user to shock, arc-flash and arc-blast hazards.

79-71 Log #9 **Final Action: Reject**
(Chapter 8)

Submitter: David W. Muska, Eveready Battery Company
Recommendation: Repeat NEC Article 250.30(A) and (B) as applicable.
Substantiation: Clarity in requirements for properly installing transformers on machinery and the grounding of these separately derived alternating current systems – is a grounding electrode conductor required for a machine electrical system being derived – not considered premises wiring.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-72 Log #69 **Final Action: Accept in Principle**
(Chapter 8)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:
Chapter 8 Grounding
8.2.1.1 Equipment Grounding. The machine and all exposed, non-current-carrying conductive parts, material, and equipment likely to be energized shall be ~~effectively~~ grounded. Where electrical devices are mounted on metal mounting panels that are located within nonmetallic enclosures, the metal mounting panels shall be effectively grounded. If specified by the manufacturer, components and subassemblies shall be bonded to the equipment grounding (protective bonding) circuit in accordance with the manufacturer's instructions.
Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.
Add clarification to 8.2.1.1 "Equipment Grounding" section that component and subassembly manufacturer's specifications on grounding are to be followed. Move material from 11.2.1.2 of Chapter 11 of NFPA 79 (2002) and add as a third sentence to existing 8.2.1.1. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.
Additionally, sentence modification meets MOS guidelines that conditional provisions and "if", "effectively" is not enforceable language, and manufacturers provide "instructions", not recommendations.
Committee Meeting Action: Accept in Principle
Editorially revise the phrase "shall be effectively grounded" to "shall be grounded" in the second sentence.
Committee Statement: To be consistent with the deletion of effectively in the first sentence because it is not enforceable language.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
SAUNDERS: The term "effectively" should not be deleted from the section (including the editorial revision made by the Committee). This term is defined in the IEEE Standard dictionary STD. 100 as follows (only part of definition is included below):
"(2) Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to limit the buildup of voltages to levels below that which may result in undue hazard to persons or to connected equipment."
This term is "enforceable" and can be evaluated to ensure the "hazardous voltage build-up" does not occur during the fault conditions that could occur in the installation.
If necessary, this definition could be added to Clause 3 of the document.
Comment on Affirmative
PADGETT: Disagree with Committee Action on changing the words in the second sentence of 8.2.1.1 from "shall be effectively grounded" to "shall be grounded." Recommend the change read "shall be ~~grounded~~ bonded to the equipment grounding (protective bonding) circuit"
Substantiation: This would be consistent with the use of the term "bonded" in the newly added third sentence.

79-73 Log #102 **Final Action: Reject**
(8.2.2.3.1)

Submitter: David Fisher, Rockwell Automation / Rep. NEMA
Recommendation: Delete the following text:
~~8.2.2.3.1 Machine members or structural parts of the electrical equipment shall be permitted to be used in the equipment grounding circuit provided that the cross-sectional area of these parts is at least electrically equivalent to the minimum cross-sectional area of the copper conductor required.~~
Substantiation: This text should be deleted because it was brought to NFPA 79 to align with IEC 60204-1 and the IEC maintenance team has since decided that this should have only been a discussion about the size of bonding jumpers. Since the size of bonding jumpers is already stipulated in Table 8.2.2.3, this paragraph is not needed for sizing bonding jumpers. Further, the paragraph implies that small machine members that do not have sufficient conductance cannot be part of the grounding circuit. In fact, all conductive machine members are to be bonded to the grounding circuit.
Committee Meeting Action: Reject
Committee Statement: The requirements of 8.2.2.3.1 contain provisions to permit the use of the structure of a machine to be used as part of the equipment grounding circuit. The section contains the requirement that the cross sectional area of the structural machine parts be at least electrically equivalent the minimum cross sectional area of the copper conductor required. This requirement is in addition to the bonding requirement in 8.2.2.3
Number Eligible to Vote: 20
Ballot Results: Affirmative: 16 Negative: 4
Explanation of Negative:
ANDERSON: The committee mistakenly rejected this proposal which should have been and AIP. The material in 8.2.2.3.1 should be deleted and replaced as follows:
"Where the conductance of structural parts of the electrical equipment or of the machine is less than that of the smallest protective conductor connected to the exposed conductive parts, a supplementary bonding conductor shall be provided. This supplementary bonding conductor shall have a cross-sectional area not less than half that of the corresponding protective conductor."
The replacement text should clarify that the purpose of the paragraph was and still is addressing the uses of how structural parts of the machine may be part of the grounding circuit in terms of the electrical equivalency; a requirement which the committee presumed was in the existing text. From the proposal it is clear that the requirement from the original text was though to have intended additional requirements on the machine builder that were never intended in the original text.
FISHER: The Committee Statement notes that 8.2.2.3.1 permits the use of the structure of the machine to be used as part of the equipment grounding circuit. This is a true statement and, in fact, the last sentence (before the Exception of 8.2.1. requires that all exposed conductive parts of a machine be connected to the equipment grounding circuit.
The second sentence of the Committee Statement declares that 8.2.2.3.1 contains provisions that the cross sectional area of the structural machine parts be at least electrically equivalent to the minimum cross sectional area of the copper conductor required (it's not clear which copper conductor). Regardless of which copper conductor is referenced, this appears to place a demand on the machinery manufacturer to provide machinery elements with sufficient cross sectional area to meet our requirement. Such a demand is completely outside the scope of this standard.
It would appear that the only reason that this section was not deleted is that some see it as the allowance to substitute machine elements for the equipment grounding conductor that is implicitly required in 8.2.1. Such a substitution should not be allowed for the following reasons:
• in accept Log 88 the Committee agreed with the necessity of placing the equipment grounding conductor as close as possible to the phase conductor to minimize the loop impedance in the event of a fault. Quick clearing of the protective devices in the event of a fault, necessary to minimize exposure to hazardous touch voltages, is dependent upon low loop impedance;
• in 8.2.3.5, NFPA 79 disallows the use of raceways, wireways or table trays to be substituted as equipment grounding conductors;
• the effectiveness of machine elements for operational bonding (functional bonding in IEC) is quickly diminished as the frequency goes up, e.g. by higher harmonics generated by electronic drives;
• IEC 60204-1 does not allow such substitutions simply because the integrity of continuity of machine elements and their impedance cannot usually match that of a properly sized and installed copper equipment grounding conductor.
KIIHR: Section 8.2.2.3.1 adds no value to the document. The first part of the requirement, allowing structural parts of the machine to be used in the grounding circuit, is already covered in 8.2.3.1. The second half of the requirement, dealing with electrical equivalence is vague and unenforceable. Rather than performing these calculations, the acceptability of the grounding circuit is more accurately determined by conducting the tests required in Chapter 19, Testing and Verification.

SANDERS: There is no information provided as to the conductor the electrical equivalency of the machine structure is to be compared.
This practice is not permitted by NFPA 70 - 2002, Section 300.3(B), which requires that all conductors of the same circuit and, where used, all equipment grounding conductors and bonding conductors are to be contained within the same raceway, cable tray, cable, or cord. 300.3(B)(2) does provide for equipment grounding conductors to be installed on the outside of a raceway or cable assembly but only for existing installations or dc circuits since there are no reactance problems with dc circuits.
The integrity of the metallic structural parts and joints used in this manner for equipment grounding purposes may become compromised over the life of the installation in ways that cannot be easily detected.
There is no corresponding requirement in IEC 60204.1, and in the interest of following the objective of NFPA 79 - 2002 edition to work in concert with IEC 60204-1 and in an effort to maintain the harmonization effort for close alignment with the proposed 2005 edition, this section should be deleted since that was also part of the premise for rejecting 79-58 (Log #99).

79-74 Log #81 **Final Action: Accept in Principle**
(8.3)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Clarify the meaning of the sub section requirements as indicated:

8.3 Control Circuits. Control circuits shall be permitted to be grounded or ungrounded. Where grounding is provided, that side of the circuit which is common ~~the coils~~ shall be grounded at the secondary winding of control transformer if alternating current or at the power supply terminal if direct current.

Substantiation: The meaning of the paragraph is hidden in only one type of ac control circuit; one that only contains control relays. No change in the requirements, only clarification.
Committee Meeting Action: Accept in Principle
Revise to read as follows:

8.3 Control Circuits. Control circuits shall be permitted to be grounded or ungrounded. Where grounding is provided, that side of the circuit common to the coils shall be grounded at the secondary winding of the control transformer if alternating current or at the power supply terminal if direct current.

Committee Statement: The committee does not accept the deletion of the word "coils" since the wording is necessary for the proper application of the requirement. The committee accepts the additional words "secondary winding of the " to add clarity to the requirement.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-75 Log #70 **Final Action: Accept in Principle**
(Chapter 9)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:

Chapter 9 Control Circuits and Control Functions

9.1 Control Circuits.

9.1.1 Control Circuit Supply.

9.1.1.1 Where control circuits are supplied from an AC source, control transformers shall be used for supplying the control circuits. Control circuits shall not be derived from auto transformers. Control circuits supplied from windings of multiwinding power transformers shall be permitted if the output voltage of the winding supplying the control circuit does not exceed 120 volts ac and the available short-circuit current does not exceed 1000 amperes rms.

9.2.5.4* Emergency Operations (Emergency Stop, Emergency Switching Off). This standard specifies the requirements for the emergency stop and the emergency switching off functions of the emergency operations listed in Annex E, both of which are, in this standard, initiated by a single human action.

Once active operation of an emergency stop (see Section 10.7) or emergency switching off (see Section 10.8) actuator has ceased following a command, the effect of this command shall be sustained until it is reset. This reset shall be possible only at that location where the command has been initiated. The reset of the command shall not restart the machinery but only permit restarting.

It shall not be possible to restart the machinery until all emergency stop commands have been reset. It shall not be possible to reenergize the machinery until all emergency switching off commands have been reset.

NOTE 1: Emergency stop and emergency switching off are complementary protective measures that are not primary means of risk reduction for hazards (e.g., trapping, entanglement, electric shock or burn) at a machine (see ISO 12100).

NOTE 2: Principles for the design of emergency stop equipment, including functional aspects, are given in ISO 13850.

9.2.5.4.1.1 In addition to the requirements for stop, the emergency stop shall have the following requirements:

(1) It shall override all other functions and operations in all modes.

(2) Power to the machine actuators, which causes a hazardous condition(s), shall be removed as quickly as possible without creating other hazards (e.g., by the provision of mechanical means of stopping requiring no external power, by reverse current braking for a Category 1 stop.

~~(3) Reset of an emergency stop circuit shall not initiate a restart.~~

(3) The reset of the command shall not restart the machinery but only permit restarting.

9.2.5.7 Enabling ~~Device~~ Control.

9.2.5.7.1 When an enabling ~~device~~ control is provided as a part of a system, it shall be designed to allow motion when actuated in one position only. In any other position, motion shall be stopped.

9.2.5.7.2 Enabling ~~devices~~ controls shall have the following features:

(1) Connect to a Category 0 or a Category 1 stop (see 9.2.2)

(2) Design follows ergonomic principles

(3) For two-position types, the positions are as follows:

(a) Position 1 is the off function of the switch (actuator is not operated).

(b) Position 2 is the enabling function (actuator is operated).

(4) For three-position types, the positions are as follows:

(a) Position 1 is the off function of the switch (actuator is not operated).

(b) Position 2 is the enabling function (actuator is operated in its mid position).

(c) Position 3 is the off function of the switch (actuator is operated past its mid position).

A three-position enabling ~~device~~ control shall require manual operation to reach Position 3. When returning from Position 3 to Position 2, the function shall not be enabled.

9.2.5.7.3 An enabling ~~device~~ control shall automatically return to its off function when its actuator is not manually held in the enabling position.

9.2.7 Cableless Control Functions.

9.2.7.1* General. Cableless control (e.g., radio, infra-red) techniques for transmitting commands and signals between a machine control system and operator control station(s) shall meet the requirements of this clause.

A.9.2.7.1 Some of these applications and system integrity considerations can also be applicable to control functions employing serial data communication techniques where the communications link uses a cable (e.g., coaxial, twisted pair, optical).

9.2.7.3 Stop Function.

9.2.7.3.2 A machine that has safety critical functions that are equipped with cableless control shall have a means of automatically initiating the stopping of the machine and preventing the initiation of potentially hazardous motions in the following situations:

(1) When a stop signal is received

(2) When a fault is detected in the cableless control ~~system~~

(3)* When a valid signal has not been detected within a specified period of time

~~9.2.7.4* Serial Data Communication. In a machine where the control of safety critical functions relies on serial data transfer, correct communications shall be ensured by using an error detection method that is able to cope with up to three error bits in any command sequence. The safety capability of the serial data communication system shall be listed to have the same degree of safety capability as hardware based components installed in accordance with this standard.~~

~~A.9.2.7.4 One way to determine applicable error detection methods is to refer to IEC 60870 5-1, Telecontrol equipment and systems.~~

9.3 Protective Interlocks.

~~9.3.2 Overtravel Limits. Where a machine overtravel causes a hazardous condition, a position sensor or limit switch shall be provided to initiate control action.~~

9.3.2 Exceeding Operating Limits. Where an operating limit (e.g., speed, pressure, position) can be exceeded leading to a hazardous condition, means shall be provided to detect when a predetermined limit(s) is exceeded and initiate an appropriate control action.

9.4.3* Control Systems Incorporating Software and Firmware Based Controllers. ~~Control systems incorporating software and firmware based controllers performing safety related functions shall conform to all of the following:~~

~~(1) In the event of any single failure perform 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 control systems incorporating hardwired/hardware components~~

~~(3) Be designed in conformance with an approved standard that provides requirements for such systems~~

9.4.3.1 Software Modification. Programmable electronic systems shall be designed and constructed so that the ability to modify the application program shall be limited to authorized personnel and shall require special equipment or other means to access the program (e.g., access code, key-operated switch).

Exception: For safety reasons, the manufacturer or supplier shall be permitted to retain the right not to allow the user to alter the program.

9.4.3.2 Memory Retention and Protection

9.4.3.2.1 Means shall be provided to prevent memory alteration by unauthorized persons.

9.4.3.2.2 Loss of memory shall not result in a hazardous condition.

9.4.3.2.3 Power supplies for electronic units that require memory retention shall have battery backup of sufficient capacity to prevent memory loss for a period of at least 72 hours.

9.4.3.3 Software Verification. Equipment using reprogrammable logic shall have means for verifying that the software is in accordance with the relevant program documentation.

9.4.3.4 Use in Safety-Related Functions.

9..4.3.4.1 Software and firmware based controllers to be used in safety-related functions shall be listed for such use.

9.4.3.4.2 Control systems incorporating software and firmware based controllers performing safety-related functions shall conform to all of the following:

(1) In the event of any single failure perform 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 control systems incorporating hardwired/hardware components

(3) Be designed in conformance with an approved standard that provides requirements for such systems

A.9.4.3 IEC ~~61508~~ 62061 provides requirements for the design of control systems incorporating the use of software and firmware based controllers to performing safety-related functions.

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

9.1.1.1 This was added to clarify the requirements of 9.1.1.1 apply to AC circuits and to align with IEC 60204.

9.2.5.4 Created a general section to consolidate the common functional requirements of emergency stop and emergency switching off. Functional requirements were brought over from 10.7.3 and 10.8.3.

9.2.5.4.1.1(3) Modified to clarify the requirement and align with IEC 60204.

9.2.5.7 Replacing the word "device" with "control" in 9.2.5.7.1, 9.2.5.7.2, and 9.2.5.7.3 better defines the requirement and aligns with IEC 60204.

9.2.7.1 Created a general section to better define the requirements of this clause and to align with IEC 60204.

9.2.7.3.2(2) Better defines the requirement.

9.2.7.4 These requirements are redundant with those of 9.2.7.1.

9.3.2 Better defines the requirement and aligns with IEC 60204.

9.4.3 Relocated and incorporated the "Programmable Equipment" topic and title from Section 11.3 to Chapter 9 as "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1. The deleted requirements above have been relocated to 9.4.3.4.2.

9.4.3.1 Relocated and incorporated the "Programmable Equipment", "Software Modifications", topic requirements and exception from 11.3.1 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.2 Relocated and incorporated the "Programmable Equipment", "Memory Retention and Protection" topic title from 11.3.2 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.2.1 Relocated and incorporated the "Programmable Equipment", "Memory Retention and Protection" requirements from 11.3.2.1 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.2.2 Relocated and incorporated the "Programmable Equipment", "Memory Retention and Protection" requirements from 11.3.2.2 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.2.3 Relocated and incorporated the "Programmable Equipment", "Memory Retention and Protection" requirements from 11.3.2.3 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.3 Relocated and incorporated the "Programmable Equipment", "Software Verification" requirements from 11.3.3 to Chapter 9 "Control Circuit and Control Functions", so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.4 Relocated from old Chapter 11 and grouped with related requirements in 9.4.3. The topic material from 11.3.4* is relocated to be grouped in subordinate paragraphs of 9.4.3.4 "Use in Safety-Related Functions" (9.4.3.4.1). A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3.4.2 Kept the Chapter 9 topic title and number, see the proposed change for old Chapter 11 (Section 11.3 Programmable Equipment) whose requirements are proposed to be relocated under the number and title 9.4.3* Control Systems Incorporating Software and Firmware Based Controllers. The topic material from 9.4.3* is relocated to be grouped in subordinate paragraphs of 9.4.3.4 "Use in Safety-Related Functions) (9.4.3.4.2).

A.9.4.3 Update reference, IEC 60201 uses the previously referenced general standard (IEC 61508) and applies it to industrial machinery controls.

When it becomes available the ANSI B11 TR-4 might also be added to the reference.

Committee Meeting Action: Accept in Principle

1) In 9.2.5.4*, replace the word "standard" with the word "section"

2) In 9.4.3.1 Exception, delete the introductory phrase "For safety reasons"

3) In 9.4.3.2.3, change the words "units that require" to "equipment requiring"

4) Retain (do not delete) Section 9.2.7.4 and the accompanying note.

5) In 9.2.5.4 relocate Notes 1 and 2 to the Annex A using the asterisk notation.

Committee Statement: The committee understands that any section in Chapter 9 not specifically reference in 79-75 (Log #70) is to remain (not be deleted by this action).

1) The word section is more appropriate for this usage.

2) "For safety reasons" is overly restrictive and does not belong.

3) The term equipment is more appropriate since it is a defined term.

4) The committee does not agree that 9.2.7.1 adequately covers the requirement.

5) Notes must be moved to the Annex A in accordance with the NFPA Style manual.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-76 Log #46 **Final Action: Accept**

(9.1.2.1 Exception No. 2)

Submitter: Michael H. Appold, Delphi Corporation

Recommendation: Revise as follows:

9.1.2.1 Exception No. 2: Any electromechanical...to be energized ~~at line~~ above control voltage through contactor or relay contacts. The contactor...both sides of the ~~line voltage~~ circuit ~~to~~ powering the magnetic device....

Substantiation: Problem: A problem arises from lack of definition of "line voltage" used in both item 9.1.2.1 and item 14.2.4.3. If a machine is supplied by 120 vac and also controlled by 120 vac, is this supplied 120 vac to be considered "line voltage?"

- Per existing 14.2.4.3 some would then say the machine's control circuits need to be wired in black wire. This would cause significant concern amongst our electricians if some machines have red 120 vac control wiring and others have black.

- Historically our industry has had to clarify/amend NFPA 79 on this topic.

- Our electricians expect wire color to be an indicator of voltage level.

Secondly, 9.1.2.1 establishes the maximum ac control voltage as 120v, but grants an exception (for higher voltages?). Does this mean that anything higher than 120 vac is considered line voltage?

Third, since 9.1.2.2 establishes DC control voltage as a maximum 250v, are any DC voltages above 250v (drive outputs, etc.?) considered line voltage?

Fourth, IEC 60204 uses the term "power" instead of line voltage.

First proposed solution: eliminate the use of the term line voltage; using just the term control voltage. (e.g., above control voltage, or below control voltage, etc.) This clarifies that wire color is more a voltage issue than an application issue.

A second solution to this issue would be to add a definition:

- Line Voltage. Any voltage greater than 120 vac, or 250 vdc.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-77 Log #2 **Final Action: Reject**
(9.1.5 (New))

NOTE: This Proposal appeared as Comment 79-189 (Log #55) which was held from the A2002 ROC on Proposal 79-63.
Submitter: Thomas Pilz, Pilz Industrial Electronics L.P.
Recommendation: Incorporate new section 9.1.5 with the following wording:
9.1.5 Safety Circuit. The probability of failure of the power circuit shall not be increased through additional control components implemented in the safety circuit. The additional fault probability in the safety circuit shall be limited independent of the risk of the machine by using control components that are so designed that if they fail do not prevent the stopping action and do not allow for a restart until the fault has been cleared. The design of the safety circuit shall be assessed in a risk assessment.
Note: ANSI/RIA 15-06, 1999, ANSI B11 TR3, Semi S10 or EN 954-1 in combination with EN 1050 can be used for guidance at the risk assessment.
Substantiation: The substantiation by the commmittee for rejecting the original proposal with reference to UL 508 does not apply here. The Safety Circuit addresses the control of mechanical machine hazards and not electrical shock or fire hazards as UL 508 does. Today, many buyers of machinery are asking their OEMs for copies of the risk assessment before taking delivery of the machine. Also, it is common practice in the Automotive and Exporting Industry to incorporate safety circuits into the control circuit in order to comply with IEC 60204-1 in combination with EN 954-1. The wording used in EN 954-1 is necessary to ensure that safety circuits do not carry a hazard in themselves. IEC 60204 itself has no section to cover the performance of safety circuitry. This is done in EN 954-1. In order to achieve conformity with IEC 60204-1, I suggest to include wording into NFPA 79 due to the lack of supporting sub standards as EN 954-1 is to EN 60204-1. When it comes to protection of personnel from mechanical hazards, the human relies on the safeguards to be operating as intended. This includes the function of the emergency stop that is supposed to be available at all times. The control circuit that incorporates these actuators, therefore, has to be designed so that it is detecting a single fault in the circuit itself as well as still being able to perform the shut down function even so the fault is present. Therefore, the concept of the safety circuit is introduced to NFPA 79 with a new definition in 3.9.5.1. This is necessary to give the user guidance on how to design such circuitry. Test houses such as TUV Product Services or TV Rheinland Berlin-Brandenburg, which are accredited in the US and are currently in the process of being listed as NRTL by OSHA, have developed test methods to certify the compliance of components/products with EN 60204-1. Since it is the objective of this group to harmonize the NFPA 79 document with EN 60204-1, these test procedures can be applied to list components/products against the US Safety Standard NFPA 79, 2002 edition, which would then be acceptable for use in the design of safety circuitry. The circuitry itself would not be required to be certified if such listed components are used. Last but not least, it needs to be mentioned that paragraph 4.1 acknowledges the risk of malfunctioning of the machine and the loss of safety function as a result of faults of failures in the control circuit resulting in exposure of humans to mechanical hazards of the 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 Meeting Action: Reject
Committee Statement: The proposal incorrectly implies that certification of components will ensure correctly operating safety circuits. The risk assessment does not determine if a safety circuit is adequate. The committee has concerns that there may be an enforcement issue in the first sentence of the recommendation.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
ANDERSON: The committee mistakenly rejected this proposal which should have been and AIP. To clarify any implication that certification of components will ensure correctly operating safety circuits. The proposed new material (AIP) should read as follows:
9.1.5* Safety Control Circuit . The probability of failure of safeguarding measures shall not be increased through additional control components implemented in the safety control circuit. The design of the safety control circuit shall be evaluated using the risk assessment process.
A9.1.5: The additional fault probability in the safety circuit shall be limited independent of the risk of the machine by using control components that are so designed that if they fail do not prevent the stopping action and do not allow for a restart until the fault has been cleared.
ANSI RIA 15-06, 1999, ANSI B11 TR3, Semi S10 or EN 954- 1 in combination with EN 1050 provides guidance for the risk assessment process.

79-78 Log #21 **Final Action: Reject**
(9.2, 9.2.5, 9.4)

Submitter: David A. Dziedzie, Visteon Utica Plant
Recommendation: Add new text to read:
When required by a risk assessment of the equipment, the device, system or interface shall be designed, constructed, and installed such that a single component failure within the device, interface or system shall not prevent normal stopping action from taking place but shall prevent a successive machine cycle. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those components whose function does not affect the safe operation of the machine tool.
Substantiation: The added language aligns the NFPA 79 document with the ANSI B11.19 machine safeguarding requirements, and the generally accepted practices of risk assessment. This will reduce conflicting requirements between national standards. Review for addition to Section 9.2, 9.2.5, or 9.4.
Committee Meeting Action: Reject
Committee Statement: ANSI B11.19 deals with safeguarding of machine tools. NFPA 79 standard deals with electrical equipment of industrial machines. Therefore, the concept of determining risk assessment only on the electrical equipment, without giving full consideration to the entire machine, is not correct. There are more solutions than the one pointed out by the submitter. The scope of the recommendation is overly narrow.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 17 Negative: 3
Explanation of Negative:
DROBNICK: The committee should accept this proposal on its merits and place the language into Section 9.4.1.1.
FREUDENBERG: I would have preferred an AIP and deleted the middle sentence. Per basic safety principles, a single fault or single electrical fault should not result in a hazard.
PILZ: I believe there is a misunderstanding between the submitter and the committee. I believe that it was always the intention of the submitter to require a risk assessment covering the entire machine. All that his wording, in my opinion, does is requiring best practice for the design of circuitry controlling the functional safety of a machine. I believe that the substantiation is correct and that the committee should accept this proposal.
Comment on Affirmative
ANDERSON: In agreement with the committee action and statement for this and the four other similar proposals [79-79 (Log# 22) thru 79-81 (Log # 24) and 79-82 (Log # 44)]. The five proposals show that the requirement for the risk assessment process in 4.1 is recognized, but also demonstrate that the implementation of the requirement might be more useful if there were suggested methodologies, structured in ways that could be more easily be coordinated with similar efforts associated with, but outside the scope of this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-79 Log #22 **Final Action: Reject**
(9.2, 9.2.5, 9.4)

Submitter: Karl Kostrzewa, Visteon
Recommendation: Add new text to read:
When required by a risk assessment of the equipment, the device, system or interface shall be designed, constructed, and installed such that a single component failure within the device, interface or system shall not prevent normal stopping action from taking place but shall prevent a successive machine cycle. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those components whose function does not affect the safe operation of the machine tool.
Substantiation: The added language aligns the NFPA 79 document with the ANSI B11.19 machine safeguarding requirements, and the generally accepted practices of risk assessment. This will reduce conflicting requirements between national standards. Review for addition to Section 9.2, 9.2.5, or 9.4.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on 79-78 (Log # 21).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
FREUDENBERG: See my Explanation of Negative for Proposal 79-78 (Log #21).
Comment on Affirmative
ANDERSON: In agreement with the committee action and statement for this and the four other similar proposals [79-78 (Log# 21), 79-80 (Log # 23), and 79-81 (Log # 24) and 79-82 (Log # 44)]. The five proposals show that the requirement for the risk assessment process in 4.1 is recognized, but also demonstrate that the implementation of the requirement might be more useful if there were suggested methodologies, structured in ways that could be more easily be coordinated with similar efforts associated with, but outside the scope of this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-80 Log #23 **Final Action: Reject**
(9.2, 9.2.5, 9.4)

Submitter: Thomas J. Swarte, Visteon
Recommendation: Add new text to read:
When required by a risk assessment of the equipment, the device, system or interface shall be designed, constructed, and installed such that a single component failure within the device, interface or system shall not prevent normal stopping action from taking place but shall prevent a successive machine cycle. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those components whose function does not affect the safe operation of the machine tool.
Substantiation: The added language aligns the NFPA 79 document with the ANSI B11.19 machine safeguarding requirements, and the generally accepted practices of risk assessment. This will reduce conflicting requirements between national standards. Review for addition to Section 9.2, 9.2.5, or 9.4.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on 79-78 (Log # 21).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
FREUDENBERG: See my Explanation of Negative for Proposal 79-78 (Log #21).
Comment on Affirmative
ANDERSON: In agreement with the committee action and statement for this and the four other similar proposals [79-78 (Log# 21), 79-79 (Log # 22), and 79-81 (Log # 24) and 79-82 (Log # 44)]. The five proposals show that the requirement for the risk assessment process in 4.1 is recognized, but also demonstrate that the implementation of the requirement might be more useful if there were suggested methodologies, structured in ways that could be more easily be coordinated with similar efforts associated with, but outside the scope of this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-81 Log #24 **Final Action: Reject**
(9.2, 9.2.5, 9.4)

Submitter: Anthony A. Selk, Visteon Corporation
Recommendation: Add new text to read:
When required by a risk assessment of the equipment, the device, system or interface shall be designed, constructed, and installed such that a single component failure within the device, interface or system shall not prevent normal stopping action from taking place but shall prevent a successive machine cycle. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those components whose function does not affect the safe operation of the machine tool.
Substantiation: The added language aligns the NFPA 79 document with the ANSI B11.19 machine safeguarding requirements, and the generally accepted practices of risk assessment. This will reduce conflicting requirements between national standards. Review for addition to Section 9.2, 9.2.5, or 9.4.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on 79-78 (Log # 21).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
FREUDENBERG: See my Explanation of Negative for Proposal 79-78 (Log #21).
Comment on Affirmative
ANDERSON: In agreement with the committee action and statement for this and the four other similar proposals [79-78 (Log# 21) thru 79-80 (Log # 23) and 79-82 (Log # 44)]. The five proposals show that the requirement for the risk assessment process in 4.1 is recognized, but also demonstrate that the implementation of the requirement might be more useful if there were suggested methodologies, structured in ways that could be more easily be coordinated with similar efforts associated with, but outside the scope of this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-82 Log #44 **Final Action: Reject**
(9.2, 9.2.5, 9.4)

Submitter: John Thompson, Visteon
Recommendation: New text to read as follows:
When required by a risk assessment of the equipment, the device, system or interface shall be designed, constructed, and installed such that a single component failure within the device, interface or system shall not prevent normal stopping action from taking place but shall prevent a successive machine cycle. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those components whose function does not affect the safe operation of the machine tool.
Substantiation: The added language aligns the NFPA 79 document with the ANSI B11.19 machine safeguarding requirements, and the generally accepted practices of risk assessment. This will reduce conflicting requirements between national standards. Review for addition to section 9.2, 9.2.5 or 9.4.
Committee Meeting Action: Reject
Committee Statement: See Committee Action and Statement on 79-78 (Log # 21).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
FREUDENBERG: See my Explanation of Negative for Proposal 79-78 (Log #21).
Comment on Affirmative
ANDERSON: In agreement with the committee action and statement for this and the four other similar proposals [79-78 (Log# 21) thru 79-81 (Log # 24)]. The five proposals show that the requirement for the risk assessment process in 4.1 is recognized, but also demonstrate that the implementation of the requirement might be more useful if there were suggested methodologies, structured in ways that could be more easily be coordinated with similar efforts associated with, but outside the scope of this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-83 Log #144 **Final Action: Reject**
(9.2.2)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Move Section 9.2.2 to new Section 3.3.95.3. No change to text.
Substantiation: Current Section 9.2.2 is not a requirement. It is a definition of terms that are used in multiple places in the document. This section should more appropriately be placed with definitions in Chapter 3.
Committee Meeting Action: Reject
Committee Statement: Language is needed in its current location to ensure the following requirements are properly interpreted. The section and the language currently aligns with IEC 60204-1.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-84 Log #150 **Final Action: Reject**
(9.2.3.2)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise 9.2.3.2 as follows:
9.2.3.2 Where a hazardous condition results from mode selection, inadvertent selection shall be prevented from occurring (e.g., key-operated switch, access code). Mode selection by itself shall not initiate machine operation. A separate action by the operator shall be required. The control circuit of the mode selection shall meet the same safety level as that determined by the risk assessment of the relevant hazard.
Substantiation: The selection of a wrong operating mode, due to a fault in the mode selection circuitry (e.g., operator activates mode selection device but machine does not switch mode, or the machine inadvertently switches operating mode without operator intervention) can potentially lead to a hazardous condition. In these cases, the mode selection device must be implemented to the same safety level as the circuitry controlling the hazard itself. The degree to which the circuity must be implemented, should be determined by means of a risk assessment.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Reject
Committee Statement: The current language in 9.2.3.2 adequately covers the subject.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
PILZ: I am personally aware of a case in Europe where a mechanically malfunctioning mode selector switch caused a young person to loose 8 of the ten fingers he had. The accident could have been prevented if an appropriate switch would have been selected and its integration into the control circuitry would have been in a way where the failure of sticking contacts could have been detected.
The wording of this proposal will point out to the user of the document that a mode selection switch does affect the functional safety of the overall machine and, therefore, needs special consideration in its design into the system.
In order to prevent severe injuries, I urge the committee to change its position and accept the proposal.
Comment on Affirmative
ANDERSON: In agreement with the committee action but the proposal indicates the need in 9.2.3.2 and elsewhere in the requirements of this standard for an agreed quantification and an agreed definition of levels of risk (probability of occurrence of harm and the severity of that harm). The term in

the proposal "safety level" or "performance level" [79-92 (Log # 153)], is an understood concept, but there are not and agreed definitions nor a methods to quantify them, nor for that matter quantifying the degree that a particular electrical systems of industrial machinery design addresses the level of risk, as required in this standard. There are several existing systems outside of this standard that can be used to quantify the levels of risk and to classify the safety-related parts of a control systems; control systems which are used to address the various level of risk of identified hazards as required by this standard, (e.g. ANSI-B11 TR3: 2000 "Risk Assessment and Risk Reduction - A Guide to Estimate, Evaluate and Reduce Risks Associated with Machine Tools" (Table 1: high medium, low, negligible), ISO 13849 "Safety of machinery – Safety-related parts of control systems", classification of safety related parts, based upon their performance in case of fault (Risk Categories B,1,2,3,and 4), IEC 61508 or IEC 62061 "Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems" classification of the level of requirements of the Safety Function (NFPA 79 3.3.89) (Safety Integrity Level (SIL) 1,2 or 3),NFPA 551 (FIGURE A.5.2.5 Risk Matrix: high, moderate and low).

A simple and consistent system or systems needs to be identified or developed to be used when addressing related requirements that are in this standard; please see comment for 79-5 Log # 28 (1.1.3 (New)) for suggested action.

79-85 Log #104 **Final Action: Accept in Principle**
(9.2.5.2.2)

Submitter: David Fisher, Rockwell Automation / Rep. NEMA
Recommendation: Revise text to read:

9.2.5.2.2 On those machines where safeguards cannot be applied for certain operations, manual control of such operations shall be by hold-to-run controls , together with enabling devices , if appropriate .

Substantiation: The problem with the current language is that it is too prescriptive. It may be the best option for a robot "teach" mode but there are many operations that can be appropriately controlled by the hold-to-run controls without the additional use of enabling controls. The revised language allows the additional use of the enabling device if appropriate.
Committee Meeting Action: Accept in Principle

Change the word "devices" to "control."

Committee Statement: Enabling control is more than an enabling device. An enabling control requires another start control device.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:

PADGETT: Disagree with Committee Action of just changing "devices" to "control" in 9.2.5.2.2. Recommend also changing the word "enabling" to "a start." Final text to read:
9.2.5.2.2 On those machines where safeguards cannot be applied for certain operations, manual control of such operations shall be by hold-to-run controls together with ~~enabling~~ a start control, if appropriate.
Substantiation: This action would align with 9.2.5.5.1 and 9.2.5.7.1. The hold-to-run control is equivalent to an enabling device and in 9.2.5.7.1 the initiating control for an enabling device is referred to as a "start control." Therefore, it is recommended to change the terminology above from "enabling control" to "start control". The combination of the hold-to-run and the start control would provide an enabling control function as in 9.2.5.5.1.

79-86 Log #63 **Final Action: Reject**
(9.2.5.4.1.4 Exception)

Submitter: John F. Bloodgood, JFB Enterprises
Recommendation: Delete 9.2.5.4.1.4 Exception in its entirety.
Substantiation: (1) A Category 0 is intended to remove power/energy to all hazardous motions under all conditions including situations arising from common mode failures (not just single failures).

(2) Part of the requirements of 9.4.3 specify "be designed in conformance with an approved standard that provide requirements for such systems". There is no standard currently recognized by NFPA which meets this requirement. IEC 61508 was originally rejected by the United States. Even if it is accepted by NFPA, it places severe requirements not only on the device manufacturer but also the machine control builder including compliance with an ISO 9001 certification program. Neither IEC 62061 nor ISO 13849-1 (REV.) are approved standards.

(3) It is noted that the ASC of ANSI/B11 has considerable concern over this exception to the point that it it remains in the NFPA 79 standard the revised B11 standards will exclude it.
Committee Meeting Action: Reject
Committee Statement: The NFPA 79 standard in 9.4.3 and 11.3.4 make provision for the use of programmable control for safety related applications of which the emergency stop function is one.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-87 Log #113 **Final Action: Accept in Principle**
(9.2.5.4.1.4 Exception)

Submitter: Daniel L. Stewart, Rockwell Automation
Recommendation: Delete entire last sentence of the exception:

~~The final removal of power shall be accomplished by means of electromechanical components.~~

Substantiation: Proposal will improve alingment with IEC 60204-1 Ed. 5.0 clause, 9.2.5.4.2 application of requirements in IEC 61508-x and EN954-1 preclude the need to require electromechanical removal of power.
Committee Meeting Action: Accept in Principle
Committee Statement: See Committee Action and Statement on Proposal 79-88 (Log #151) that meets the intent of the submitter.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-88 Log #151 **Final Action: Accept**
(9.2.5.4.1.4, 9.2.5.4.1.5, A.9.2.5.4.1.4 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Delete 9.2.5.4.1.4, revise old 9.2.5.4.1.5 (and renumber to 9.2.5.4.1.4) and add Annex A note A.9.2.5.4.1.4.

~~9.2.5.41.4 Where a Category 0 stop is used for the emergency stop function, it shall have only hardwired electromechanical components.~~

~~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.~~

9.2.5.4.1.4 * Where a category 0 or Category 1 stop is used for the emergency stop function, it shall have a circuitry design (including sensors, logic and actuators) according to the relevant risk as required by 4.1 and 9.4.1. Final removal of power to the machine actuators shall be ensured and shall be by means of electromechanical components. Where relays are used to accomplish a category zero emergency stop function, they shall be nonretentive relays.

Exception: Drives,or solid state output devices, designed for safety related functions shall be allowed to be the final switching element, when designed according to relevant safety standards.

A.9.2.5.4.1.4 IEC 61508 and IEC 61800-5-2 (under preparation) give guidance to the manufacturer of drives on how to design a drive for safety related functions.

Substantiation: The requirement in current 9.2.5.4.1.4 allowing only for hardwired electromechanical components, is overly restrictive, and could prohibit the use of new technology. The exception to current 9.2.5.4.1.4 begins to address this issue.

The proper selection of hardware (or software), as well as the circuit design itself, should be based upon the results of a risk assessment. This is the approach taken by IEC 60204-1.

By adding the proposed language to current 9.2.5.4.1.5 (new 9.2.5.4.1.4), we bring in the requirement for risk assessment in selecting the proper design for emergency stop functions. This language makes the requirement (and exception) in current 9.2.5.4.1.4 redundant and unnecessary.

The new exception, regarding drives, allows for the application of new emerging technology. To aid the user in the selection of this new technology, an informative note is added as A.9.2.5.4.1.4 to give guidance as to the relevant standards in this area.

This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:

BLOODGOOD: Again there is a misunderstanding about risk assessment and its application to Emergency Stop. Risk assessment must be applied to the whole machine and its related equipment and not just to the electrical equipment.
The possibility of common mode failures are not usually considered which is one of the problems of applying current standards and those under development. The exception refers to relevant standards. What are these relevant standards. The U. S. voted against IEC 51508. IEC 63061 is finally approaching approval but those who would use this document as the relevant standard have not been privy to its requirements and it is questionable that it would be applicable to Emergency Stop - Category 0. (Within the Machinery Safety standards, Emergency Stop is not considered as a safety function). Also, IEC 62061 brings in a number of ISO & IEC standards that are not recoginzed by NFPA.

PADGETT: Agree with the Committee Action except change the new text in 9.2.5.4.1.4 to read "...and shall be selected based on the requirements of 4.1." Also delete the exception.
Substantiation: The proposed text seems to imply that there are various degrees to a Category 0 stop when in fact there is only one. A Category 0 is "an uncontrolled stop by immediately removing power to the machine actuators" as defined in 9.2.2.

The determination that needs to be made is the type of emergency stop that would meet the requirements in 4.1. This determination in turn results in a circuit design to assure the effectiveness of the selected type of emergency stop. The requirement, therefore, is to select the type of emergency stop based upon the risk assessment applied to the whole machine. The changed wording, therefore, brings the correct reemphasis on risk assessment.
Deleting the exception to 9.2.5.4.1.4. The overall section 9.2.5.4 addresses Category 0 and Category 1 emergency stop functions. Emergency stop functions are not considered as safety related functions and, therefore, the exception does not specifically address requirements related to emergency stop functions. That is for example, the equivalence of the design to electromechanical components. The exception is also unenforceable since it does not specify what "relevant safety standards" that are to be used.
Due to the critical nature of assuring that emergency stop functions operate, the statement that devices need to be "designed according to relevant safety standards" does not assure proper design was achieved unless the product is "listed" to a standard intended to assure this use.
The exception, as written, does not provide sufficient requirements to assure that the devices can be used for emergency stop functions.
It should be noted that it is not intended to restrict new technology, but to assure that equipment meets the requirements of the standard.
Comment on Affirmative
MONTEITH: Accept committee action with the below changes:
Exception: Drives or solid state output devices ~~designed~~ listed for safety related functions shall be allowed to be the final switching element when ~~designed~~ listed ~~according~~ to relevant safety standards.
A.9.2.5.4.1.4 IEC 61508 and IEC 61800-2 (under preparation) give guidance to the manufacturer of drives on how to design a drive for safety related functions. The use of the word "designed" does not assure compliance to the required safety standard. The listing requirement should be maintained.

79-89 Log #152 **Final Action: Accept in Principle**
(9.2.5.5, A.9.2.5.5 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new 9.2.5.5 and add new Annex A note A.9.2.5.5:
9.2.5.5* Monitoring of command actions. Movement or action of a machine or part of a machine that can result in a hazardous condition shall be monitored. On manually controlled machines, operators can provide some of this monitoring.
A.9.2.5.5 Conditions that cannot reasonably be expected to be monitored by the operator will require additional means which may include overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices.
Substantiation: Include material from IEC 60204-1 into NFPA 79 for harmonization. The monitoring of hazardous movements/actions will result in greater safety to personnel.
The second paragraph of the requirement from IEC 60204-1 is being added as an informative note to Annex A, as it is merely explanatory to the first paragraph.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept in Principle
Revise text of the recommendation to read as follows:
9.2.8 Monitoring of Command Actions. Movement or action of a machine or part of a machine that can result in a hazardous condition shall be monitored by providing, for example, overtravel limiters, motor overspeed detection, mechanical overload detection or anti-collision devices.
A.9.2.8 On some manually controlled machines, operators provide monitoring.
Committee Statement: The Committee revised the proposed text to reflect the latest revisions to 60204-1. The committee relocated the text to 9.2.8 because it belongs in the control functions section of Chapter 9.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-90 Log #101 **Final Action: Accept in Principle**
(9.2.5.7)

Submitter: David Fisher, Rockwell Automation / Rep. NEMA
Recommendation: Revise text to read as follows:
9.2.5.7 Enabling Device.
9.2.5.7.1 An enabling control function incorporating the use of an enabling device shall, when activated, allow machine operation to be initiated by a separate start control and, when deactivated, stop the machine and prevent initiation of machine operation. ~~When~~ A n enabling device is provided as a part of ~~a system~~ the enabling control function , ~~it~~ shall be designed to allow motion when actuated in one position only. In any other position, motion shall be stopped.
9.2.5.7.2 Enabling devices shall have the following features:
(1) Connect to a Category 0 or a Category 1 stop (see 9.2.2)
(2) Design follows ergonomic principles
(3) For two-position types, the positions are as follows:
(a) Position 1 is the off function of the switch (actuator is not operated)
(b) Position 2 is the enabling function (actuator is operated)
(4) For three-position types, the positions are as follows:
(a) Position 1 is the off function of the switch (actuator is not operated)
(b) Position 2 is the enabling function (actuator is operated in its mid position)
(c) Position 3 is the off function of the switch (actuator is operated past its mid position)
A three-position enabling device shall require manual operation to reach Position 3. When returning from Position 3 to Position 2, the function shall not be enabled.
9.2.5.7.3 An enabling device shall automatically return to its off function when its actuator is not manually held in the enabling position.
Substantiation: The present language does not clarify the difference between an enabling control and hold-to-run control. The revised text makes it clear that, in addition to correct actuation of the enabling device, the operation of an additional start control is necessary to initiate motions. (This idea was lost when we included only one of the two discussions about enabling devices from IEC 60204-1). Further, there is no restriction as to whether that additional start control is momentarily operated or it is hold-to-run.
Committee Meeting Action: Accept in Principle
Revise text of the recommendation to read as follows:
9.2.5.7 Enabling ~~Device~~ C o n t r o l .
9.2.5.7.1 An enabling control function incorporating the use of an enabling device shall, when activated, allow machine operation to be initiated by a separate start control and, when deactivated, stop the machine and prevent initiation of machine operation. ~~When~~ A n enabling device ~~is~~ provided as a part of ~~a system~~ the enabling control function , ~~it~~ shall be designed to allow motion when actuated in one position only. In any other position, motion shall be ~~stopped~~ inhibited .
Committee Statement: The Committee understands that this action modifies the action on Proposal 79-75 (Log #70). The word inhibited was changed to be more precise.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-91 Log #103 **Final Action: Accept**
(9.3.6)

Submitter: David Fisher, Rockwell Automation / Rep. NEMA
Recommendation: Revise text to read:
9.3.6 Protective Interlock. Where doors or guards have interlocked switches used in circuits with safety related functions, 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 or guards are open (difficult to defeat or bypass).
Substantiation: The problem is that listed "safety switches" are commonly recognized in the control industry as listed UL98 disconnect switches. Even without the term "safety switch", the required performance and characteristics in addition to simple listing are sufficient to specify a product that will be suitable in an interlocking circuit.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-92 Log #153 **Final Action: Accept in Principle**
(9.4.1)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise 9.4.1 as follows:
9.4.1 General Requirements. Where failures or disturbances in the electrical equipment can cause a hazardous condition or damage to the machine or the work in progress, measures shall be taken to minimize the probability of the occurrence of such failures or disturbances. The electrical control circuits shall have an appropriate level of safety performance that has been determined from the risk assessment of the machine.
Substantiation: This section describes the functions in the event of failure. It is exactly these types of failures that can cause potential hazards to exist. This is an appropriate place for a renewed reference to a risk assessment for functional safety, which influences the design of the electrical control circuit.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept in Principle
Revise the recommendation to read as follows:
The electrical control circuits shall have an appropriate performance level that has been determined from the risk assessment of the machine.
Committee Statement: Safety level is an inappropriate term for this discussion. Performance level is a more appropriate way of characterizing the different levels of circuitry.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
BLOODGOOD: The term "performance level" is neither defined or referenced to another standard. It is noted that the revision of ISO 13849-1 (draft) does define this term and goes into great detail covering the concept of this term but the standard is still under development and it is estimated that this revised standard will not be published for another 2 years (if ever). Also, risk assessment is not intended to determine performance level.

PADGETT: Disagree with Committee Action. This proposal should be rejected.
Substantiation: Risk assessment is adequately covered in 4.1 and it is not necessary to repeat this requirement. Also, there is no reference standard noted to be used in determining performance levels.
Comment on Affirmative
ANDERSON: In agreement with additional suggestions in comment for79-Log # 150 (9.2.3.2). In the AIP the committee editorially failed to address the existing text "(See Annex I)" which should also have been corrected by moving it to a reference in Annex A as follows : 9.4.1* General requirements. When… ; and adding "A9.4.1 See Annex I 'Minimizing the Probability of Control Function Failure'". Also if this AIP proposal does not remove the text form I.1.2.1 then the cross referencing in I 1.2.1 (3), (4) and (5) will suffice, if I 1.2.1 is removed than the AIP action should include referencing to the details that remain in Annex I for I 1.2.1 (3), (4) and (5).
DROBNICK: Many proposals have been presented this cycle containing the phrase "risk assessment". The current standard also discusses this term in Section 4.1. There is no guidance provided by the 79 document, other than annexed references, to help the reader accomplish this requirement. I suggest that the Chairman appoint a Task Group to:
• define risk assessment.
• review all current and proposed stategies to accomplish assessments.
• propose language to address intended and unintended machine and control system operations, which impact the safety of equipment and personnel.
MUNSON: The Committee reviewed many proposals this cycle concerning "risk assessment".
The current version of NFPA 79 discusses this term in Section 4.1. Guidance is not provided by the 79 document, other than annexed references. I would propose that the Chairman create a Task Group to:
• Define risk assessment. To review the question "Does risk assessment differ depending on"
• machine level evaluation
• component level evaluation
• electrical evaluation
• mechanical evaluation
• intended and unintended machine operation
• control system operations
• Review all current and proposed strategies (National & International) to accomplish assessments
• Develop a committee position on risk assessment
• Propose language to address
The goal will be to unite the committee with a common stance and provide the reader a method to successfully accomplish this requirement.
PILZ: I applaud the committee for inserting the best industry practice of linking the results of a risk assessment to the design of the control circuits controlling the functional safety of machinery. An ad hoc committee, however, could add wording during the ROC to give further guidance to the user of this document.

79-93 Log #154 **Final Action: Accept**
(9.4.1.1 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new 9.4.1.1 from Annex I:
9.4.1.1 Measures to reduce these risks shall include, but are not limited to, one or more of 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
(4) Provisions of partial or complete redundancy or diversity
(5) Provision for functional tests
Substantiation: This section was included as part of Annex I in the previous version of NFPA 79. By including this list of requirements in the normative text, and rewording it to become more enforceable language, the usability of the document is increased. By moving it to normative text, the standard is now more precise as to how the measures dictated in 9.4.1 are to be implemented.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
PADGETT: Maintain text in Annex I.
This requirement is unenforceable. The information provided is recommended design practices, not safety requirements, that provide an unlimited set of recommended design approaches. This text is informational for designers and does not increase the usability of the document since it is not specific in requirements. By stating "shall include, but not be limited to" makes this unenforceable. The text, therefore, should remain in the Annex.
Comment on Affirmative
ANDERSON: In agreement however proposal editorially failed to address the cross-references in the existing text "(See I.2), (See I.3), (See I.4) and (See I.5)" respectively. If accepting this proposal does not remove the text form I.1.2.1 then the cross referencing in I 1.2.1 (3), (4) and (5) will suffice, if I 1.2.1 is removed than the action should become AIP and include referencing to the details that remain in Annex I for I 1.2.1 (3), (4) and (5).

79-94 Log #71 **Final Action: Accept**
(Chapter 10)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:
Chapter 10 Operator Interface and Control Devices
10.1 General.
10.1.1* Applicability. This chapter shall contain the requirements for devices mounted outside or partially outside control enclosures.
A.10.1.1 For further information on device selection, mounting, identification, and coding, see ~~IEC 60073~~ IEC 61310-1 and ~~IEC 60447~~ IEC 61310-3 .
Particular consideration should be taken in the selection, arrangement, programming and use of operator input device such as touchscreens, keypads and keyboards, for the control of hazardous machine operations.
10.1.4 Position Sensors.
10.1.4.1 Position sensors (e.g., limit switches, position switches, proximity switches) shall be arranged so that they will not be damaged in the event of overtravel.
10.1.4.2* Position sensors used in circuits with safety-related control functions either shall have ~~positive (direct)~~ opening operation or shall provide similar reliability.
A.10.1.4.2 For further information on ~~positive (direct)~~ opening operation, see IEC 60947-5-1 , Annex K .
10.3 Indicator Lights and Icons of Color Graphic Interface Devices.
10.3.2 * Colors. Indicator lights and icons of color graphic interface devices shall be color-coded with respect to the condition (status) of the machine in accordance with Table 10.3.2. Alternate purposes shall be permitted to indicate machine or process status.
A.10.3.2 Indicating towers on machines should have the applicable colors in the following order from the top down; RED, YELLOW, BLUE, GREEN and WHITE.
10.3.3 * Flashing Lights. Flashing lights shall be permitted to be used for any of the following purposes:
(1) Attract attention
(2) Request immediate action
(3) Indicate a discrepancy between the command and actual states
(4) Indicate a change in process (flashing during transition)
A.10.3.3 For additional information see IEC 61310-1 for recommended flashing rates and pulse/pause ratios.
10.7 Devices for Stop and Emergency Stop.
10.7.2 Types.
10.7.2.1 The types of devices for emergency stop shall include, but are not limited to, the following:
(1) Pushbutton-operated switches in accordance with 10.7.2.2 and 10.7.4
(2) Pull-cord-operated switches
(3) Foot-operated switches without a mechanical guard
(4) Push-bar-operated switches
(5) Rod-operated switches
10.7.2.2* Pushbutton-type devices for emergency stop shall be of the self-latching type and shall have ~~positive (direct)~~ opening operation.
A.10.7.2.2 For further information on ~~positive (direct)~~ opening operation, see IEC 60947-5-1 , Annex K .
~~10.7.3 Restoration of Normal Function After Emergency Stop. It shall not be possible to restore an emergency stop circuit until the emergency stop device has been manually reset. Where several emergency stop devices are provided in a circuit, it shall not be possible to restore that circuit until all emergency stop devices that have been operated have been reset.~~
10.7.5 Local Operation of the Supply Disconnecting Means to Effect Emergency Stop.
10.7.5.3 Disconnecting (isolating) electrical devices as described in 5.5.4, where accessible to the operator, shall also be permitted to serve the function of emergency stop.
10.8 Devices for Emergency Switching Off.
10.8.2 Types.
10.8.2.1 * The types of devices that initiate an emergency switching off operation shall be permitted to include, but are not limited to, the following:
A.10.8.2.1 For further information on direct opening operation, see IEC 60947-5-1, Annex K.
~~10.8.3 Restoration of Normal Function After Emergency Switching Off. It shall not be possible to restore an emergency switching off circuit until the emergency switching off circuit has been manually reset.~~
10.8.4 Actuators.
10.8.4.2 * Where the emergency switching off initiating device is separate from the emergency stop device, the emergency switching off initiating device shall be functionally identified.
A.10.8.4.2 Where emergency switching off devices are on operator control stations that can be disconnected, to avoid the possibility of confusion between active and inactive emergency switching off devices it is recommended that

emergency switching off devices on operator control stations that can be disconnected do not have a yellow background.

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

A.10.1.1 Updated IEC references and added new second paragraph to provide additional information from IEC 60204 for the user.

10.1.4.2 Updates IEC references and better defines the requirement.

10.3.2 Additional user information from IEC 60204.

10.3.3 Provides additional information for the user from IEC 60204.

10.7.2.1 Updated references.

10.7.2.2 Updates IEC references and better defines the requirement.

10.7.3 This was moved to 9.2.4.1.

10.7.5.3 This was added to include devices erroneously omitted in the 2002 edition and to align with IEC 60204.

10.8.2.1 This provides additional information to the user from IEC 60204.

10.8.3 This was moved to 9.2.5.4.1.

10.8.4.2 This provides additional information to the user from IEC 60204.

Committee Meeting Action: Accept

Committee Statement: The committee understands that any section in Chapter 10 not specifically reference in 79-94 (Log #71) is to remain (not be deleted by this action).

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

GOETZ: It is understood that the deleted text of 10.7.3 and 10.8.3 has been replaced by equivalent text added to 9.2.5.4 under Proposal 79-75 (Log #70) rather than as noted in the substantiation.

79-95 Log #14 **Final Action: Accept in Principle**

(10.7.2.4 (New))

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.

Recommendation: Add a new 10.7.2.4 as follows:

Emergency stop pushbuttons of the palm or mushroom-head type shall effect an emergency stop when depressed.

Substantiation: It is generally accepted that E-Stop buttons actuate when pressed-in; however, we have recently seen instances where mushroom-head buttons were used with switches arranged to stop machinery when pulled-out; resulting in a dangerous condition for operators.

Committee Meeting Action: Accept in Principle

Revise the third sentence of 10.7.4 to read as follows:

The actuator of a pushbutton-operated device shall be of the palm or mushroom-head type and shall effect an emergency stop when depressed.

Committee Statement: This modification meets the intent of the submitter and is more appropriate placed in 10.7.4

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-96 Log #35 **Final Action: Accept in Principle**

(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC

Recommendation: Make new section in Chapter 11 Electronic Equipment -- title: Adjustable Speed Drive Systems

Substantiation: To maintain alignment with NFPA 70-2005, 430, 122 to 430.128, as per TC committee direction of September, 2003. Adjustable Speed Drive Systems are essentially electronic based, not just a special type of induction or brush commutated motor.

This proposal was developed by Task Group 9, Servo Drives/Motors.

Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows: Add a new last Chapter XX, Servo Drives and Motors.

Committee Statement: A new chapter is proposed as a new last chapter in order to preserve one of the stated objectives of NFPA 79, which is to maintain alignment where possible with IEC 60204-1. The new chapter is being added to maintain alignment to IEC 60204-1.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 17 Negative: 3

Explanation of Negative:

BLOODGOOD: It is understood from the Committee Action that the new chapter would read as follows:

Chapter XX, Servo Drives and Motors.

XX.2 Overload Protection.

XX.2.1 Overload protection of the motor shall be provided as detailed in XX.1.1 through XX.1.2.

XX.2.1.1 Motor Amplifier/Drive. Where the amplifier/drive is marked to indicate that motor overload protection is included, additional overload protection shall not be required.

XX.2.1.2 Multiple motor applications. For multiple motor applications, individual motor overload protection shall be provided.

XX.3 Motor Over temperature Protection.

XX.3.1 General.

A.XX.3.1 The relationship between the motor current and motor temperature changes when the motor is operated by a servo drive. When operating at reduced speeds overheating of motors may occur at current levels less than or equal to motor rated full load current. This is the result of reduced motor cooling when its shaft-mounted fan is operating less than rated name plate RPM.

XX.3.1.1 Servo drive systems shall protect against motor over temperature conditions. Over temperature protection shall be in addition to any conductor protection. Protection shall be provided by one of the following means.

XX.3.1.1.1 Integral motor thermal protector.

XX.3.1.1.2 Servo drive controller with load and speed sensitive overload protection and thermal memory detection upon shutdown or power loss.

XX.3.1.1.3 Over temperature protection relay utilizing thermal sensors embedded in the motor.

XX.3.1.2 Motors with Cooling Systems.

XX.3.1.2.1 Motors that utilize external forced air or water cooling systems shall require over temperature protection in the event that cooling system is inoperative or has failed.

XX.3.1.3 Multiple Motor Applications.

XX.3.1.3.1 For multiple motor application, individual motor over temperature protection shall be provided.

XX.3.1.4 Automatic Restarting and Orderly shutdown.

XX3.1.4.1 The provisions of NFPA 70-2005, 430.43 and 430.44 shall apply to the motor over temperature protection means.

XX.4.1 Drive Supply Conductors. Circuit conductors supplying servo drive systems shall be sized to have an ampacity not less than 125 percent of the rated input of the equipment.

XX.4.2 Motor Circuit Conductors - Minimum size and Ampacity on a Single Motor Circuit. Motor Circuit conductors shall have an ampacity of at least 125 percent of the motor full-load current when operated in a continuous mode of operation, or as specified by the servo drive system manufacturer. Motor circuit conductors for motors operating in other than continuous mode shall be permitted to have reduced ampacity based upon the design load and duty cycle. Although I do not disagree with the concept of the proposal I find it insufficient to create a separate chapter. I propose that the three sections be moved as shown below.

XX.2 Overload move to 7.3.

XX.3 Overcurrent move to 7.10.

XX.4 Conductor size 13.6.

And the title (and new chapter) be deleted. Also the format of the sections is not in conformance with the NFPA MOS (i.e., xx.y.z.1 but no xx.y.z.2) and unnecessary titles. There is also an inconsistency in the use of terms - servo drive, servo drive system, drive.

KIIHR: While I agree that the inclusion of requirements specifically directed at the use of servo systems is appropriate, I do not think that adding a whole new chapter is the best course of action. The committee has gone to great lengths during the last two cycles to keep NFPA 79 consistent with IEC 60204, and the addition of a new chapter would be a step backwards in that effort. I would recommend that Mr. Schreck and his Task Group find a home for each of these new requirements within the existing framework of NFPA 79. This effort could be handled during the upcoming comment phase.

LOCKE: I concur with the Explanation of Negative Vote of Mr. Kijhr.

79-97 Log #36 **Final Action: Accept in Principle**

(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC

Recommendation: New text to read as follows:

Conductors - Minimum Size and Ampacity, (A) Branch/Feeder Circuit Conductors. Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system shall have an ampacity not less than 125 percent of the rated input to the power conversion equipment.

(B) Bypass Device. For an adjustable speed drive system that utilizes a bypass device, the conductor ampacity shall not be less than required by NFPA 70-2005, 430.6. The ampacity of circuit conductors supplying power conversion equipment included as part of an adjustable speed drive system that utilizes a bypass device shall be the larger of:

1) 125 percent of the rated input to the power conversion equipment, or

2) 125 percent of the motor full-load current rating as determined in NFPA 70-2005, 430.6.

Substantiation: To maintain alignment with NFPA 70-2005, Article 430.122 to 430.128, as per TC committee direction of September, 2003.

This proposal was developed by Task Group 9, Servo Drives/Motors.

Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows::

"XX.4.1 Drive Supply Conductors.

Circuit conductors supplying servo drive systems shall be sized to have an ampacity not less than 125 percent of the rated input of the equipment.

Committee Statement: This was originally to be incorporated into Chapter 11, which has been deleted by action taken on ROP 72. It now fits better under this new Chapter in this location.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:

BLOODGOOD: See My Explanation of Negative on 79-96 (Log #35).

79-98 Log #37 **Final Action: Reject**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: To add to the list of alternatives --, or as specified by the Adjustable Speed Drive System, or Servo Drive/Motor manufacturer.
Substantiation: To allow conductor sizing per engineering determination while still providing guidance and allowing manufacture specifications/ recommendations.

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-99 Log #38 **Final Action: Accept in Principle**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: New text to read as follows:

Overload Protection. Overload protection of the motor shall be provided.

(A) Included in Power Conversion Equipment. Where the power converion equipment is marked to indicate that motor overload protection is included, additional overload protection shall not be required.

(B) Bypass Circuits. For adjustable speed drive systems that utilize a bypass device to allow motor operation at rated full load speed, motor overload protection shall be provided in the bypass circuit.

(C) Multiple Motor Applications. For multiple motor application, individual motor overload protection shall be provided.
Substantiation: To maintain alignment with NFPA 70-2005, 430.122 to 430.128, as per TC committee direction of September, 2003.

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Accept in Principle

Revise the recommended text to read as follows:

XX.2. Overload Protection.

XX.2.1. Overload protection of the motor shall be provided as detailed in XX.2.1.1 through XX.2.1.2.

XX.2.1.1. Motor Amplifier/Drive. Where the amplifier/drive is marked to indicate that motor overload protection is included, additional overload protection shall not be required.

XX.2.1.2. Multiple motor applications. For multiple motor applications, individual motor overload protection shall be provided.
Committee Statement: The motor overload protection is provided here to keep it separate from the other chapters. This was originally to be incorporated into Chapter 11, which has been deleted by action taken on ROP 72, and is placed in this new Chapter.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:

BLOODGOOD: See My Explanation of Negative on 79-96 (Log #35).
Comment on Affirmative

KIIHR: The proposal and committee action may have missed one issue. The accepted wording appears to allow only two options of overload; 1) overloads included in the drive system, or 2) for multiple motors overloads for each motor. When a drive system does not include an overload yet only drives one motor, user supplied external overloads are required, but are only implied by the existing wording.

PADGETT: Agree to Committee Action and recommend the following sentence be added to XX.2.1.1 "This information shall be included in the technical documentation."
Substantiation: The marking on the amplifier/drive may not be obvious and may be part of a part number. In this case the documentation should state that the selected drive contains the required overload protection.

79-100 Log #39 **Final Action: Accept in Principle**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: Revise as follows:

Motor Overtemperature Protection. (A) General. Adjustable speed drive systems shall protect against motor over temperature conditions. Overtemperature protection shall be in addition to any conductor protection. Protection shall be provided by one of the following means.

1) Integral motor thermal protector.

2) Adjustable speed drive controller with load and speed sensitive overload protection and thermal memory detention upon shutdown or power loss.

3) Over temperature protection relay utilizing thermal sensors embedded in the motor.

(B) Motors with Cooling Systems. Motors that utilize external forced air or water cooling systems shall require over temperature protection in the event that cooling system is inoperative or has failed.

(C) Multiple Motor Application. For multiple motor application, individual motor overtemperature protection shall be provided.

(D) Automatic Restarting and Orderly Shutdown. The provisions of NFPA 70-2005, 430.43 and 430.44 shall apply to the motor overtemperature protection means.

Add to Annex a: The relationship between motor current and motor temperature changes when the motor is operated by an adjustable speed drive. When operated at reduced speed, overheating of motors may occur at current levels less than or equal to a motor's rated full load current. This is the result of reduced motor cooling when its shaft-mounted fan is operating less than rated nameplate RPM.b
Substantiation: To maintain alignment with NFPA 70-2005, 430.122 to 430.128, as per TC committee direction of September 2003.

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows:

XX.3. Motor Over temperature Protection.

XX.3.1. General*.

A.XX.3.1.* The relationship between the motor current and motor temperature changes when the motor is operated by a servo drive. When operating at reduced speeds overheating of motors may occur at current levels less than or equal to motor rated full load current. This is the result of reduced motor cooling when its shaft-mounted fan is operating less than rated name plate RPM.

XX.3.1.1. Servo drive systems shall protect against motor over temperature conditions. Over temperature protection shall be in addition to any conductor protection. Protection shall be provided by one of the following means.

XX.3.1.1.1. Integral motor thermal protector.

XX.3.1.1.2. Servo drive controller with load and speed sensitive overload protection and thermal memory detection upon shutdown or power loss.

XX.3.1.1.3. Over temperature protection relay utilizing thermal sensors embedded in the motor.

XX.3.1.2. Motors with Cooling Systems.

XX.3.1.2.1. Motors that utilize external forced air or water cooling systems shall require over temperature protection in the event that cooling system is inoperative or has failed.

XX.3.1.3. Multiple Motor Applications.

XX.3.1.3.1. For multiple motor application, individual motor over temperature protection shall be provided.

XX. 3.1.4. Automatic Restarting and Orderly shutdown.

XX.3.1.4.1. The provisions of NFPA 70-2005, 430.343 and 430.44 shall apply to the motor over temperature protection means."
Committee Statement: This was originally to be incorporated into Chapter 11, which has been deleted by action taken on proposal 79-104 (Log #72), and is placed in this new Chapter.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative

GOETZ: The items numbered as XX.3.1.1.1, XX.3.1.2, and XX.3.1.1.3 should be included as sub-items (1)-(3) to XX.3.1.1 to complete the requirement (as shown in the recommended text) as they are not stand-alone requirements.

79-101 Log #40 **Final Action: Accept**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: Delete current NFPA 79-2002, 7.3.1.2 in its entirety.
Substantiation: Requirement contained in new alignment language from NFPA 70-2005, 430.126(A)(3).

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Accept

Change the recommendation by modify existing title, removing all text and note within existing section and replace existing text with Annex A material to read as follows:

7.3.1.2* "Adjustable Speed (Electronic) and Servo (Servo) Drives and Motors.

A.7.3.1.2 For information covering adjustable speed drives (ASD) see NFPA 70-2005 430.120 Adjustable Speed Drive Systems. For Servo Drives see Chapter XX Servo Drives and Motors."
Committee Statement: To provide maximum visibility for this unique technology, and the new Chapter XX incorporates the present 2002 NFPA 79 text as part of proposal 79-101 (Log #40).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative

ANDERSON: Note: the section involved is 7.3.1.2, not Chapter 11

79-102 Log #41 **Final Action: Accept in Principle**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: Revise as follows:

Motor Circuit Conductors - Minimum size and Ampacity on a Single Motor Circuit. Motor Circuit conductors shall have an ampacity of at least 125 percent of the motor full-load current when operated in a continuous mode of operation. Motor circuit conductors for motors operating in other than continuous mode shall be permitted to have reduced ampacity based upon the design load and duty cycle.

Substantiation: The conditions under which conductor ampacity (size) reduction is allowed, and what must be determined.

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Accept in Principle

Revise as follows:

xx.4.2 Motor Circuit Conductors - Minimum size and Ampacity on a Single Motor Circuit. Motor Circuit conductors shall have an ampacity of at least 125 percent of the motor full-load current when operated in a continuous mode of operation, or as specified by the servo drive system manufacturer. Motor circuit conductors for motors operating in other than continuous mode shall be permitted to have reduced ampacity based upon the design load and duty cycle.

Committee Statement: This text provided rules for sizing conductors. The option of the system manufacturer to provide conductor sizing is permitted.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative

PADGETT: Agree to Committee Action and recommend the following sentence be added to XX.4.2 "The design parameters used to calculate reduce ampacity shall be included in the technical documentation."
Substantiation: When circuit conductors are sized based on the design load, and that load is programmable, the "as designed" parameters should be defined in the machine documentation.

79-103 Log #42 **Final Action: Reject**
(Chapter 11)

Submitter: George Schreck, Komatsu America Industries LLC
Recommendation: New text to read as follows:

Standstill Mode of Servo Systems. All adjustable speed drive axis shall be monitored for movement not commanded or controlled by the adjustable speed drive and shall initiate a Category 0 or Category 1 stop.

Exception: Motors that are not subject to standstill or hold in place restrictions, such as fans and pumps, shall not be required to be monitored.

Substantiation: When a servo drive system has halted motion due to a program command, it has not truly "stopped" as would be implied by a Category 2 Stop (NFPA 79-2003, 9.2.2) and as recognized in EN 954-1:1996.

This proposal was developed by Task Group 9, Servo Drives/Motors.
Committee Meeting Action: Reject
Committee Statement: Standstill mode is not described or defined. This requirement has no direct relationship to 9.2.2. This proposal does not cover detection of no motion when a command is given.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-104 Log #72 **Final Action: Accept in Principle**
(Chapter 11 and Annex J)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Revise text to read:

~~Chapter 11 Electronic Equipment~~ Chapter 11 Control Equipment: Location, Mounting, and Enclosures

~~11.1 General.~~

~~11.1.1 This chapter shall apply to all types of electronic equipment including programmable electronic systems, subassemblies, printed circuit boards, electronic components, and other miscellaneous solid state equipment.~~

~~11.1.2 Electronic equipment used as part of an industrial machine, including subassemblies, printed circuit boards, devices, internal wiring, and components, shall not be require to be inspected at the time of installation of the industrial machine, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory.~~

~~11.1.3 Listed or labeled electronic equipment shall be permitted to be used without modifications, on or with industrial machines, where approved for the location and use.~~

4.2 Electrical Components and Devices. Electrical components and devices shall be installed and used assuming the operating conditions of ambient temperature, altitude, humidity, and supply voltage outlined in this chapter, and within their design ratings, taking into account any derating stipulated by the component or device manufacturer. Listed or labeled equipment shall be permitted to be used without modifications, on or with industrial machines, where approved for the location and use.

~~11.2 Basic Requirements.~~

~~11.2.1 Equipment Grounding (Equipotential Bonding).~~

~~11.2.1.2 Where specified by the manufacturer, components and subassemblies shall be effectively bonded to the equipment grounding (protective bonding) circuit in accordance with the manufacturer's recommendations.~~

8.2.1.1 Equipment Grounding. The machine and all exposed, non-current-carrying conductive parts, material, and equipment likely to be energized shall be effectively grounded. Where electrical devices are mounted on metal mounting panels that are located within nonmetallic enclosures, the metal mounting panels shall be effectively grounded. Where specified by the manufacturer, components and subassemblies shall be effectively bonded to the equipment grounding (protective bonding) circuit in accordance with the manufacturer's recommendations.

~~11.2.2 Subassemblies Subassemblies shall be readily removable for inspection or replacement.~~

~~11.2.3 Electrical Noise and Transient Suppression. Transient suppression, isolation, or other appropriate means shall be provided where the electronic equipment generates electrical noise or transients, which can affect the operation of equipment.~~

4.4.2* Electromagnetic Compatibility (EMC).

4.4.2.1 Transient suppression, isolation, or other appropriate means shall be provided where the ~~electronic~~ equipment generates electrical noise or transients, which can affect the operation of equipment.

~~11.2.4 Output Protection. Outputs controlled by programmable electronic systems shall be protected from overload and short circuit conditions.~~

~~11.3 Programmable Equipment.~~

9.4.3* Control Systems Incorporating Software and Firmware Based Controllers.

~~11.3.1 Software Modification. Programmable electronic systems shall be designed and constructed so that the ability to modify the application program shall be limited to authorized personnel and shall require special equipment or other means to access the program (e.g., access code, key-operated switch).~~

~~Exception: For safety reasons, the manufacturer or supplier shall be permitted to retain the right not to allow the user to alter the program.~~

9.4.3.1 Software Modification. Programmable electronic systems shall be designed and constructed so that the ability to modify the application program shall be limited to authorized personnel and shall require special equipment or other means to access the program (e.g., access code, key-operated switch).

Exception: For safety reasons, the manufacturer or supplier shall be permitted to retain the right not to allow the user to alter the program.

~~11.3.2 Memory Retention and Protection.~~

9.4.3.2 Memory Retention and Protection.

~~11.3.2.1 Means shall be provided to prevent memory alteration by unauthorized persons.~~

9.4.3.2.1 Means shall be provided to prevent memory alteration by unauthorized persons.

~~11.3.2.2 Loss of memory shall not result in a hazardous condition.~~

9.4.3.2.2 Loss of memory shall not result in a hazardous condition.

~~11.3.2.3 Power supplies for electronic units that require memory retention shall have battery backup of sufficient capacity to prevent memory loss for a period of at least 72 hours.~~

9.4.3.2.3 Power supplies for electronic units that require memory retention shall have battery backup of sufficient capacity to prevent memory loss for a period of at least 72 hours.

~~11.3.3 Software Verification. Equipment using reprogrammable logic shall have means for verifying that the software is in accordance with the relevant program documentation.~~

9.4.3.3 Software Verification. Equipment using reprogrammable logic shall have means for verifying that the software is in accordance with the relevant program documentation.

~~11.3.4* Using in Safety Related Functions. Software and firmware based controllers to be used in safety related functions shall be listed for such use.~~

9.4.3.4 Use in Safety-Related Functions.

9.4.3.4.1 Software and firmware based controllers to be used in safety-related functions shall be listed for such use.

~~9.4.3* Control Systems Incorporating Software and Firmware Based Controllers. Control systems incorporating software and firmware based controllers performing safety related functions shall conform to all of the following:~~

~~(1) In the event of any single failure perform 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 control systems incorporating hardwired/hardware components~~

~~(3) Be designed n conformance with an approved standard that provides requirements for such systems~~

9.4.3.4.2 Control systems incorporating software and firmware based controllers performing safety-related functions shall conform to all of the following:

(1) In the event of any single failure perform 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 control systems incorporating hardwired/hardware components
(3) Be designed in conformance with an approved standard that provides requirements for such systems

A.9.4.3 ~~IEC 61508~~ IEC 62061 provides requirements for the design of control systems incorporating the use of software and firmware based controllers to performing safety-related functions.

~~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.~~

Add to Annex J Informational References

J.1.3 IEC Publications.

IEC 62061, Safety of machinery – Functional safety of electrical, electronic and programmable control systems, expected first edition late 2004.

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

Chapter 11 The existing Chapter 11 requirements are incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number. The incorporation of the application aspects of industrial machinery electronic control reflects the general use of electronic equipment that has now developed to the point that special requirements do not justify a separate chapter for the topic. The change is maintaining alignment with the new edition of IEC-60204-1.

11.1 A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. Today industrial electronic equipment has evolved such that it is readily available to meet most conditions that are generally found in and by a typical industrial machine. The change is maintaining alignment with the new edition of IEC-60204-1.

11.1.1 A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. Today industrial electronic equipment has evolved such that it is readily available to meet most conditions that are generally found in and by a typical industrial machine. The change is maintaining alignment with the new edition of IEC-60204-1.

11.1.2 Seems to be an instruction to the AHJ and not an application requirement.

11.1.3 and 4.2 Add clarification in Section 4.2 “Electrical Components and Devices” of existing about applying listed or labeled items. Move material from paragraph 11.1.3, of the old Chapter 11 and add as a second sentence to existing Section 4.2. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed.

Today industrial electronic equipment has evolved such that it is readily available to meet most conditions that are generally found in and by a typical industrial machine. This applying listed or labeled parts requirement would apply to any electrical equipment that was part of the industrial machine NFPA 79: 2002, Section 1.5 specific provisions not made in relation to NFPA 70; [reference NFPA 70: 2003 110.3(A)(1) FPN and (B)]

11.2 A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. Today industrial electronic equipment has evolved such that it is readily available to meet most conditions that are generally found in and by a typical industrial machine. The requirements now found in Chapter 11 can be relocated to the subject’s chapter or are already addressed elsewhere in this standard. The change is maintaining alignment with the new edition of IEC-60204-1.

11.2.1 Requirements are covered in existing Section 8.2 Equipment Grounding (Protective Bonding) Circuit and the revised 8.2.1.1; see proposed change for 11.2.1.2 for the old Chapter 11. The change is maintaining alignment with the new edition of IEC-60204-1.

11.2.1.2 and 8.2.1.1 Add clarification to 8.2.1.1 “Equipment Grounding” that component and subassembly manufacturer’s specifications on grounding are to be followed. Move material from 11.2.1.2 of the old Chapter 11 and add as a third sentence to existing 8.2.1.1. A separate grouping of requirements that specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.

11.2.2 Requirements are essentially covered in existing Section 12.1 General requirements. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.

[“12.1.1 All control equipment shall be located and mounted so as to facilitate the following:
(1) Accessibility and maintenance of the equipment
(2) Protection against the external influences or conditions under which the equipment is intended to operate
(3) Operation and maintenance of the machine and its associated equipment”]

11.2.3 and 4.4.2.1 A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. Move requirements from old Chapter 11 (“11.2.3 Electrical Noise and Transient suppression”) to under 4.4.2 Electromagnetic compatibility (EMC) and as 4.4.2.1.

This is a general existing requirement that is consistent with NFPA 70: 2002 and the existing requirements throughout NFPA 79: 2002 and would apply to any electrical equipment that was part of the industrial machine [reference NFPA 70: 2002 110.3(B)] Note A level of interference to the operation of electrical control equipment is evaluated as part of the listing process. The change is maintaining alignment with the new edition of IEC-60204-1.

Elimination of the word “electronic” generalizes the requirement and correlates to IEC 60204.

11.2.4 This requirement is included in 9.1.3 as it would apply to any electrical equipment (including programmable electronic systems output) that was part of the industrial machine. Reference NFPA 79: 2002 9.1.3 Protection. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3 and 9.4.3* Relocate and incorporate the “Programmable Equipment” topic and title to Chapter 9 as “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.1 ad 9.4.3.1 Relocate and incorporate the “Programmable Equipment”, “Software Modifications” topic requirements and exception to Chapter 9 “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition IEC-60204-1.

11.3.2 and 9.4.3.2 Relocate and incorporate the “Programmable Equipment”, “Memory Retention and Protection” topic title to Chapter 9 “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.2.1 and 9.4.3.2.1 Relocate and incorporate the “Programmable Equipment”, “Memory Retention and Protection” requirements to Chapter 9 as “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.2.2 and 9.4.3.2.2 Relocate and incorporate the “Programmable Equipment”, “Memory Retention and Protection” requirements to Chapter 9 as “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.2.3 and 9.4.3.2.3 Relocate and incorporate the “Programmable Equipment”, “Memory Retention and Protection” requirements to Chapter 9 as “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.3 and 9.4.3.3 Relocate and incorporate the “Programmable Equipment”, “Software Verification” requirements to Chapter 9 as “Control Circuit and Control Functions”, so as to be grouped with other similar requirements. Today industrial programmable equipment is more developed to the point it is available to meet conditions found by industrial machines; and it is generally used for a variety of control circuit and function methodologies; its requirements are based in the same foundations as the other control circuit and control function requirements. The change is maintaining alignment with the new edition of IEC-60204-1.

11.3.4 and 9.4.3.4 Relocated from old Chapter 11 and grouped with related requirements in 9.4.3. The topic material from 11.4.3* is relocated to be grouped in subordinate paragraphs of 9.4.3.4 “Use in Safety-Related Functions” (9.4.3.4.1). A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed. The change is maintaining alignment with the new edition of IEC-60204-1.

9.4.3 Kept the Chapter 9 topic title and number, see the proposed change for old Chapter 11 (11.3 Programmable Equipment) whose requirements are proposed to be relocated under the number and title 9.4.3* Control Systems Incorporating Software and Firmware Based Controllers. The topic material from 9.4.3* is relocated to be grouped in subordinate the paragraphs of 9.4.3.4

"Use in Safety-Related Functions" (9.4.3.4.2).

A.9.4.3 Update reference, IEC 60204 uses the previously referenced general standard (IEC 61508) and applies it to Industrial machinery controls. When it becomes available the ANSI B11 TR-4 might also be added to the reference.

A.11.3.4 The Note location in Annex A is moved and combined with the similar note applying to 9.4.3 and to correspond to the revised referring paragraph. A separate grouping of requirements that are specifically directed to electronic equipment for industrial machines is no longer needed.

J.1.3 IEC 60204 uses the previously referenced general standard (IEC 61508) and applies it to Industrial machinery controls. It is a proposed new reference in Annex A, A.9.4.3.bg

Committee Meeting Action: Accept in Principle

The Committee desires to remove the entire text of Chapter 11.

Committee Statement: See actions on other proposals such as Proposals 79-96 (Log # 35), 79-97 (Log # 36), 79-99 (Log # 38), 79-100 (Log # 39), 79-101 (Log # 40), 79-102 (Log # 41), and 79-103 (Log #42).

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

Comment on Affirmative

GOETZ: It is understood that the text of the new 9.4.3.1 and 9.4.3.2.3 are modified by panel action on Proposal 79-75 (Log #70).

PADGETT: The affirmative with comment vote supports the position of Mel Saunders.

SAUNDERS: As part of the Accept in Principle action, 9.4.3.4.2(1) should be modified to read:

"9.4.3.4.2(1) In the event of any single failure that can lead to a hazardous condition, the control system shall perform as follows:"

Substantiation: Firmware and software based safety systems can tolerate some faults and still maintain their same safety performance level. For example, safety networks do allow bad or failed network messages to occur without creating a stop condition as long as these systems receive a valid message within the allotted response time of the safety system. Another example is the use of a 2 out of 3 safety processor voting system. In this case only two processors have to agree at any one time. This is used in many safety applications where high availability is needed.

79-105 Log #73 **Final Action: Accept in Principle**
(Chapter 12 and Chapter 13)

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Renumber the whole Chapter from 12 to 11.

Chapter ~~12~~ 11 Control Equipment: Location, Mounting, and Enclosures

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 12 now becomes Chapter 11. The change is maintaining alignment with the new edition of IEC-60204-1.

Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows:

1) Renumber the whole Chapter from 12 to 11.

Chapter ~~12~~ 11 Control Equipment: Location, Mounting, and Enclosures

2) Renumber the whole Chapter from 13 to 12.

Chapter ~~13~~ 12 Conductors, Cables, and flexible Cords

Committee Statement: Chapter 13 was also included.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-106 Log #82 **Final Action: Accept in Principle**
(12.1.2)

Submitter: William Anderson, The Procter & Gamble Company

Recommendation: Clarify the requirement to match the intent. Add " control enclosure" to 12.1.2.

12.1.2 Minimum control enclosure construction requirements shall comply with UL 508, UL 508A, UL 50, or NEMA 250 for metallic and nonmetallic enclosures.

Substantiation: The paragraph is in the chapter on control equipment: location, mounting and Enclosures but the construction requirements cite references that contain requirements additionally to those for enclosure construction and function. This calification matches the substantiation notes from the NFPA 79 committee meetings.

Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows:

12.1.2 Minimum control enclosure construction shall comply with UL 508, UL 508A, UL 50, or NEMA 250 for metallic and nonmetallic enclosures.

Committee Statement: Editorially delete the word "requirements" because it is redundant.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-107 Log #83 **Final Action: Accept in Principle**
(12.1.4)

Submitter: William Anderson, The Procter & Gamble Company

Recommendation: The cross reference in 12.1.4 is confusing because the material covered in the existing 6.2.3 include requirements not related to enclosure door and can confuse the interlocking requirements in 6.2.3. This problem is being addressed in a proposal to correct 6.2.3; if the proposal for 6.2.3 is approved then the alternate cross reference (or 6.2.4) is to be used instead of the reference to 6.2.3.2. In either case the interlock confusion should be corrected by adding the "or 6.2.3.2" to 12.1.4

12.1.4 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 or 6.2.3.2.
<If proposal to move NFPA: 2002 6.2.3.2 is accepter the change would read 6.2.3 or 6.2.4 >

Substantiation: The cross reference does not direct the reader to only the relevant requirements, the proposed change should correct misinterpretations of the requirement for doors and the requirements for interlocks now present.

Committee Meeting Action: Accept in Principle

Revise the recommendation to read as follows:

12.1.4 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 or 6.2.4

Committee Statement: Since proposal 79-60 (Log #80) has been accepted, the cross reference was revised to 6.2.4.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-108 Log #13 **Final Action: Reject**
(12.2.2.2 Exception (New))

Submitter: George Gardner, JCS Controls inc.

Recommendation: Add an Exception to read:

Pipelines, tubing and devices operating from instrument quality, compressed air can be installed in an electrical enclosure provided that:

i. All vents be connected to exhaust ports outside of the enclosure;

ii. Mounting location or barriers will prevent leakage of air and moisture from contacting electrical components.

Maintenance of these pneumatic components shall be performed by personnel trained to service electro-mechanical systems.

Substantiation: In certain processing plants, control equipment has to be installed in Type 4 or Type 4X enclosures. This control equipment typically includes pneumatic switching and regulating devices (e.g., solenoid valves and pressure transducers). Providing a single enclosure that contains all of the control components is a more cost effective and more maintainable approach than providing separate enclosures for the electrical and pneumatic hardware. The use of separate enclosures requires more electrical terminations, more enclosure penetrations and additional space in the processing plant.

When electrical and pneumatic components are n the same enclosure, the plant maintenance personnel responsible for the pneumatic components must be trained to service equipment mounted in electrical enclosures. This will ensure that having the pneumatic devices in an electrical enclosure will not compromise personnel safety.

Committee Meeting Action: Reject

Committee Statement: The submitter's concern is already covered in existing text of Section 12.2.2.2, Exception 2. The recommendation does not contain an upper limit on air pressure.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-109 Log #112 **Final Action: Accept in Principle**
(12.4.8)

Submitter: Barry Boggs, Toyota Motor Manufacturing North America

Recommendation: Revise as follows:

12.4.8 A print pocket sized to accommodate electrical diagrams shall be attached to the inside or outside of the door of the control enclosure or compartment. When this is not practicable it is permissible to place the pocket nearby the control enclosure or compartment in a well-identified location. Single-door and multi-door enclosures shall have at least one print pocket.

Substantiation: Requiring the drawings to be kept within the enclosure unnecessarily increases the risk to maintenance Personnel for the potential of arc flash hazards when retrieving and replacing the diagrams. Not all servicing of the machine requires activity within the control enclosure; many times the troubleshooting and testing occur outside of the enclosure. Being able to access the drawings without the need to open the enclosure will reduce unnecessary risk to personnel.

Committee Meeting Action: Accept in Principle

Revise the second sentence of the recommendation to read as follows: "When this is not practicable, it shall be permissible to place a pocket suitable for the environment, outside the door of the control enclosure or compartment in a well identified location."

Committee Statement: This change adds clarity and protects the prints from working machine environment damage.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20
Comment on Affirmative
HILBERT: I support the committee action and agree with the submitter that placing the documents inside of the enclosure may unnecessarily expose personnel to arc flash hazard. However, the proposed language introduces enforcement concerns as it is not actually clear as to where the information identifying the location is to be placed or how far away the pocket can be located from the machine.

79-110 Log #111 **Final Action: Reject**
(12.5)

Submitter: Barry Boggs, Toyota Motor Manufacturing North America
Recommendation: Revise as follows:
12.5 Spaces Around Control Cabinets and Compartment. Access and working space for control cabinets and compartments operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the provisions of Chapter 12. Sufficient access and working space shall be provided and maintained around all control cabinets and compartments to permit ready and safe operation and maintenance of such control cabinets and compartments. The floor or platform area contained within this working space shall be level and clear of obstructions.
Substantiation: Providing step back and shoulder clearances (depth and width) for the work activity within electrical enclosures is very important for personnel safety. However, if the surface on which they are standing is uneven or has obstacles that create a trip hazard these should be prohibited. The intent of this clause is to provide safe working space and this should clearly include the floor surface.
Committee Meeting Action: Reject
Committee Statement: This requirement for working space to be level is outside the scope of NFPA 79. The proposed requirements be clear of obstructions is already covered by the last sentence of 12.5.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-111 Log #7 **Final Action: Reject**
(12.5.1.3)

Submitter: David W. Muska, Eveready Battery Company
Recommendation: Revise text:
Height of 2.0 m (6 ft 7 in.)
Substantiation: Consistency with 5.3.4.1.
Committee Meeting Action: Reject
Committee Statement: The reference in 12.5.1.3 is height of working space and is consistent with the height requirements of Article 110 of the National Electrical Code. The requirements on 5.3.4.1 are concerned with the height of the disconnecting means operating handle and are consistent with Article 404 of the National Electrical Code.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-112 Log #91 **Final Action: Reject**
(13.2.7 (New))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Add a new section to read:
13.2.7 **Appliance Wiring Material.** Single conductor or multi-conductor assemblies of appliance wiring material Type AWM shall not be permitted.
Substantiation: Type AWM constitutes a plethora of materials - the construction of which is typically of lesser capability and is which is un-known and unavailable to the NFPA 79 user community, or public at large. Type AWM products are a grouping of Recognized product not suitable for evaluation for use in the field by the NFPA 79 user community. Type AWM is intended for additional evaluation for use relative to a consensus product standard by a safety testing laboratory as part of a higher level product Listing. The proposed language in 13.2.7.4 makes the NFPA 79 user community explicitly aware of the in-applicability of directly using appliance wiring material Type AWM on machinery constructed to NFPA 79.
Committee Meeting Action: Reject
Committee Statement: The submitter has not provided adequate technical substantiation to prohibited the use of AWM wiring in these applications. There are permitted multiple marked materials that include the Type AWM and their permitted use may be mistakenly prohibited by the proposed text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
GARSIDE: As amply noted by Mr. Locke in his negative vote, AWM per se is not evaluated for use in machinery. This should have been an AIP. I would support the wording suggested by Mr. Locke in his vote.
LOCKE: UL Standard 758 Appliance Wiring Material states:
"1.2 The appliance wiring material covered by the requirements of this Standard are solely for use as factory-installed wiring either within the overall enclosure of appliances and other equipment (internal wiring) or as external interconnecting cable for appliances (external wiring), or for further processing as components in multi-conductor cables.
"1.3 These requirements do not cover any wire, cable, or cord types that are presently covered in the National Electrical Code (NEC), NFPA 70, and are not intended for installation in buildings or structures in accordance with the NEC except within the scope of the installation instructions of the end-product for which their use is intended.
"1.7 The final acceptance of AWM is dependent upon its use in complete equipment that conforms with the standards applicable to such equipment."
UL AVLV2.GuideInfo Appliance Wiring Material – Component states:
"The devices covered under this category are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field.
"THE FINAL ACCEPTANCE OF THE COMPONENT IS DEPENDENT UPON ITS INSTALLATION AND USE IN COMPLETE EQUIPMENT SUBMITTED TO UNDERWRITERS LABORATORIES INC."
The UL Marking Guide Wire and Cable states:
"In general, AWM is not evaluated for field installation unless it is included as a part of a complete, Listed product or system. For example, data processing equipment Listed under the Information Technology Equipment Including Electrical Business Equipment (NWGQ) category will use external interconnect cables, such as AWM Style 2464, only if the AWM has been evaluated and described in the Listing for the particular piece of equipment. The limitations on the installation of the Listed end-use product or system also apply to the wiring."
www.ul.com/wire/faq.html General Wire & Cable FAQs states:
"1 - What is the relationship between the UL Standards for Wire and Cable and the National Electrical Code?The large majority of UL's wire and cable Standards are intended to be compatible with the installation requirements of the National Electrical Code (NEC). Some exceptions are Boat Cable, Marine Shipboard Cable, and Appliance Wiring Material."
The direct application of Type AWM as part of the electrical equipment of industrial machinery built to comply with NFPA 79 is inconsistent with the intent of UL as evidenced by the text amply published by UL on the subject. The electrical equipment of industrial machinery cannot be listed to NFPA 79 because NFPA 79 is not a product standard. As such NFPA 79 is not a standard to which AWM can directly conform. The direct application of Type AWM on industrial machinery built to comply with NFPA 79 is therefore unsafe.
Given the constraints associated with Type AWM as identified in the applicable product standard and supportive UL documentation - this proposal should not be rejected. This proposal should be accepted in principle. The technical committee might revise this proposal to read as follows:
13.2.7 Appliance Wiring Material. Single conductor or multi-conductor Type AWM shall not be permitted.
Exception: When part of a listed assembly suitable for the intended application Type AWM shall be permissible.
Such a revision is consistent with the submitter's intent, addresses the concerns of the technical committee, and improves the conditions for safety by appraising the NFPA user community of the constraints associated with Type AWM.

79-113 Log #4 **Final Action: Reject**
(13.3.1)

Submitter: Jeff Schmidt, Melton Machine Control Co.
Recommendation: Revise to read:
13.3.1 (1) MTW (also TFFN) - Moisture-, Heat-, etc.
Substantiation: TFFN is also listed as MTW, but it would be more straightforward if TFFN was listed directly. We wire all of our machinery control wiring with TFFN or THHN.
Committee Meeting Action: Reject
Committee Statement: Type MTW is an acceptable insulation type. Type TFFN is a fixture wire and is not specifically permitted by NFPA 79. Compliance with Type TFFN is insufficient to demonstrate compliance with Type MTW wire.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-114 Log #110 **Final Action: Reject**
(13.6.1.1(1)(c)i, (2)(c)i, (3)(c)i, 13.6.1.2 (1)(c)i, (2)(c)i, (3)(c)i)

Submitter: Todd F. Lottmann, Cooper Bussmann
Recommendation: Revise existing language to read as follows:
(c) Overcurrent protection is provided by one of the following:
i. A branch circuit rated listed and marked " Suitable for protection of ~~use with~~ 16 AWG ~~wire~~ conductors in branch circuit applications."
Substantiation: The change to allow the use of 16 and 18 awg conductors in the 2002 NFPA 79 was a great example of the harmonization effort that occurred. It provided a means of using smaller conductors in branch circuit applications, modeling a practice which has been used for years in IEC 60204, which would be safe and suitable for installation in NEC building system within the principles of the North American Safety System. In order for this to occur, certain conditions needed to be mandated such as:

(1) Circuits with Limited ampacities.
(2) A suitable level physical protection was needed.
(3) And most importantly, SUITABLE OVERCURRENT PROTECTION needed to be provided. Part (c)i of all of the 13.6.1 sections provided guidance as to the selection of the proper overcurrent protective devices which would provide the needed level of protection for these smaller conductors. Subsections i and ii both were written under the premise that the product standards, UL489 for circuit breakers and UL248 for fuses, would be updated to include testing which would evaluate the product to provide the level of protection that was needed. To assure the proper testing would be created, the NFPA 79 committee provided guidance to UL and the appropriate STP's in the panel statements for the approval of the final wording in Section 13.6.1 and 13.6.1.2 directing the SDO to review the testing that was submitted and used for judgement on accepting this wording. Long story short, we added the wording before the product testing existed and trusting that the SDO (UL) and the STP would provide this testing.

UL 489 has been revised and testing has been added which will be used for this requirement. HOWEVER, THE NEW TESTING PROGRAM DOES NOT PROVIDE THE LEVELS OF PROTECTION THAT WERE ASSUMED when this change occurred. For example, there will be no specific marking requirement, rather the wire range will be changed. For the committee's review, I have included the correspondence that occurred during the UL 489 revisions process.

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

Committee Meeting Action: Reject

Committee Statement: Requirements exists in UL 489 for a circuit breaker listed for 16 AWG wire. The additional proposed wording doesn't add clarity and will conceivably confuse the inspector. UL 489 has been changed with a very rigorous testing program for 16 and 18 wires. These circuit breakers will be marked for use with 16 or 18 AWG as appropriate and they will be marked as "Listed Circuit Breakers". The UL 489 testing and marking went through the UL STP process with intent of aligning with existing wording in NFPA 79. The existing NFPA 79 wording is clear and fully in line with the UL required marking.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-115 Log #96 **Final Action: Accept**
(13.8.2)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration

Recommendation: Revise text to read:

13.8 ~~Flexible~~ Cords.

13.8.1 ~~Multiconductor flexible cords~~ Cords shall be suitable for the intended use and be of the type listed in Table 13.8.2. Other cords of the types identified in NFPA 70 Table 400.4 that are part of a Listed assembly and are suitable for the intended use shall be permitted.

13.8.2 * Ampacity of ~~Flexible~~ Cords. The continuous current by ~~flexible~~ cords shall not exceed the values given in Table 13.8.2. (See Table 13.8.2 below.)

A.13.8.2 The ampacity values of Table 13.8.2 are based on Table 400.5(A) of ANSI/NFPA-70.

Substantiation: NOTE: This proposal is submitted as part 2 of a 2 part series of proposals relating to the definition of "cord".

The adjective "flexible" is often used in conjunction with the noun "cord." The words "flexible cord" and "cord" are synonymous in NFPA 79 – which leads to confusion (e.g. is a "flexible cord" somehow different from a "cord"?). In the requirements body of NFPA 79 the word "cord" is used nine times (Chapters 3, 5, 13, and 14) while "flexible cord" is used six times (Chapters 3 and 13). The word "flexible" is redundant with the definition of "cord" and therefore not required. For consistency throughout the NFPA 79 the redundant word "flexible", where it precedes "cord", should be removed except in Section 3.3.7 Attachment Plug (Plug Cap) (Plug), which is a definition that originates in NFPA 70 and should therefore be left unchanged.

"Multiconductor" is also is redundant with the definition of "cord" and therefore not required.

"Cables" is removed from the Table heading, as there are no cables included in the revised table.

The content of Table 13.8.2 as currently represented is the same as NEC® Table 400-5(A), 1999 edition (from whence it originated) and NEC® Table 400.5(A) 2002 edition. As the scope of the NEC® is broader than that of NFPA 79, all permissible cords and flexible cables are identified in NEC® 400.5(A).

~~Table 13.8.2~~ Allowable Ampacity for ~~Flexible~~ Cords and Cables [Based on Ambient Temperature of 30°C (86°F).

Size (AWG)	~~Thermoset Type TS~~ / ~~Thermoplastic Types TPT, TST~~	Thermoset Types ~~C, E, EO, PD~~, S, SJ, SJO, SJOW, SJOO, SJOOW, SO, SOW, SOO, SOOW, ~~SP-1, SP-2, SP-3, SRD, SV, SVO, SVOO~~ Thermoplastic Types ~~ET, ETLB, ETP, ETT,~~ SE, SEW, SEO, SEOW, SEOOW, SJE, SJEW, SJEO, SJEOW, SJEOOW, SJT, SJTW, SJTO, SJTOW, SJTOO, SJTOOW~~, SPE-1, SPE-2, SPE-3, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3,~~ ST,~~ SRDE, SRDT,~~ STO, STW, STOW, STOO, STOOW~~, SVE, SVEO, SVT, SVTO, SVTOO~~		~~Thermoplastic Types HPD, HPN, HS, HSJ, HSO, HSJO, HSOO, HSJOO~~
		A[a]	B[b]	
~~27[c]~~	~~0.5~~	~~"~~	~~"~~	~~"~~
~~20~~	~~"~~	~~5[d]~~	~~[e]~~	~~"~~
~~18~~	~~"~~	~~7~~	~~10~~	~~10~~
~~17~~	~~"~~	~~"~~	~~12~~	~~"~~
~~16~~	~~"~~	~~10~~	~~13~~	~~15~~
~~15~~	~~"~~	~~"~~	~~"~~	~~17~~
~~14~~	~~"~~	~~15~~	~~18~~	~~20~~
~~12~~	~~"~~	~~20~~	~~25~~	~~30~~
~~10~~	~~"~~	~~25~~	~~30~~	~~35~~
~~8~~	~~"~~	~~35~~	~~40~~	~~"~~
~~6~~	~~"~~	~~45~~	~~55~~	~~"~~
~~4~~	~~"~~	~~60~~	~~70~~	~~"~~
~~2~~	~~"~~	~~80~~	~~95~~	~~"~~

Notes:

[a] The allowable currents apply to 3-conductor cords and other multiconductor cords connected to utilization equipment so that only 3 conductors are current carrying.

[b] The allowable currents apply to 2-conductor cords and other multiconductor cords connected to utilization equipment so that only 2 conductors are current carrying.

~~[c] Tinsel cord.~~

~~[d] Elevator cables only.~~

~~[e] 7 amperes for elevator cables only; 2 amperes for other types.~~

Not all of the cords and flexible cables, however, are of a type intended for a general application on industrial machinery. Many cords and flexible cables are intended for use in very specific applications, as well as in specific environments. These specific application, specific environment type cords and flexible cables – per their very nature and intended application scope – are inappropriate for general use on industrial machinery constructed to NFPA 79 and should be removed from Table 13.8.2. Those cord and flexible cable types include:

- Parallel Tinsel Cord type TPT.
- Jacket Tinsel Cord type TST.
- Lamp Cord type C.
- Elevator Cable types E, EO, ET, ETLB, ETP, ETT.
- Heater Cord type HPD.
- Parallel Heater Cord type HPN.
- Thermoset Jacketed Heater Cord types HSJ, HSJO, HSJOO.
- Twisted Portable Cord type PD.
- All Thermoset Parallel Cords type SP-1, SP-2, SP-3.
- All Elastomer (thermoplastic) Parallel Cord types SPE-1, SPE-2, SPE-3.
- All Plastic Parallel Cord types SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3.
- Range, Dryer Cable types SRD, SRDE, SRDT.
- Vacuum Cleaner Cord types SV, SVE, SVEO, SVT, SVTO, SVTOO, SVO, SVOO.

It is important to note that none of these aforementioned cords or flexible cables were identified as permitted for use in the 1997 edition of NFPA 79 which only identified SO, STO, STOW, SJO, SJOW and SJTO as permissible in section 15.1.2. It was recognized that section 15.1.2 was insufficient and was not inclusive of cord types plausibly suitable for industrial machinery such as types S, SJ, SJOO, SJOOW, SOW, SOO, SOOW, SEOW, SEOOW, SJE, SJEW, SJEO, SJEOW, SJEOOW, SJT, SJTW, SJTOW, SJTOO, SJTOOW, STO, STOW, STOO and STOOW. The inclusion of Table 13.8.2 in the 2002 edition of NFPA 79 remedied the exclusion of these plausibly suitable cord types, but also misleadingly identified a series of cord types not suitable for industrial machinery.

Cord type STW is also plausibly suitable for use on industrial machinery and has been included. (Presently the NEC® does not address STW in what may be characterized as an error of omission.)

The cord types identified as suitable for industrial machinery in this proposal are consistent with the cord types required by UL508A Industrial Control Panels Section 28.5.4

Should, however, any Listed assembly that is inclusive of specific application type cords or flexible cables be integrated into an industrial machinery system then the proposed revision to Section 13.8.1 would allow the use of said Listed assemblies provided the assemblies are suitable for the intended application environment.

Endnote A.13.8.2 is added for expository purposes and to indicate linkage to the table's source data in the NEC®.

This proposal is intended to enhance safety and NFPA 79 user utility of by including only those cords plausibly suitable for direct application on industrial machinery.

Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-116 Log #74 **Final Action: Accept**
(Chapter 14)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Renumber the whole Chapter from 14 to 13.

Chapter ~~14~~ 13 Wiring Practices
~~14.1~~ 13.1 Connections and Routing.
13.1.4* Connection between pick-up and pick-up converter of an inductive power supply system.
The cable between the pick-up and the pick-up converter as specified by the manufacturer of the inductive power supply shall be:
– as short as practicable;
– adequately protected against mechanical damage.
A.13.1.4 The output of the pick-up can be a current source, therefore damage to the cable can result in a high voltage hazard.
~~14.2~~ 13.2 Identification of Conductors.
~~14.2.3~~ 13.2.3 Identification of the Grounded Circuit Conductor.
~~A.14.2.3.1~~ A.13.2.3.1 IEC 60204-1 reserves the use of the color ~~LIGHT~~ BLUE for the neutral conductor and requires its use when identification is by color.
~~14.2.3.2~~ 13.2.3.2 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) AC circuit conductor, which remains energized when the main disconnecting means is in the off position.
(3) Whichever color stripe is selected, that color stripe shall be consistent with the ungrounded conductor of the excepted circuit described in 5.3.5.
Exception No 1: Multiconductor cables shall be permanently reidentified at the time of installation.
Exception No. 2: Where the identification of machine power and control wiring is such that compliance with the mandatory color codes is too restrictive for specific applications, it shall be permitted to use additional identification at selected locations as an alternative. This means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted on the inside of the main electrical control panel enclosure in a visible location.
~~14.3~~ 13.3 Wiring Inside Enclosures.
~~14.3.4~~ 13.3.4 ~~Panel conductors~~ Conductors inside enclosures shall be supported where necessary to keep them in place. Conductors that do not run in ducts shall be supported.
~~14.4.3~~ 13.4.3 Connection to Moving Elements of the Machine.
~~14.4.3.7~~ 13.4.3.7 The straight section between two bends ~~in an S shaped length and a bend into another plane~~ shall be at least 20 times the diameter of the cable.

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

Chapter 14 and Chapter 13 - The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 14 now becomes Chapter 13. The change is maintaining alignment with the new edition of IEC-60204-1.

14.1 and 13.1 This addition incorporates new technology
14.2 and 13.2 Modified to align with IEC 60204
14.2.3.2 and 13.2.3.2 "AC" for item (2) was inadvertently left off when transferring from NFPA 79: 1997 edition. Exceptions reflect alternatives to meeting the intent of the requirements.
14.3 and 13.3 To clarify the requirements and align with IEC 60204.
14.4.3 and 13.4.3 To clarify the requirements and align with IEC 60204.

Committee Meeting Action: Accept
Committee Statement: The committee understands that any section of Chapter 14 not specifically reference in 79-116 (Log #74) is to remain (not be deleted by this action).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-117 Log #88 **Final Action: Accept**
(14.1.2.5)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Add the following paragraph (14.1.2.5) to existing subsection:

14.1.2 Conductor and cable runs

As follows:

14.1.2.5 The equipment grounding (protective) conductor shall be placed close as practicable to the associated live (insulated) conductors in order to decrease the impedance of the loop in the event of a fault.

Substantiation: In conductor and cable runs the distance between the circuit conductors defines a significant part of the circuit impedance. The implicit design requirement for equipment grounding circuits is to have a low impedance path should a fault condition exist. Thus there is the need to locate equipment grounding conductors as close as practicable to the associated live circuit conductors that are in the circuit for which the equipment grounding conductor is intended to provide protection.

Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-118 Log #140 **Final Action: Accept in Principle**
(14.1.2.5 (New))

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Add the following paragraph (14.1.2.5) to existing subsection:

14.1.2 Conductor and cable runs

As follows:

14.1.2.5 The equipment grounding (protective) conductor shall be placed close as practicable to the associated live (insulated) conductors in order to decrease the impedance of the loop in the event of a fault.

Substantiation: In conductor and cable runs the distance between the circuit conductors defines a significant part of the circuit impedance. The implicit design requirement for equipment grounding circuits is to have a low impedance path should a fault condition exist. Thus, there is the need to locate equipment grounding conductors as close as practicable to the associated live circuit conductors that are in the circuit for which the equipment grounding conductor is intended to provide protection.

Committee Meeting Action: Accept in Principle
Committee Statement: See Committee Action on Proposal 79-117 (Log # 88) that meets the intent of the submitter.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-119 Log #10 **Final Action: Reject**
(14.1.4 and 14.1.5)

Submitter: David W. Muska, Eveready Battery Company
Recommendation: Add new text to read:
Cables or Cords
External splices of cables or taping of damaged cables is not permitted.
Substantiation: NEC does not allow taping or splices outside of 1 particular 400.9. Need similar requirements in NFPA 79 for sensors and photoeye applications.
Committee Meeting Action: Reject
Committee Statement: The submitters concerns are already addressed by the requirements in 14.1.2.1.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-120 Log #100 **Final Action: Reject**
(14.1.4.8)

Submitter: Melvin K. Sanders, TECo., Inc.
Recommendation: Revise the present text as follows.
14.1.4.8 * Cables shall be visible for any part of their length where subjected to physical damage and shall be protected as follows:
(1) By alternative routing
(2) With additional guarding or railings
(3) When supported by flooring or decking, with walk over or drive over cable protective devices
(4) By installation in a wire way
(5) By installation in a floor or deck covering trapezoidal walk over raceway specifically designed for cable protection
Add a new part to Annex A as follows.
A.14.1.8. Additional information may be found in IEC 60364-4-41, Ed. 5: "Electrical installations of buildings – Part 4-41: Protection against electrical shock" clause 413.3.4.
Substantiation: The added text is adapted from IEC as a way to mitigate electrical shock possibilities and ties in with the general statements of NFPA 79 Sections 6.1 and 6.2.1. This will also clarify for NFPA 79 users the need to comply with NFPA 79 Section 1.5 and through that to NFPA 70 Section 400.8(2). The Annex text provides the source document so it can be read in its entirety for correctness of interpretation.
Committee Meeting Action: Reject
Committee Statement: This is not practical since the cables could be outside of view but protected by the machine parts.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-121 Log #34 **Final Action: Reject**
(14.2.3)

Submitter: Mike Steele, R.A. Jones
Recommendation: Add exception where multiconductor cable is used and other means of identification is provided.
Substantiation: Cable manufactures typically only offer cable with specific color requirements for a premium cost, if they offer it at all.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-122 Log #18 **Final Action: Accept**
(14.2.3.1)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise text to read:
14.2.3.1* Where an ac circuit includes a grounded conductor, this conductor shall be WHITE, GRAY, or three continuous WHITE stripes on other than GREEN, BLUE, or ORANGE ~~, or YELLOW~~ insulation along its entire length.
Substantiation: NOTE: This proposal is submitted as part 3 of a 5 part series of proposals relating to Sections 14.2.4.1, A.14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
BACKGROUND: During the NFPA 79, 2002 edition revision cycle a Technical Committee (TC) effort to align NFPA 79 with IEC 60204-1 was undertaken. At that time it was determined in TC discussion that a transition from a reserved color yellow to a reserved color orange would be best achieved by allowing both of the colors yellow and orange for a transitional period of one NFPA 79 revision cycle where after only the color orange would remain reserved for the stated purpose. At that time, in synergy with Section 14.2.4.1, the text of Section 14.2.3.1 was written to include the prohibition on the use of the colors orange and yellow.
This proposal in conjunction with other proposals, seeks to follow up on the aforementioned transition plan relative to the alignment of NFPA 79 with IEC 60204-1 whereby only orange remains a reserved color for the identified dedicated purpose in Section 14.2.1. The text proposed for Section 14.2.4.1 in proposal 1 of 5 of this series of proposals would make the prohibition on the use of yellow in Section 14.2.3.1 no longer required.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-123 Log #84 **Final Action: Accept in Part**
(14.2.3.2)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: To clarify the existing requirements revise 14.2.3.2 (2) add the term "ac". To be consistent with the other identification by color requirements and to allow for color identification in complex applications include the requirements in 14.2.4.3 Exception No.4 in 14.2.3.2
(2) WHITE with ORANGE stripe or WHITE with YELLOW stripe for grounded (current-carrying) ac circuit conductor, which remains energized when the main disconnecting means is in the off position.
Exception: Where the identification of machine power and control wiring is such that compliance with the mandatory color codes is too restrictive for specific applications, it shall be permitted to use additional identification at selected locations as an alternative. This means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted on the inside of the main electrical control panel enclosure in a visible location.
Substantiation: Paragraph 14.2.3.2(1) defines the requirement for dc circuits, and then logically 14.2.3.2(2) must be defining the requirements for ac circuits, as had been the requirement in the 1997 edition [16.1.3]. Thus for clarity of the existing logic the term "ac" should be returned to 14.2.3.2(2).
Subsection 14.2.3.2, requirements are difficult to fulfill on machines where complex control systems require additional and consistent color identification methods included in the 14.2.4.3 Exception No.4 language. Applying the language as an exception to 14.2.3.2 would all for the continuation of the safe application of the principles contained in the requirements in 14.2.3.2.
Committee Meeting Action: Accept in Part
Accept only the addition of "ac" in item (2). Do not accept the addition of a new exception.
Committee Statement: Adding the term ac improves the clarity of the requirement. The exception is not accepted because the text relates to machine power and control wiring identification in Section 14.2.3 is only concerned with the identification of the grounded circuit conductor.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-124 Log #19 **Final Action: Accept in Part**
(14.2.3.2(2))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise text to read:
14.2.3.2(2) WHITE with ORANGE stripe ~~or WHITE with YELLOW stripe~~ for grounded (current-carrying) circuit conductor, which remains energized when the main supply circuit disconnecting means is in the off position. This color identification shall be strictly reserved for this application only.
Substantiation: NOTE: This proposal is submitted as part 4 of a 5 part series of proposals relating to Sections 14.2.4.1, A.14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
BACKGROUND: During the NFPA 79, 2002 edition revision cycle a Technical Committee (TC) effort to align NFPA 79 with IEC 60204-1 was undertaken. At that time it was determined in TC discussion that a transition from a reserved color yellow to a reserved color orange in Section 14.2.4.1 would be best achieved by allowing both of the colors yellow and orange for a transitional period of one NFPA 79 revision cycle where after only the color orange would remain reserved for the stated purpose. At that time, in synergy with Section 14.2.4.1, the text of Section 14.2.3.1 was written to include a requirement for the use of conductor strike colors orange or yellow.
This proposal in conjunction with other proposals, seeks to follow up on the aforementioned transition plan relative to the alignment of NFPA 79 with IEC 60204-1 whereby only orange remains a reserved color for the identified dedicated purpose in Section 14.2.4.1. The text proposed for Section 14.2.4.1 in proposal 1 of 5 of this series of proposals would make the requirement option for the use of yellow striped conductors in Section 14.2.3.2(2) no longer appropriate.
The addition of the words " supply circuit " between "main" and "disconnecting means" is editorial and is intended to provide consistent language relative to that used in Section 5.3.5.1 Excepted Circuits of which Section 14.2.3.2(2) is concerned.
As stated in Section 14.2.4.1 the conductor color applied to excepted circuits shall be reserved. Reason would thereby dictate that excepted circuits with a grounded circuit conductor identified by the color combination of white with an orange stripe should have the aforesaid color combination reserved as well.

Committee Meeting Action: Accept in Part
Do not accept the last sentence.
Committee Statement: The last sentence was not accepted since it is overly restrictive. The committee understands that the action on this proposal 79-124 (Log #19) modifies the action taken on proposals 79-123 and 79-116 (Log #84 and Log #74).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-125 Log #3 **Final Action: Reject**
(14.2.4)

Submitter: Michael Browning, Durr Env.
Recommendation: Add text to read as follows:
For line voltage conductors that remain energized when the supply disconnecting means is in the off position, these conductors shall be black with yellow stripe or black with yellow markers.
Yellow conductors shall be limited to control circuits at less than line voltage.
Substantiation: SAE HS-1738 (SAE supplement to NFPA 79) and the old J. I. C. Standards both limited yellow to control circuits. This would be more consistent with the concept that black wires are in line voltage conductors.
Committee Meeting Action: Reject
Committee Statement: The substantiation is outdated. The current requirement in HS 1738 for identification by color for other conductors is now consistent with NFPA 79.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-126 Log #15 **Final Action: Accept**
(14.2.4.1)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise text to read:
14.2.4.1* The color ORANGE shall be used to identify ungrounded conductors that remain energized when the main supply circuit disconnecting means is in the off position. ~~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~~ This color ~~identifications~~ identification shall be strictly reserved for this application only.
Substantiation: NOTE: This proposal is submitted as part 1 of a 5 part series of proposals relating to Sections 14.2.4.1, A.14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
BACKGROUND: During the NFPA 79, 2002 edition revision cycle a Technical Committee (TC) effort to align NFPA 79 with IEC 60204-1 was undertaken. At that time it was determined in TC discussion that a transition from a reserved color yellow to a reserved color orange would be best achieved by allowing both of the colors yellow and orange for a transitional period of one NFPA 79 revision cycle where after only the color orange would remain reserved for the stated purpose.
This proposal seeks, along with others in this series, to follow up on the aforementioned transition plan relative to the alignment of NFPA 79 with IEC 60204-1 by eliminating the use of the yellow conductors to identify excepted circuits.
The melding of the words " main " and " circuit " to "supply" and "disconnecting means" is editorial, and is intended to provide consistent language relative to that used in Section 5.3.5.1 Excepted Circuits of which Section 14.2.4.1 is concerned.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-127 Log #85 **Final Action: Reject**
(14.2.4.3)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Move and revise for clarity the alternate requirements of existing Exception No.4 to the normative text of the existing paragraph 14.2.4.3 and add a note recommending the paractice required by the alternate requirement for the base requrement also.
14.2.4.3 * The use of other colors for the purpose of identification shall be 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
Where the identification of machine power and control wiring is such that compliance with these mandatory colors for the purpose of identification is too restrictive, it shall be permitted to use other colors, provided the chosen method is consistent for the users site, and the method of the circuit identification is described and that description is permanently posted on the inside in a visible location of the main electrical control panel enclosure.
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.
Exception No. 4: Where the identification of machine power and control wiring is such that compliance with the mandatory color codes is too restrictive for specific applications, it shall be permitted to use additional identification at selected locations as an alternative. This means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted on the inside of the main electrical control panel enclosure in a visible location.
A.14.2.4.3 When the color is used for the identification of any conductor it is recommended that a minimum explanatory information, showing the relationship between the conductor's color and circuit type, be permanently posted on the inside the main electrical control panel enclosure in a visible location.
Substantiation: The alternative requirements in Exception No. 4 belong in the normative text in keeping with the MOS 2003.
Committee Meeting Action: Reject
Committee Statement: The submitter has not provided any substantiation to warrant moving the exception into the general rule. The recommendation of a note contains a requirement that is not permitted according to the NFPA Style Manual.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-128 Log #47 **Final Action: Accept in Principle**
(14.2.4.3(1) and (2))

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Revise as follows:
14.2.4.3
(1) BLACK for ungrounded ~~line, load, and control~~ conductors ~~at line~~ above control voltage.
(2) RED for ungrounded ac control conductors ~~at less than line voltage~~ .
Substantiation: Problem: A problem arises from lack of definition of "line voltage" used in both item 9.1.2.1 and item 14.2.4.3. If a machine is supplied by 120 vac and also controlled by 120 vac, is this supplied 120 vac to be considered "line voltage?"
- Per existing 14.2.4.3 some would then say the machine's control circuits need to be wired in black wire. This would cause significant concern amongst our electricians if some machines have red 120 vac control wiring and others have black.
- Historically our industry has had to clarify/amend NFPA 79 on this topic.
- Our electricians expect wire color to be an indicator of voltage level.
Secondly, 9.1.2.1 establishes the maximum ac control voltage as 120v, but grants an exception (for higher voltages?). Does this mean that anything higher than 120 vac is considered line voltage?
Third, since 9.1.2.2 establishes DC control voltage as a maximum 250v, are any DC voltages above 250v (drive outputs, etc.?) considered line voltage?
Fourth, IEC 60204 uses the term "power" instead of line voltage.
First proposed solution: eliminate the use of the term line voltage; using just the term control voltage. (e.g., above control voltage, or below control voltage, etc.) This clarifies that wire color is more a voltage issue than an application issue.
A second solution to this issue would be to add a definition:
- Line Voltage. Any voltage greater than 120 vac, or 250 vdc.
Committee Meeting Action: Accept in Principle
Revise the recommendation to read as follows:
14.2.4.3
(1) BLACK for ungrounded ac and dc power conductors
(2) RED for ungrounded ac control conductors
Committee Statement: The recommendation was revised to align with IEC 60204-1.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
SAUNDERS: The panel Action should be Reject.
I do not agree that the proposed change would correct the situations and misunderstandings as described in the substantiation. Without an example or specific directions for the system with a power feed at 120 volts and control circuits at 120 volts, the revised requirement for Black for ac and "power" conductors could be interpreted the same, i.e. - all black, all red - or a combination, where someone defines what is the "circuit supplying power from the supply network-" and what "carries electric signals directing the performance of the controller-".

79-129 Log #48 **Final Action: Accept**
(14.4.5.1)

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Revise as follows:
14.4.5.1 Where equipment...shall be permitted. ~~The male plug shall be connected to the load circuit.~~ With power on the system, there shall be no voltage present on the exposed male pins of any connector.
Substantiation: Problem & Substantiation: The current wording presumes attachment plug and receptacles are always used between a supply and a load.

They are also used for interconnections between multiple "supplies" and "loads", sometimes on equipment with multiple sources of supply power, but not always on applications where one "side" of the plug/socket combination can be considered the load circuit. Is the current wording intended to require a mixture of male and female pins on any one side of the plug/socket combination? The issue should be that we do not want voltage on the exposed male pins of any unplugged connector. This may require that some plug/socket combinations mix both female and male pins on the same connector. This proposal should clarify the issue. It covers 14.4.5.1 as it applies to equipment which is removable. Refer to a similar proposal on item 14.4.6 for plug/sockets provided on non-removeable equipment.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
SAUNDERS: The Action should be Accept in Principle and should be modified to read:
"With power on the system, no shock hazard shall exist from the exposed male pins of any connector."
Substantiation: This text would allow the use of exposed male pins in machines that prevent a shock hazard by using PELV.
A "Comment" will be submitted to ensure the review of this action at the ROC meeting.

79-130 Log #49 **Final Action: Accept**
(14.4.6)

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Add a new sentence to 14.4.6 as follows:
With power on the system, there shall be no voltage present on the exposed male pins of any unplugged connector .

Substantiation: Problem & Substantiation: The current wording presumes attachment plug and receptacles are always used between a supply and a load. They are also used for interconnections between multiple "supplies" and "loads", sometimes on equipment with multiple sources of supply power, but not always on applications where one "side" of the plug/socket combination can be considered the load circuit. The issue should be that we do not want voltage on the exposed male pins of any unplugged connector. This may require that some plug/socket combinations mix both female and male pins on the same connector. This proposal covers 14.4.6 as it covers plug/socket combinations used for dismantling equipment, use of these connectors is not limited to dismantling for shipment and, therefore, we need wording to protect service electricians. The Technical Correlating Committee may believe that a similar proposal on item 14.4.5.1 has already addressed the issue, although 14.4.5.1 only covers plugs and sockets "where equipment is removable".
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative
SAUNDERS: The action should be Accept in Principle and should be modified to read:
"With power on the system, no shock hazard shall exist from the exposed male pins of any connector."
Substantiation: This test would allow the use of exposed male pins in machines that prevent a shock hazard by using PELV.
A "Comment" will be submitted to ensure the review of this action at the ROC meeting.

79-131 Log #50 **Final Action: Accept**
(14.5.5.4)

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Revise as follows:
14.5.5.4 Liquidtight flexible nonmetallic conduit minimum electrical trade size shall be metric designator 12 (t rade size 3/8) .
Substantiation: Current item does not follow the same metric (English) format as the remainder of the document. Refer to item 14.5.3.1.1, etc.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-132 Log #51 **Final Action: Accept**
(14.5.5.5)

Submitter: Michael H. Appold, Delphi Corporation
Recommendation: Revise as follows:
14.5.5.5 The maximum electrical trade size of liquidtight flexible nonmetallic conduit shall be metric designator 103 (trade size 4) . ~~4 in trade size.~~
Substantiation: Current item does not follow the same metric (English) format as the remainder of the document. Refer to item 14.5.3.1.1, etc.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-133 Log #75 **Final Action: Accept**
(Chapter 15)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Renumber the whole Chapter from 15 to 14.
Chapter ~~15~~ 14 Electric Motors and Associated Equipment
Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.
The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 15 now becomes Chapter 14. The change is maintaining alignment with the new edition of IEC-60204-1.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-134 Log #76 **Final Action: Accept**
(Chapter 16)

Submitter: Lori Tennant, Schneider Electric North America/Square D company
Recommendation: Renumber the whole Chapter from 16 to 15.
Chapter ~~16~~ 15 Acccessories and Lighting
Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.
The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 16 now becomes Chapter 15. The change is maintaining alignment with the new edition of IEC-60204-1.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-135 Log #32 **Final Action: Accept**
(16.1.1)

Submitter: Drake A. Drobnick, Visteon Corp
Recommendation: Revise text to read:
16.1 Accessories.
16.1.1 Receptacles for Accessory Equipment.
Proposed language
Add two new bullet items and increment the existing six bullets:
(1) Receptacles mounted external to the enclosure shall be Ground-fault Circuit Interrupter protected
(2) Receptacles shall be supplied from a grounded 120 volt a.c. source
Add the word parallel in the existing bullet (1)
(1) Receptacles shall be of the parallel blade grounding type.
Substantiation: The added language aligns the NFPA 79 document with the SAE HS-1738, 2002 edition, enhances employee safety, and specifies installation requirements.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
KIIHR: A further look at this proposal shows that for safety of maintenance personnel, GFCI is already covered by 16.1.2. Other receptacles are for accessory equipment, and when mounted external to the enclosure are subject to the same environment and use as receptacles provided as part of the facilities. The NEC does not require receptacles provided as part of the facilities to be GFCI, so neither should NFPA 79. The proposed second bullet requires grounding, which is already covered by the existing 16.1.1 bullets 2) and 3). The proposed second bullet also details a 120vac source, which might be implied by existing bullet 1) but should be cleaned-up during the comment phase.

79-136 Log #86 **Final Action: Reject**
(16.2.2.1 and 16.2.2.2)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Add provisions to allow higher voltages for lightining in control endlosures; revise 16.2.2.1 and 16.2.2.2:
16.2.2.1 The lighting circuit voltage shall not exceed ~~150~~ 250 volts between conductors.
16.2.2.2 Lighting circuits shall have overcurrent protection in accordance with 7.2.6 and shall be supplied from one of the following sources:

(1) A separate isolating transformer connected to the load side of the supply disconnecting means. Overcurrent protection shall be provided in the secondary circuit.

(2) A separate isolating transformer connected to the line side of the supply disconnecting means shall be permitted for the supply of a maintenance lighting circuit in control enclosures only. Overcurrent protection shall be provided in the secondary circuit.

(3) A grounded machine circuit that has separate overcurrent protection and does not exceed 150 volts to ground or 250 volts to ground in control enclosures shall be permitted.

(4) An isolating transformer connected to the line side of the supply disconnecting device when a separate primary disconnecting means and secondary overcurrent protection are provided and mounted within the control enclosure adjacent to the supply disconnecting device.

(5) An externally supplied lighting circuit (e.g., factory lighting supply). This shall be permitted in control enclosures and for the machine work light(s) where the total power rating does not exceed 3 kW.

Substantiation: Higher voltage lighting is availabe that is intended for use in industrial areas, but prohibited in indutrial machines by the present standard. Access to enclosures is limited to qualified persons per requirements in 6.2.3 "Enclosure Interlocking". The requriement to provide the safe use of the higher voltage for lighting is contained within this standard.

Committee Meeting Action: Reject

Committee Statement: The submitter has failed to provide any technical substantiation to warrant the increase from 150 volts to 250 volts for the lighting circuit voltage.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-137 Log #5 **Final Action: Reject**
(Chapter 17)

Submitter: David W. Muska, Eveready Battery Company

Recommendation: The "Arc-flash Hazard" warning sticker must be installed on the electrical equipment.

Substantiation: Consistency with NEC Article 110.16.

Committee Meeting Action: Reject

Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-138 Log #77 **Final Action: Accept**
(Chapter 17)

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Renumber the whole Chapter from 17 to 16.

Chapter ~~17~~ 16 Marking and Safety Signs

~~17.4~~ 16.4 Machine Nameplate Data.

~~17.4.1~~ 16.4.1 Control equipment shall be legibly and durably marked in a way that it is plainly visible after the equipment is installed. A nameplate giving the following information shall be attached to the enclosure:

(1) Name or trademark of supplier

(2) Serial number, where applicable

(3) Rated voltage, number of phases and frequency (if ac), and full-load current for each supply

(4) Ampere rating of the largest motor or load

(5) Maximum ampere rating of the short-circuit and ground fault protective device, where provided

(6) Short-circuit ~~interrupting~~ current rating of ~~the machine overcurrent protective device, where furnished as part of~~ the ~~equipment~~ control panel .

(7) Electrical diagram number(s) or the number of the index to the electrical drawings

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 17 now becomes Chapter 16. The change is maintaining alignment with the new edition of IEC-60204-1.

17.4 To align with the NEC, UL 508A and IEC 60204.

Committee Meeting Action: Accept

Committee Statement: The committee understands that any section in Chapter 17 not specifically reference in 79-138 (Log #77) is to remain (not be deleted by this action).

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-139 Log #27 **Final Action: Reject**
(17.2.7 (New))

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.

Recommendation: Add a new 17.2.7 as follows:

Control panels and electrical enclosures shall be field marked with a label to convey the dangers from Arc-Flash and Arc-Blast Hazards, and the level of PPE required to protect workers against these hazards.

FPN: See NFPA 70E for specific requirements on Arc-Flash and Arc-Blast Hazards.

Substantiation: Justification: This marking will convey information regarding the dangers from Arc-Flash and Arc-Blast hazards to electricians and other maintenance workers.

(Note: It may be preferable to insert this into Chapter 6).

Committee Meeting Action: Reject

Committee Statement: This requirement is outside the scope of the standard. The requirement to place calculated or lookup table values on the sign is not required by NFPA 70.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 19 Negative: 1

Explanation of Negative:

DEFELICE: We agree that the level of PPE required cannot be readily ascertained by the machine manufacturer; as it would require information which may not be available to them (such as the amount of available short-circuit current). We do not feel that this should have been an "Accept-in-Principle", as the first part of the statement, which would require simple labeling (without the energy calculations) would have reminded maintenance personnel of the need for proper PPE.

Comment on Affirmative

HILBERT: I agree with the committee that adding a requirement for the calculated values is beyond the scope of this document. However, the submitter's proposal has merit with regards to a warning label. Perhaps language requiring a warning label that simply identifies the arc flash hazard would be acceptable. This requirement would also be in line with the current language in NFPA 70.

79-140 Log #138 **Final Action: Accept in Part**
(17.2.7 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Add new 17.2.7 as follows:

17.2.7 A safety sign shall be provided adjacent to the main supply circuit disconnect operating handle to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing or maintenance of the equipment. The marking shall include "DANGER - RISK OF ARC FLASH HAZARD - APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING REQUIRED WHEN OPERATING DISCONNECTING MEANS OR SERVICING ELECTRICAL EQUIPMENT" or equivalent text.

Substantiation: During the revision cycle for the 2002 edition of NFPA 79, concerns were raised over inclusion of requirements that referenced the ability to operate the supply circuit disconnecting means when the control equipment door is open. Several comments on the proposals noted that the supply circuit disconnecting means themselves could pose an electric burn hazard when operated to the on position with the door open or due to a fault that may initiate an automatic interruption of power at the disconnecting means.

For the 2005 NFPA 79 cycle, a task group was formed to consider the questions and to make recommendations to the NFPA 79 committee for any necessary changes to add, amend or clarify the position of NFPA 79 on this topic.

It is recognized that hazards to personnel resulting from such operations of the disconnecting means with the door open may not be completely eliminated by the machine design alone. The features (which permit a door interlocking means to be defeated and allow operation of the disconnecting means with the door open) of the equipment currently required by NFPA 79 are intended to facilitate and improve the safety of service operations that are beyond the scope of this standard.

A review of recent OSHA incident investigation summaries (1997 and earlier) related to a variety of industrial equipment (as a result of keyword search for "electrical cabinet", "disconnecting means", and "electrical switch") reveals a variety of electric burn incidents due to faults in energized parts with an enclosure door open, and operation of a disconnect with the door open and also with the door in the closed position. It is significant to note that many of the injuries involved non-qualified persons performing a non electrical or electrical service operation either by themselves, or while assisting and taking direction from qualified persons. Some of the incidents noted that the persons involved in accidents were recently trained in and/or aware of appropriate work practices but either ignored or forgot to employ them. It is recognized that not all such incidences are recorded as OSHA incidents due to the severity of the resulting injuries is it likely that additional unrecorded incidents of the types noted above also occur.

The current Section 110.16 of the NEC requires an arch flash warning marking to be placed on equipment where the possibility of arch flash is likely to occur and specifically mentions industrial control panels.

The proposed addition to NFPA 79 provides for a physical marking to serve to warn both qualified and nonqualified persons due to arc flash hazards. (A companion proposal includes similar references in maintenance manuals). The proposed marking is not intended to preclude the need for additional information detailing incident energy and appropriate PPE or service procedures necessary to perform service when installed in the field.

A companion proposal has been submitted to add a requirement addressing this issue within maintenance manuals, currently Chapter 18.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept in Part

17.2.7 A safety sign shall be provided adjacent to the main supply circuit disconnect operating handle to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing or maintenance of the equipment.

Committee Statement: The text of the safety sign was not accepted because it was too restrictive.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-141 Log #107 **Final Action: Reject**
(17.4.1)

Submitter: Todd F. Lottmann, Cooper Bussmann

Recommendation: Revise as follows:

17.4.1 ~~Control equipment shall be legibly and durably marked in a way that is plainly visible after the equipment is installed. A nameplate giving the following information shall b e attached to the enclosure:~~ A permanent nameplate shall be attached to the control equipment enclosure or machine and shall be plainly visible after installation. The nameplate shall include the following information:

(1) ~~Name or trademark of supplies~~ Supply voltage, phase, frequency, and full-load currents.

(2) ~~Serial number, where applicable~~ Maximum ampere rating of the short-circuit and ground-fault protective device

(3) ~~Rated voltage, number of phases and frequency (if ac) and full load current for each supply~~ Ampere rating of largest motor or load

(4) ~~Ampere rating of the largest motor or load~~ Short Circuit Current Rating of the machine industrial control panel based on one of the following:

(a) Short Circuit Current Rating of a listed and labeled machine control enclosure or assembly

(b) Short Circuit Current Rating established using an approved method (UL 508A-2001 Supplement SB is an example of an approved method)

(5) ~~Maximum ampere rating of the short circuit and groundfault protective device, where provided~~ Electrical diagram number(s) or the number of the index to the electrical drawings

~~(6) short circuit-interrupting rating of the machine overcurrent protective device, where furnished as art of the equipment~~

~~(7) Electrical diagram number(s) or the number of the index to the electrical drawings~~

Substantiation: This will correlate with the changes to the 2005 NEC in Section 670.3 for nameplate markings and was a result of the NEC/NFPA 79 task group work. This change will make the requirements in NFPA 79 and Article 670 the same.

Committee Meeting Action: Reject

Committee Statement: The Committee believes that the nameplate is missing many items such as serial number and manufacturers name as well as other information.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-142 Log #78 **Final Action: Accept**
(Chapter 18)

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Renumber the whole Chapter from 18 to 17.

Chapter ~~18~~ 17 Technical Documentation

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 18 now becomes Chapter 17. The change is maintaining alignment with the new edition of IEC-60204-1.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-143 Log #139 **Final Action: Accept**
(18.9.3 (New))

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Add a new 18.9.3 as follows:

18.9.3 Where service procedures requiring electrical work while equipment is energized, the technical documentation shall make reference to appropriate safe work practices, such as the requirements of NFPA 70E or OSHA 29 CFR Part 1910.331-335.

Substantiation: During the revision cycle for the 2002 edition of NFPA 79, concerns were raised over inclusion of requirements that referenced the ability to operate the supply circuit disconnecting means when the control equipment door is open. Several comments on the proposals noted that the supply circuit disconnecting means themselves could pose an electric burn hazard when operated to the on position with the door open or due to a fault that may initiate an automatic interruption of power at the disconnecting means.

For the 2005 NFPA 79 cycle, a task group was formed to consider the questions and to make recommendations to the NFPA 79 committee for any necessary changes to add, amend or clarify the position of NFPA 79 on this topic.

It is recognized that hazards to personnel resulting from such operations of the disconnecting means with the door open may not be completely eliminated by the machine design alone. The features (which permit a door interlocking means to be defeated and allow operation of the disconnecting means with the door open) of the equipment currently required by NFPA 9 are intended to facilitate and improve the safety of service operations that are beyond the scope of this standard.

A review of recent OSHA incident investigation summaries (1997 and earlier) related to a variety of industrial equipment (as a result of keyword search for “electrical cabinet”, “disconnecting means”, and “electrical switch”) reveals a variety of electric burn incidents due to faults in energized parts with an enclosure door open, and operation of a disconnect with the door open and also with the door in the closed position. It is significant to note that many of the injuries involved non-qualified persons performing a non electrical or electrical service operation either by themselves, or while assisting and taking direction from qualified persons. Some of the incidents noted that the persons involved in accidents were recently trained in and/or aware of appropriate work practices but either ignored or forgot to employ them. It is recognized that not all such incidences are recorded as OSHA incidents due to the severity of the resulting injuries is it likely that additional unrecorded incidents of the types noted above also occur.

The current Section 110.16 of the NEC requires an arch flash warning marking to be placed on equipment where the possibility of arch flash is likely to occur and specifically mentions industrial control panels.

The proposed addition to NFPA 79 provides for an additional requirement to include references to safe work practices in maintenance manuals where service procedures require the equipment to be energized. (A companion proposal includes a physical marking to serve to warn both qualified and nonqualified persons due to arc flash hazards). The proposed instructions are not intended to preclude the need for additional information detailing incident energy and appropriate PPE or service procedures necessary to perform service when installed in the field.

A companion proposal has been submitted to add a requirement, currently Chapter 17, for a safety sign to be provided on the equipment.

This proposal is submitted on behalf of Task Group No. 2 consisting of the following participants, Michael Appold, Daren Bateman, David Fisher, Charles Goetz, Mark Hilbert, Glen Kama, Gary Locke, and Martyn Robinson.

Committee Meeting Action: Accept

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-144 Log #79 **Final Action: Accept in Principle**
(Chapter 19)

Submitter: Lori Tennant, Schneider Electric North America/Square D company

Recommendation: Renumber the whole Chapter from 19 to 18.

Chapter ~~19~~ 18 Technical Documentationb

Substantiation: I am submitting this proposal as Chair of NFPA 79, Task Group 1, responsible for maintaining alignment with the proposed new edition of IEC 60204-1.

The existing Chapter 11 requirements were incorporated in other chapters and all chapters after the old Chapter 11 decrement chapter numbers by one number; therefore Chapter 19 now becomes Chapter 18. The change is maintaining alignment with the new edition of IEC-60204-1.

Committee Meeting Action: Accept in Principle

Committee Statement: Editorially correct title in the recommendation to “Testing and Verification”.

Number Eligible to Vote: 20

Ballot Results: Affirmative: 20

79-145 Log #25 **Final Action: Accept**
(Table 19.2)

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.
Recommendation: Revise Table 19.2 as follows:

Minimum Equipment Grounding (Protective Bonding) Conductor Cross-Sectional Area of the Branch Under Test (AWG)	Minimum Measured Voltage Drop* (V)
12	1.7

Substantiation: Justification: Values for 12 AWG wire are missing from the table.
Committee Meeting Action: Accept
Committee Statement: The committee understands that the table headings and column heading remain unchanged. Only 12 AWG and the 1.7 volts are to added to the existing table.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-146 Log #CP8 **Final Action: Accept**
(Annex A)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery
Recommendation: Add a new paragraph to the existing note in Annex A, A.9.4.3 to read as follows:
A.9.4.3 SEMI S2 permits software and firmware based controllers performing safety-related functions and SEMI S2 Related Information #14 provides additional information on how to design and implement functional safety for use in semiconductor manufacturing equipment.
Substantiation: Software and firmware based controllers may in some cases be safer than traditional electro-mechanical interlocks and it was necessary to publish information and provide training on how to design and use functional safety.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-147 Log #148 **Final Action: Accept**
(A..4.1)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise A.4.1 as follows:
A.4.1 A sample inquiry form is provided in Annex B for use in facilitating an agreement between the supplier and the user.
Hazards can include, but are not limited to, the following:
(1) Failures or faults in the electrical equipment resulting in the possibility of electrical shock or electrical fire.
(2) Failures or faults in control circuits (or components and devices associated with these circuits) resulting in malfunctioning of the machine.
(3) Disturbances or disruptions in power sources as well as failures or faults in the power circuits resulting in the malfunctioning of the machine.
(4) Loss of continuity of circuits that depend upon sliding or rolling contacts resulting in a failure of a safety function.
(5) Electrical disturbances (e.g., electromagnetic, electrostatic, or radio interference) either from outside the electrical equipment or internally generated
(6) Stored energy (either electrical or mechanical)
(7) Audible noise at levels that cause health problems to persons
Safety measures are a combination of the measures incorporated at the design stage and those measures required to be implemented by the user.
Design and development should be the first consideration in the reduction of risks. Where this is not possible, safeguarding should be considered. Safeguarding includes the use of safeguards, awareness means, and safe working procedures.
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.
Substantiation: A reference to ANSI B11.TR3 is currently made in A.3.3.84, as an Annex A note to the definition of Risk. A note on a document related to risk assessment would more appropriately be tied to Section 4.1 as this is where the requirement for performing a risk assessment exists.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Committee Statement: The Committee understands that the action on this proposal modifies the action on 79-19 (Log #65) by adding only a new last sentence to read as follows: 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. See Committee Action and Statement on Proposal 79-19 (Log #65).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-148 Log #87 **Final Action: Accept in Principle**
(A.4.1)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Add additional and clarifying data to note:
A.4.1 A sample inquiry form is provided in Annex B for use in facilitating an agreement between the supplier and the user.
Hazards can include, but are not limited to, the following:
(1) Failures or faults in the electrical equipment resulting in the possibility of electrical shock or electrical fire
(2) Failures or faults in control circuits (or components and devices associated with these circuits) resulting in malfunctioning of the machine
(3) Disturbances or disruptions in power sources as well as failures or faults in the power circuits resulting in the malfunctioning of the machine
(4) Loss of continuity of circuits that depend upon sliding or rolling contacts resulting in a failure of a safety function
(5) Electrical disturbances (e.g., electromagnetic, electrostatic, or radio interference) either from outside the electrical equipment or internally generated , resulting in the malfunction of the machine
(6) ~~Stored energy (either electrical or mechanical)~~ Release of electrical of mechanical stored energy of unexpected movement that can cause injury.
(7) Audible noise at levels that cause health problems to persons
(8) Surface temperatures that can cause injury
Safety measures are a combination of the measures incorporated at the design stage and those measures required to be implemented by the user.
Design and development should be the first consideration in the reduction of risks. Where this is not possible, safeguarding should be considered. Safeguarding includes the use of safeguards, awareness means, and safe working procedures.
Additional information on the risk assessment process can be found in ANSI B11.TR3, *Risk Assessment and Risk Reduction—A Guide to Estimate, Evaluate and Reduce Risks Associated with Machine Tools* , 2000.
Substantiation: Update note to include additional information to understand hazard identification and risk analysis associate with this standards requirements.
Committee Meeting Action: Accept in Principle
Committee Statement: See Committee Action and Statement on Proposal 79-19 (Log # 65) that meets the intent of the submitter.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-149 Log #141 **Final Action: Reject**
(A.4.1)

Submitter: William Anderson, The Procter & Gamble Company
Recommendation: Add to the existing note A.4.1:
Flash hazard analysis, calculation methods and ways to mitigate the hazard, are found in NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces. Flashhazard quantification includes factors relating to the amount of power available and the time interval to remove the power to the arc fault location.
To limit the flash hazard in an industrial machine there are some basic choices, one choice is to use a fault protection device, such as a circuit breaker or fuse to open during the arc fault quickly enough to limit the total power available to the arc (flash); and to do that, the one must have some assurance there is a level of fault current available to open the protective device quickly enough to limit the total power to the potential arc fault location.
The alternative choice would be to use a suitable sized isolation transformer to limit the available power to the industrial machine and subsequently to the potential arc fault location.
Regardless of the method to control the hazard, the flash hazard is one of the factors of the general operating condition that is required to be understood and controlled in order to remove or limit the risk to a tolerable level.
Substantiation: Flash hazard is a recognized hazard [NFPA 70E and NFPA 70: 2005 edition] that needs to be at least mentioned in this electrical standard for industrial machines.
Committee Meeting Action: Reject
Committee Statement: The requirements for flash hazards analysis and applicable calculations methods are contained in NFPA 70E. The proposed note offers only limited discussions of NFPA 70E requirements and is incomplete.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 18 Negative: 2
Explanation of Negative:
ANDERSON: The committee mistakenly rejected this proposal. It is agreed that the requirements for a flash hazard analysis and application calculation methods are contained in NFPA 70E.
However, the implementation of electrical equipment of industrial machinery design to address the hazard as identified by those calculations is within the scope of this standard [NFPA 79: 2002, 1.2 Purpose. This standard shall provide detailed information for the application of electrical/electronic equipment, apparatus, or systems supplied as part of industrial machines that will promote safety to life and property.]
NFPA 70E addresses electrical safety-related work practices for the electrical hazards. As an example NFPA 70E deals with work practices to avoid electrical

shock, while mitigating that hazard in equipment design requirements is well covered in NFPA 79.
The quantification of the magnitude of potential of a flash hazard is covered in NFPA 70E and possible ways the worker can increase his or her protection from that potential harm. Providing equipment that reduces that potential hazard is certainly a new area where NFPA 79 needs to develop requirements for equipment design. This proposed note is a first step to alert designers of the need for and offers possible methodologies that might be taken to accomplish the reduction of potential flash hazards. The intent of the note is to encourage the development of standardized solutions for the electrical equipment for industrial machinery which will reduce the potential for flash hazards.
I believe it is important that this note be included in the next edition of NFPA 79.
KIIHR: The discussion of flash hazard analysis is appropriate as a note to Section 4.1 addresses the risks associated with the hazards relevant to the electrical equipment of the machine. Flash Hazard is one of these relevant hazards. The note appropriately points the user to NFPA 70E for additional information.

79-150 Log #CP7 **Final Action: Accept**
(A.4.2)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery
Recommendation: Add a note to A.4.2 to read as follows:
A.4.2 Semiconductor Manufacturing Equipment for use in semiconductor fabrication facilities may be accepted by one of the following judged under the requirements of a testing laboratory"per 1.3.2 to an international (e.g. IEC60204 or IEC61010-1), regional (e.g. EN60204 or EN61010-1), national (e.g. UL508, UL508A, UL61010-1, NFPA79), or industry standard (e.g. SEMI S2 or SEMI S22) electrical standard(s) deemed appropriate by the testing laboratory, or field evaluation to NFPA 79, or another approach, such as "acceptable to the local authority having jurisdiction."
Substantiation: The note is intended to reduce confusion about the existing role of NFPA 79 and other standards significant to the semiconductor industry.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-151 Log #149 **Final Action: Accept**
(A.9.2 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new A.9.2 to read as follows:
A.9.2 Information on the safety-related aspects of control functions is under consideration within IEC 62061 and ISO 13849-1 (revision).
Substantiation: This informative note is being added to give the user guidance as to the relevant standards in this area. The addition of this note will aid in the usability of the document.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-152 Log #155 **Final Action: Accept in Principle**
(A.9.4.1 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new informative note A.9.4.1 to Annex A:
A.9.4.1 IEC 62061 and ISO 13849-1 and -2, give guidance on design according to the determined risk reduction in the risk assessment.
Substantiation: This informative note is being added to give the user guidance as to the relevant standards in this area. IEC 60204-1 requires the application of these standards where control functions are relevant to reduce risk.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept in Principle
Revise the recommendation to read as follows:
A.9.4.1 IEC 62061, ISO 13849-1 and -2, and B11.TR4 give guidance on design according to the determined risk reduction in the risk assessment.
Committee Statement: ANSI B11.TR4 was added to include an ANSI document.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
BLOODGOOD: It is not clear as to what version of 13849 is to be considered. The current version is severely flawed. The new version which is at least 2 years away is extremely convoluted.

79-153 Log #156 **Final Action: Accept**
(A.9.4.1.1 (New))

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Add new informative note A.9.4.1.1 to Annex A:
A.9.4.1.1 More information on these risk reduction techniques can be found in Annex I.
In general, only single failures need 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.
Where memory retention is achieved for example, by the use of battery power, measures should be taken to prevent hazardous situations arising from failure or removal of the battery.
Means should be provided to prevent unauthorized or inadvertent memory alteration by for example a key, access code or tool.
Substantiation: This text has been added to the Annex A note to aid in the usability of the document by the reader. Some of the content was already present in Annex I of the current NFPA 79, and was simply moved to Annex A to make it more accessible to the reader. The final two sentences were brought from IEC 60204-1 as examples of good design practices. They were also brought over to further harmonize the two documents.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-154 Log #157 **Final Action: Accept**
(A.9.4.3)

Submitter: Thomas J. Kiihr, Jr., Delphi Corporation
Recommendation: Revise Annex A note A.9.4.3.2 (formerly A.9.4.3):
A.9.4.3.2 IEC 62061 and ISO 13849-1, and -2, provide requirements for the design of control systems incorporating the use of software and firmware based controllers to performing safety-related functions.
IEC 61508 provides requirements for the design of software and firmware based safety controllers.
IEC 61800-5-2 (under preparation) and IEC 61508 give guidance to the drive manufacturer on the design of drives intended to provide safety functions.
Substantiation: This informative note is being revised to give the user guidance as to the relevant standards in this area. It has been updated to reflect changes in the relevant standards, and to list new standards that were not in existence during the last cycle. The reference to IEC 62061 and ISO 13849 concerns the design of the system i.e. sensors, logic solver and actuators together. In addition to this system view the reference to IEC 61508 specifically concerns the software based controller which is only a part of the system.
This proposal was prepared by the members of the NFPA 79, Task Group 4.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
PADGETT: To be consistent with the use of terms in the Annex, change the word "requirements" in A.9.4.3.2 to "guidance" in both the first and second sentence.
Substantiation: This change is also consistent with the proposal substantiation and brings consistency to the document.

79-155 Log #17 **Final Action: Accept**
(A.14.2.4.1)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise text to read:
A.14.2.4.1 ~~IEC 60204-1 recommends the use of the color ORANGE for this purpose where identification is by color.~~ The 2002 edition of this standard permitted the consistent applied use of either the color orange or the color yellow in fulfillment of this requirement. For further information on excepted circuits, see 5.3.5.
Substantiation: NOTE: This proposal is submitted as part 2 of a 5 part series of proposals relating to Sections 14.2.4.1, A.14.2.4.1, 14.2.3.1, 14.2.3.2(2), and Chapter 3 respectively, and the reserved use of the colors orange and yellow.
BACKGROUND: During the NFPA 79, 2002 edition revision cycle a Technical Committee (TC) effort to align NFPA 79 with IEC 60204-1 was undertaken. At that time it was determined in TC discussion that a transition from a reserved color yellow to a reserved color orange would be best achieved by allowing both of the colors yellow and orange for a transitional period of one NFPA 79 revision cycle where after only the color orange would remain reserved for the stated purpose.
This proposal, combined with the others in this series, seeks to follow up on the aforementioned transition plan relative to the alignment of NFPA 79 with IEC 60204-1 by revising the Addendum note to Section 14.2.4.1 to reflect pertinent data as it relates to the elimination for the use of yellow conductors to identify excepted circuits.

The text proposed for Section 14.2.4.1 in proposal 1 of 5 of this series of proposals would make the first sentence in A.14.2.4.1 unnecessary and a candidate for deletion.

The inclusion of a new first sentence in A.14.2.4.1 would facilitate safety by alerting a user of this standard that electrical equipment of industrial machinery designed and manufactured to the 2002 edition may find yellow colored conductors applied to excepted circuits.

Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
PADGETT: Agree with the Committee Action, but there needs to be additional explanation added to the note as follows:
" The use of either Yellow or Orange, however, was only to be permitted until the publishing of this addition of the standard. This was to allow equipment suppliers time to convert to using only Orange. It is recommended, when possible, to review this requirement with purchasers (see Annex B)."
Substantiation: Reflects the intent of using both Yellow and Orange and the future use of Orange only.

79-156 Log #94 **Final Action: Accept in Part**
(A.18.7.5)

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise text to read as follows:

A.18.7.5 The class designation letters/device function designations identified in IEEE 315 are not intended for use on industrial control and industrial equipment as device and component designations. See Annex E for examples of device and component designations.
(See Figure on following page.)

Substantiation: 1) Although NFPA 79 does not call for the use of the class designation letters/device function designations identified in IEEE 315, and

2) Although IEEE 315 Section 22 informs a user that class designation letters/device function designations identified in IEEE 315 Section 22 are not applied to industrial control and industrial equipment, and

3) Although IEEE 315 directs a user to Joint Industrial Council (JIC) Electrical Standard for Mass Production Equipment EMP-1-1967 and General Propose Machine Tools EGP-1-1967, and

4) Although NFPA 79 indicates that the aforesaid JIC standards have been incorporated into NFPA 79:

The identification of the applicable elements of IEEE 315 is not clear to all users, and as a result the class designation letters/device function designations of IEEE 315 are misapplied to electrical equipment of industrial machinery creating an unsafe situation whereby inappropriate and misleading designations relative to the common practice are used (see Figure 1 for a NFPA 79 - IEEE 315 relationship flow chart.) NFPA 79 requires that component and device designations be consistently applied, and one may argue, therefore, the class designation letters/device function designations of IEEE 315 might be applied if applied consistently. IEEE 315, however, indicates (plausibly to the contrary) that designation letters/device function designations for industrial control and industrial equipment are not covered by the IEEE 315, and that a user needs to reference JIC EMP-1-1967 and EGP-1-1967 (i.e.; now NFPA 79.) It is thereby reasonable to conclude that the use of IEEE 315 designation letters/device function designations for industrial control and industrial equipment is inappropriate, but that this information is not readily accessible or evident to all users. This conclusion is borne out by experience.

The purpose of the proposed additional language to A18.7.5 is to provide readily accessible expository information in NFPA 79 regarding the appropriate application of component and device designations per NFPA 79 relative to the inappropriate application of class designation letters/device function designations of IEEE 315 to industrial control and industrial equipment that is consistent with the intent of NFPA 79 and IEEE 315.

Committee Meeting Action: Accept in Part

The committee does not accept the insertion of the figure. Other text is accepted.

Committee Statement: The figure does not add clarity and contains outdated and erroneous information. In addition, there is no instruction or information on how the figure is to be used.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20
Comment on Affirmative

LOCKE: Please note that I am the submitter of this proposal.
It appears that there may have been an administrative transposition error relative to the inadvertent placement of proposal data presented at the ROP meeting. Please note that the figure was not proposed for inclusion in A.18.7.5. The figure was included as expository information as part of the substantiation. The proposal section of 79-156 Log #94 is reproduced in whole as follows:
"3. Proposal (include proposed new or revised wording, or identification of wording to be deleted.)
A.18.7.5 The class designation letters/device function designations identified in IEEE 315 are not intended for use on industrial control and industrial equipment as device and component designations. See Annex E for examples of device and component designations."
The omission of the proposed figure is appropriate and consistent with the proposal as submitted. The Committee Meeting Action on 79-156 (Log #94) should be revised to correctly reflect "Accept" rather than "Accept in Part."

79-157 Log #53 **Final Action: Accept in Principle**
(A.19.2)

Submitter: Bob Eugene, Underwriters Laboratories Inc.
Recommendation: Revise to read as follows:

A.19.2 The concepts of SELV are further explained in UL 1950, UL ~~3101-1~~ 61010A-1 , and IEC 60364-411.1.

Substantiation: UL 61010A-1 has replaced UL 3101-1.
Committee Meeting Action: Accept in Principle

A.19.2 The concepts of SELV are further explained in UL 1950, UL 61010A-1, and IEC 60364-4-41. It should be noted that there is a difference in the definitions of SELV in these standards.

Committee Statement: The committee updated the references and added further information to assist the user.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-158 Log #159 **Final Action: Reject**
(Annex C, C.2, C.5, C.7)

NOTE: This Proposal appeared as Comment 79-427 (Log #30) which was held from the A2002 ROC on Proposal 79-164 .
Submitter: Nicholas E. Rafferty, Bucks County Fire Marshal's Office, PA
Recommendation: Add new text to read as follows:

C.2 Plastics machinery. Examples of plastics machinery are as follows:
(1) Injection molding machinery
(2) Extrusion machinery
(3) Blow molding machines
(4) Specialized processing machines
(5) Thermoset molding machines
(6) Size reduction machinery (including cutting, sawing, and sanding operations)

C.5 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 ventilation machines

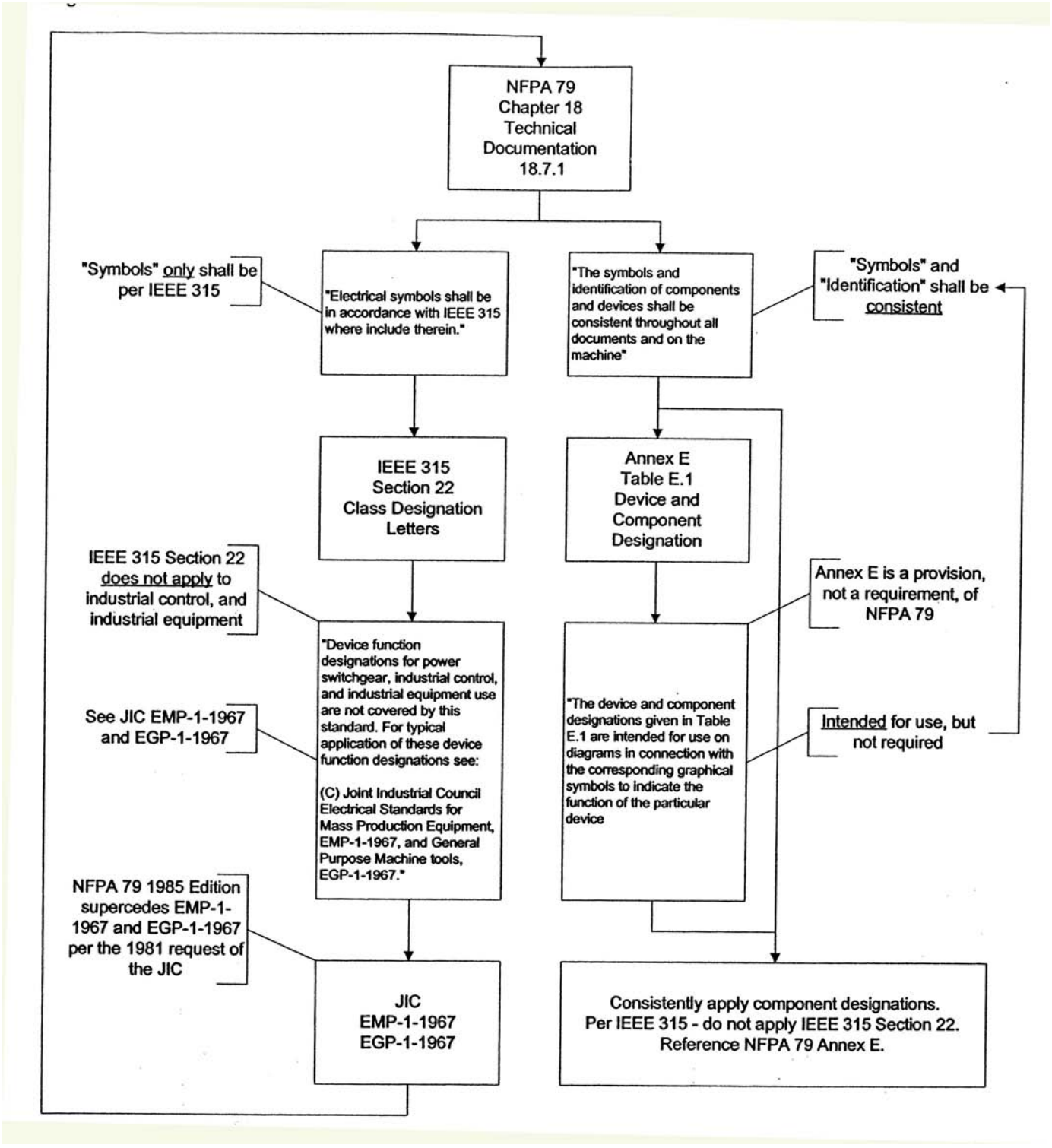
Substantiation: This standard has had a history of being viewed as a machine tool only standard. More specific examples are needed to promote this standard to the broader section of industrial applications, from machine tool, plastics manufacturer, to non-process related machinery and systems that are commonly used in the chemical and 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 Meeting Action: Reject
Committee Statement: See the Panel Action and Statement on 79-159 (Log #31).
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-159 Log #31 **Final Action: Reject**
(Annex C, C.2, C.5, C.7)

Submitter: Frank C. DeFelice, Jr., Cytec Industries Inc.
Recommendation: Revise Annex C as follows:

C.5 Material-Handling Machines; Examples of material-handling machines are as follows:
(1) Industrial robots
(2) Transfer machines
(3) Sortation machines
(4) Packaging machines
(5) Drum handling machines
(6) Palletizing machines
(7) Blending machines
(8) Conveying machines
(9) Film processing machines

Substantiation: Justification: To clarify that these types of machines are covered under NFPA 79.


NFPA 79
Chapter 18
Technical
Documentation
18.7.1
"Symbols" only shall be per IEEE 315
"Electrical symbols shall be in accordance with IEEE 315 where include therein."
"The symbols and identification of components and devices shall be consistent throughout all documents and on the machine"
"Symbols" and "Identification" shall be consistent
IEEE 315
Section 22
Class Designation
Letters
Annex E
Table E.1
Device and
Component
Designation
IEEE 315 Section 22 does not apply to industrial control, and industrial equipment
Annex E is a provision, not a requirement, of NFPA 79
"Device function designations for power switchgear, industrial control, and industrial equipment use are not covered by this standard. For typical application of these device function designations see:
(C) Joint Industrial Council Electrical Standards for Mass Production Equipment, EMP-1-1967, and General Purpose Machine tools, EGP-1-1967."
"The device and component designations given in Table E.1 are intended for use on diagrams in connection with the corresponding graphical symbols to indicate the function of the particular device
See JIC EMP-1-1967 and EGP-1-1967
Intended for use, but not required
NFPA 79 1985 Edition supercedes EMP-1-1967 and EGP-1-1967 per the 1981 request of the JIC
JIC
EMP-1-1967
EGP-1-1967
Consistently apply component designations.
Per IEEE 315 - do not apply IEEE 315 Section 22.
Reference NFPA 79 Annex E.

Committee Meeting Action: Reject
Committee Statement: Annex C is not intended to be an all inclusive list. Rather it is intended to provide a few examples of types of industrial machines.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
DEFELICE: This material is located in the Annex; and as such, is for informational purposes only. The present list does not adequately represent many of the types of machinery where the use of NFPA 79 would be applicable. These additions would serve to increase the usability of the document.

79-160 Log #12 **Final Action: Reject**
(Figure D.1(a))

Submitter: David W. Muska, Eveready Battery Company
Recommendation: This graphical picture should be drawn with verbiage to match the description per machine nameplate data 17.4.1.
Substantiation: Consistency.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-161 Log #92 **Final Action: Reject**
(Figure D.1(q))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise Figure D.1(q) as follows: (See Figure D.1(1) on the following page.)
FIGURE D.1(q) ~~Selections from ANSI Y32.2/IEEE 315/315A Symbol Table~~ Sample Symbols and Designations
* An additional character may be used as a suffix to the identified character. The additional character is ascertained per IEC 60346 relative to a specific application.
** An additional character may be used as a prefix to the identified character. The additional character is ascertained per IEC 60346 relative to a specific application.
Substantiation: The headings and title of Figure D.1(q) are misleading or incorrect.
" ~~ANSI~~ Symbol" and " ~~ANSI Code~~ " are inappropriate, un-identifiable, technically misleading, non-specific terminologies as it relates to Figure D.1(q). " IEEE 315/315A Symbol" and " NFPA 79 Annex E Device and Component Designation " are appropriate, identifiable and technically correct terminologies – respectively.
"IEC 617" is technically incorrect. "IEC 60 617" is technically correct. "IEC ~~Code~~ " is also un-identifiable, non-specific terminology. "IEC 60346 Reference Designation " is identifiable, specific and technically correct.
" ~~Selections from ANSI Y32.2/IEEE 315/315A Symbol Table~~ " is incomplete and technically misleading. ANSI has abandoned ANSI Y32.2 IEEE315/315A. " ~~IEEE 315/315A Symbol Table~~ " does not exist as such. The proposed title "Figure D1(q) Sample Symbols and Designations " is generically appropriate, and not redundant with the proposed headings.
"FL S ", "T A S", and "T ~~+~~ B " from FIGURE D.1(q) are revised to reflect the **Designations** as found in **Table E.1 Device and Component Designation** .
The IEC 60346 Reference Designations are revised to reflect only those characters that can be ascertained generically. Most two-character designations cannot be so ascertained, but were included in FIGURE D.1(q) because they were included in the associated Figure in SAE HS-1738 which was used as the model verbatim. The SAE reference designations as depicted may have reflected the characters used in some automotive environments, but may not be reflective of manufacturing in general – and as such may prove misleading. The notes to FIGURE D.1(q) identify how a user may identify an additional character.
The text " ~~XT~~ " is removed from the IEC 60346 Reference Designations column as it is redundant with "X ~~+~~ * ".
All of the **Descriptions** are revised as shown to reflect the same **Device** identification or descriptions found in **Table E.1 Device and Component Designation** . These **Descriptions** are revised to enhance the application of crisp, consistent terminology throughout the standard thereby enhancing user utility.
Committee Meeting Action: Reject
Committee Statement: The committee is unclear as to the intent of the submitter. Specifically, are the changes shown in the substantiation with underline and strikethrough part of the recommended changes? The committee has concerns between the two columns.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
LOCKE: Please note that I am the submitter of this proposal.
It appears that there may have been an administrative transposition error and inadvertent cross over of data presented with that of 79-162 Log #93. It also appears that the content of the table columns has moved out of its relative position as presented at the ROP.
An excerpt of the proposal as originally submitted is included here:
" **3. Proposal** *(include proposed new or revised wording, or identification of wording to be deleted.)*
Insert Table Here
FIGURE D.1(q) Selections from ANSI Y32.2/IEEE 315/315A Symbol Table Sample Symbols and Designations
* An additional character may be used as a suffix to the identified character. The additional character is ascertained per IEC 60346 relative to a specific application.
** An additional character may be used as a prefix to the identified character. The additional character is ascertained per IEC 60346 relative to a specific application.
4. Statement of Problem and Substantiation for Proposal:
The headings and title of Figure D.1(q) are misleading or incorrect.
"ANSI Symbol" and "ANSI Code" are inappropriate, unidentifiable, technically misleading, nonspecific terminology's as it relates to Figure D.1(q). " IEEE 315/315A Symbol" and " NFPA 79 Annex E Device and Component Designation " are appropriate, identifiable and technically correct terminology's – respectively.
"IEC 617" is technically incorrect. "IEC 60 617" is technically correct. "IEC Code" is also unidentifiable, nonspecific terminology. "IEC 60346 Reference Designation " is identifiable, specific and technically correct.
"Selections from ANSI Y32.2/IEEE 315/315A Symbol Table" is incomplete and technically misleading. ANSI has abandoned ANSI Y32.2 IEEE315/315A. "IEEE 315/315A Symbol Table" does not exist as such. The proposed title "Figure D1(q) Sample Symbols and Designations " is generically appropriate, and not redundant with the proposed headings.
"FL S ", "T A S", and "T1 B " from FIGURE D.1(q) are revised to reflect the **Designations** as found in **Table E.1 Device and Component Designation** .
The IEC 60346 Reference Designations are revised to reflect only those characters that can be ascertained generically. Most two-character designations cannot be so ascertained, but were included in FIGURE D.1(q) because they were included in the associated Figure in SAE HS-1738 which was used as the model verbatim. The SAE reference designations as depicted may have reflected the characters used in some automotive environments, but may not be reflective of manufacturing in general – and as such may prove misleading. The notes to FIGURE D.1(q) identify how a user may identify an additional character.
The text "XT" is removed from the IEC 60346 Reference Designations column as it is redundant with "X1 * ".
All of the **Descriptions** are revised as shown to reflect the same **Device** identification or descriptions found in **Table E.1 Device and Component Designation** . These **Descriptions** are revised to enhance the application of crisp, consistent terminology throughout the standard thereby enhancing user utility."
Underlined and stricken text in proposal section "4. Statement of Problem and Substantiation for Proposal:" was included to correlate with the text as written in proposal section "3. Proposal". Such underlining and striking may, however, have proven confusing and I apologize to the technical committee.
Retention of inappropriate, unidentifiable, technically misleading, nonspecific information in Figure D.1(q) is inappropriate. As this proposal corrects discrepancies and inaccuracy in material that is intended to be expository it should not be reject, but rather accepted on its merits. Relative to the committee statement if there is anything technically incorrect in this proposal it is unbeknown at this time - but identification of any such error might warrant an acceptance in principle of this proposal with the correction of the applicable text. Otherwise any concerns might be readily addressed with a formal comment.
In the broader picture the technical committee chair might consider the appointment of a small limited scope working group to investigate the state of affairs regarding IEEE 315 and our current dependency on an abandoned standard. The working group might also investigate IEC 60617 and IEC 60346 so as to foster greater understanding.

~~ANSI~~ IEEE 315/315A Symbol ~~ANSI Code~~ NFPA 79 Annex E Device and Component Designation	IEC 60617 Symbol IEC ~~Code~~ 60346 Reference Designation	Description
<<The symbols from this column are omitted in this rendition of this table for convince. GJL >>	<<The symbols from this column are omitted in this rendition of this table for convince. GJL >>	
CON	K~~M~~*	
CON	K~~M~~*	
CR	KA	
CR	KA	Contactor, normally open contact- ~~open~~
TR	K~~T~~*	
TR	K~~T~~*	Contactor, normally closed contact- ~~closed~~
TR	K~~T~~*	
TR	K~~T~~*	Relay, normally open contact ~~open~~
SS	SA	Relay, normally closed contact ~~closed~~
PB	S~~B~~*	Timer relay, normally open ~~Timed~~
PB	S~~B~~*	contact~~, N.O.~~ – on delay ~~(TDE)~~
PB	S~~B~~*	Timer relay, normally closed ~~Timed~~
FLS	S~~L~~*	contact~~, N.C.~~ – on delay ~~(TDE)~~
FLS	S~~F~~*	Timer relay, normally open ~~Timed~~
PS	S~~P~~*	contact~~, N.O.~~ – off delay ~~(TDD)~~
TAS	S~~T~~*	Timer relay, normally closed ~~Timed~~
LS	SQ	contact~~, N.C~~. – off delay ~~(TDD)~~
PRS	SQ	Selector Switch
LT	H~~L~~*	Pushbutton, normally open contact- ~~N.O.~~
PL	HS	
CR	KA	Pushbutton, normally closed ~~N.C.~~
CON	K~~M~~*	Pushbutton, normally closed - mush-
M	K~~M~~*	room head
TR	KA	~~Liquid Level~~ Float switch
SOL	~~Y~~V**	Flow switch
CTR	E~~C~~*	Pressure switch
CB	~~Q~~F**	Temperature-actuated switch
T~~I~~B	X~~I~~*	Limit switch
FU	~~XT~~	Proximity switch
	FU*	Pilot ~~Indicating~~ light
		Plug ~~and socket~~
		Control relay coil
		Contactor coil
		Motor starter coil
		Timer ~~coil~~ relay
		Solenoid ~~coil~~
		~~Electromechanical c~~Counter
		Circuit breaker
		Terminals ~~(reference)~~ block
		~~Fused terminals (reference)~~
		Fuse~~, protective~~

Figure D.1(q)

79-162 Log #93 **Final Action: Reject**
(Figure D.1(q))

Submitter: Gary J. Locke, Lockheed Martin Systems Integration
Recommendation: Revise this part of Figure D.1(q) as follows:

~~ANSI~~ IEEE 315/315A Symbol ~~ANSI Code~~ NFPA 79 Annex E Device and Component Designation	IEC 60617 Symbol IEC ~~Code~~ 60346 Reference Designation	Description

Substantiation: The headings and title of Figure D.1(q) are misleading or incorrect.
" ~~ANSI~~ Symbol" and " ~~ANSI Code~~ " are inappropriate, un-identifiable, technically misleading, non-specific terminologies as it relates to Figure D.1(q). " IEEE 315/315A Symbol" and " NFPA 79 Annex E Device and Component Designation " are appropriate, identifiable and technically correct terminologies – respectively.
"IEC 617" is technically incorrect. "IEC 60 617" is technically correct. "IEC ~~Code~~ " is also un-identifiable, non-specific terminology. "IEC 60346 Reference Designation " is identifiable, specific and technically correct.
" ~~Selections from ANSI Y32.2/IEEE 315/315A Symbol Table~~ " is incomplete and technically misleading. ANSI has abandoned ANSI Y32.2 IEEE315/315A. " ~~IEEE 315/315A Symbol Table~~ " does not exist as such. The proposed title "Figure D.1(q) Sample Symbols and Designations " is technically correct, and not redundant with the proposed headings.
Committee Meeting Action: Reject
Committee Statement: The committee is unclear as to the intent of the submitter. Specifically, are the changes shown in the substantiation with underline and strikethrough part of the recommended changes? The committee has concerns between the two columns.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 19 Negative: 1
Explanation of Negative:
LOCKE: Please note that I am the submitter of this proposal.
It appears that there may have been an administrative transposition error, and inadvertent cross over of data presented with that of 79-161 Log #92.
An excerpt of the proposal as originally submitted is included here:
"3. Proposal *(include proposed new or revised wording, or identification of wording to be deleted.)*

~~ANSI~~ IEEE 315/315A Symbol ~~ANSI Code~~ NFPA 79 Annex E Device and Component Designation	IEC 60617 Symbol IEC ~~Code~~ 60346 Reference Designation	Description

FIGURE D.1(q) Selections from ANSI Y32.2/IEEE 315/315A Symbol Table Sample Symbols and Designations
4. Statement of Problem and Substantiation for Proposal:
The headings and title of Figure D.1(q) are misleading or incorrect.
"ANSI Symbol" and "ANSI Code" are inappropriate, unidentifiable, technically misleading, nonspecific terminology's as it relates to Figure D.1(q). " IEEE 315/315A Symbol" and " NFPA 79 Annex E Device and Component Designation " are appropriate, identifiable and technically correct terminology's – respectively.
"IEC 617" is technically incorrect. "IEC 60 617" is technically correct. "IEC Code" is also unidentifiable, nonspecific terminology. "IEC 60346 Reference Designation " is identifiable, specific and technically correct.
"Selections from ANSI Y32.2/IEEE 315/315A Symbol Table" is incomplete and technically misleading. ANSI has abandoned ANSI Y32.2 IEEE315/315A. "IEEE 315/315A Symbol Table" does not exist as such. The proposed title "Figure D1(q) Sample Symbols and Designations " is technically correct, and not redundant with the proposed headings"
Underlined and stricken text in proposal section "4. Statement of Problem and Substantiation for Proposal:" was included to correlate with the text as written in proposal section"3. Proposal". Such underlining and striking may, however, have proven confusing and I apologize to the technical committee.
Retention of incorrect information in Figure D.1(q) is inappropriate. As this proposal corrects discrepancies and inaccuracy in material that is intended to be expository it should not be reject, but rather accepted on its merits.

79-163 Log #CP6 **Final Action: Accept**
(Annex H)

Submitter: Technical Committee on Electrical Equipment of Industrial Machinery
Recommendation: Delete Annex H
Substantiation: The usefuness of the Annex H has expired.
Committee Meeting Action: Accept
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-164 Log #6 **Final Action: Reject**
(Annex I)

Submitter: David W. Muska, Eveready Battery Company
Recommendation: Adopt into standard completely the utilization of a safety relay.
Substantiation: Improved safety with consistency amongst International standards.
Committee Meeting Action: Reject
Committee Statement: This proposal does not comply with the Regulations Governing Committee Projects Section 4-3.3(c) since the submitter has not provided the specific recommended text.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20

79-165 Log #54 **Final Action: Accept in Part**
(J.1.7)

Submitter: Bob Eugene, Underwriters Laboratories Inc.
Recommendation: Revise to read as follows:
J.1.7 UL Publications Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.
UL 50, Standard for Safety for Enclosures for Electrical Equipment, 1995 with revisions through September 2003 .
UL 508, Standard for Safety for Industrial Control Equipment, 1999 with revisions through December 2003 .
UL 62, Standard for Safety for Flexible Cord and Fixture Wire, 1997.
UL 248.14, Standard for Safety for Low-Voltage Fuses — Part 14: Supplemental Fuses, 2000.
UL 651, Standard for Safety for Schedule 40 and 80 Rigid PVC Conduit, 1995 with revisions through October 2002 .
UL 1004, Standard for Safety for Electric Motors, 1994 with revisions through February 2001 .
UL 1077, Standard for Safety for Supplementary Protectors for Use in Electrical Equipment, 1999.
UL 1950, Standard for Safety of Information Technology Equipment ~~,~~ ~~Including Electrical Business Equipment~~ , ~~1993~~ 1995 with revisions through July 2003 .
UL ~~3101-2~~ 61010A-1 , Electrical Equipment for Laboratory Use: Part 1: General Requirements, ~~1997~~ 2002 with revisions through December 2002 .
Substantiation: Revise titles and editions of referenced standards. A change is also being submitted to A.19.2 for the standard number change from UL 3101-1 to UL 61010A-1.
Committee Meeting Action: Accept in Part
Revise the recommendation to read as follows:
Revise to read as follows:
J.1.7 UL Publications Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.
UL 50, Standard for Safety for Enclosures for Electrical Equipment, 1995.
UL 508, Standard for Safety for Industrial Control Equipment, 1999 .
UL 62, Standard for Safety for Flexible Cord and Fixture Wire, 1997.
UL 248.14, Standard for Safety for Low-Voltage Fuses — Part 14: Supplemental Fuses, 2000.
UL 651, Standard for Safety for Schedule 40 and 80 Rigid PVC Conduit, 1995.
UL 1004, Standard for Safety for Electric Motors, 1994.
UL 1077, Standard for Safety for Supplementary Protectors for Use in Electrical Equipment, 1999.
UL 1950, Standard for Safety of Information Technology Equipment ~~,~~ ~~Including Electrical Business Equipment~~ , ~~1993~~ 1995 .
UL ~~3101-2~~ 61010A-1 , Electrical Equipment for Laboratory Use: Part 1: General Requirements, ~~1997~~ 2002 .
Committee Statement: Editorial changes were made to conform to the NFPA Manual of style.
Number Eligible to Vote: 20
Ballot Results: Affirmative: 20