

AGENDA

UNIFORM BUILDING CODE COMMISSION  
ELECTRICAL ADVISORY COMMITTEE

January 9, 2014 1:00  
Room 475  
160 E 300 S Salt Lake City, UT

*This agenda is subject to change up to 24 hours prior to the meeting.*

1. Swear in new member
2. Elect a chairman and vice-chairman
3. Approve minutes from the April 12, 2012 meeting
4. Plan review of 2014 NEC

Please call Sharon at 801-530-6163 or email [ssmalley@utah.gov](mailto:ssmalley@utah.gov) if you do not plan on attending this meeting.



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UNIFORM BUILDING CODE COMMISSION

ELECTRICAL ADVISORY COMMITTEE  
MEETING

April 12, 2012 1:00  
Room 464 Heber M Wells Building  
160 E 300 S Salt Lake City, UT

MINUTES

STAFF

Dan S Jones, Bureau Manager  
Sharon Smalley, Board Secretary

ELECTRICAL ADVISORY COMMITTEE MEMBERS

Kurt Brooks (excused)	David Wesemann (excused)
Thad Quist	Gary Beckstrand
Rickey Carter	Chris Joyal, Liaison
Mike Thomas (excused)	Kevin Phillips

VISITORS

MINUTES

A motion was made by Ricky Carter to approve the minutes from the January 12, 2012 and February 9, 2012 meetings. The motion was seconded by Thad Quist and passed unanimously.

REVIEW OF ELECTRICAL PORTION  
OF THE 2012 IRC

Gary Beckstrand passed out a report of the significant changes in the electrical portion of the 2012 IRC. In the report, he also listed a cost analysis of those changes.

Those present reviewed and discussed the report. In the report, Mr. Beckstrand proposed that the current amendment for Section E3902.11 not be deleted but just change the section number to E3902.12. He also recommended that there be a new amendment that would delete Section E3902.13. Following the discussion on his proposals, a motion was made by Thad Quist to amend E3902.11 by changing the number to E3902.12 and instead of deleting Section E3902.13, add an amendment to that section that would add an exception that would state, "Exception: This section does not apply for a simple move or an

extension of a branch circuit or an outlet which does not significantly increase the existing electrical load. This exception does not include changes involving remodeling or additions to a residence.” The motion was seconded by Ricky Carter and passed unanimously.

A motion was made by Kevin Phillips to make a recommendation to approve the electrical portion of the 2012 IRC with the two amendments. The motion was seconded by Thad Quist and passed unanimously.

The meeting adjourned at 2:05.

*Note: These minutes are not intended to be a verbatim transcript but are intended to record the significant features of the business conducted in this meeting. Discussed items are not necessarily shown in the chronological order they occurred.*

Note: This summary includes some changes that were considered but rejected - not every listed change was made

Art	Sec Sub	ROP	ROC	NITMAM	Description
All					"Approved" substituted for "adequate" in some locations - rejected by most panels
All					Include "or other structures" after "buildings" in many places - rejected by some panels.
Global		various			"Switchgear" added in many places - most previously referred to switchboards or metal-enclosed switchgear
Global		various			Continued effort to correctly reference grounding electrode conductors and bonding conductors
Global		various			Continued effort to replace "identified (or designed) for the purpose" with "identified" - many locations esp Chapter 3
Global		various			Eliminate whole-article references - delete or replace with sections or parts
Global		various	1-76		Include abbreviations (Type EMT, Type IMC, Type FMC, Type MI etc) in requirements that name wiring methods
Global		various			Replace language about details of locking means on disconnects with reference to 110.25
Global		various			Replace service conductors with appropriate terms as revised in 2011 edition
Global		various	1-61		Revise many definitions related to types of raceways and add information in general definition of "raceway"
Global		various			Specifications for format of caution, warning, and danger signs - many references to this section elsewhere
Global		various			Substitute 1000 volts for 600 volts in many locations - systems such as PV may operate around 750 volts
Global		various			Many but inconsistent actions on revising dates of documents referenced in informational notes
90	1	1-3	1-1		Change Title, delete (C) and put intent statement (not design specification or instruction manual) in (A)
90	2 (B)(5)	1-9			Incorporate TIA in section describing electric utility installations not covered by NEC
90	8 (B)	1-19			Delete "(in one circuit)" from limitations on number of circuits in an enclosure due to fault current
100		5-20	5-6		Revised definition of Separately Derived System (again)
100		1-60	1-27		Add informational note to definition of Premises Wiring to list some power sources
100		18-9	18-4, 18-5		New definition of Retrofit Kit
100		9-8a	9-6		New definition of Substation
100		5-3	5-1		Rejected changing "equipment grounding conductor" to "equipment bonding conductor"
100		4-9 - others	4-5, others		Relocate and revise definition of Substation
100		13-3			Relocate definition of Battery System to Article 100 from Article 480
100		11-5			Relocate definition of Control Circuit from Article 409 to Article 100
100		18-3			Relocate definition of Electric-Discharge Lighting from Article 600 to Article 100
100		5-13			Relocate definition of Ground-Fault Current Path to Article 100
100		5-46	5-14		Relocate/revise definition of Effective Ground-Fault Current Path - ground fault detectors not just for high-impedance ground systems
100		11-7			Relocate definition of Industrial Control Panel from Article 409 to Article 100
100		4-4			Relocate definition of Charge Controller from Article 690 to Article 100
100		11-3			Revised and relocated definitions of Adjustable Speed Drive and Adjustable Speed Drive System
100		9-7			Revise "Metal-Enclosed Power Switchgear" to just "Switchgear" with an informational note - many locations
100		11-8			Revise and relocate definition of "Motor Control Circuit" to "Control Circuit" in Article 100
100		5-6, 5-7	5-3		Revise and relocate definition of Effective Ground-Fault Current Path
100		18-5			Revise and relocate definition of Lighting Track (Track Lighting) from Article 410
100		1-52			Revise definition of "Location, Damp" to one sentence and an informational note
100		16-6			Revise definition of Communications Equipment to include conductors
100		1-31			Revise definition of Concealed to one sentence with an informational note.
100		6-4			Revise definition of Copper-Clad Aluminum Conductors to a single sentence
100		1-31a			Revise definition of Device to exclude conductors
100		1-49			Revise definition of Exposed (as applied to live parts) to a single sentence
100		5-16			Revise definition of Intersystem Bonding Termination to clarify that it is only for termination of intersystem bonding conductors
100		1-68			Revise definition of Nominal Voltage to a single sentence with informational note
100		1-24	1-13		Revise definition of Readily Accessible to preclude the use of a tool
100		5-14a			Revised definition of Equipment Grounding Conductor

Art	Sec	Sub	ROP	ROC	NITMAM	Description
100			4-8a			Revised definition of Photovoltaic (PV) System - Article 100 or 690?
100			1-63			Revised definition of Sealable Equipment to be one sentence with informational note
100			10-5	10-2		Revised definition of Selective Coordination
100			8-24			Revised/simplify definition of Raceway and add informational note
110	14	(C)(1)	1-98	1-44 reject		Temperature ratings for terminals of flexible cords refer to Table 400.5 - rejected
110	16		1-102			Clarify requirements for durability of markings for arc flash hazard labels
110	16		1-105	1-54		Flash hazard labels revised to include switchgear and may be factory-installed
110	17		1-110	1-59 reject		New labeling required to identify work, space dimensions to be kept clear - rejected
110	21		1-114, 1-117	1-61		Specifications for format of caution, warning, and danger signs - ROC removed specific colors and wording
110	24	IN	1-121, 1-124	1-64		Informational note added to explain fault current markings - not for arc flash hazard analysis
110	25		1-130	1-76		General requirements for GFCIs to be located in a readily accessible location
110	25		1-130	1-76		General requirements for lockable disconnecting means, exc for cord connections - many other sections revised
110	26	(C)(3)	1-145	1-85		"Listed panic hardware" required on doors rather than "open under simple pressure"
110	26	(C)(3)	1-143a			Threshold for panic hardware and direction of door swing reduced to 800A
110	26	(E)(2)	1-155			Dedicated space requirements extended to outdoor equipment
110	27		1-158	1-94		Elevation for guarding of live parts increased
110	33	(A)(3)	1-169a			Listed panic hardware required on doors for egress from equipment over 600V
200	4	(B)	5-29	5-10		Grouping and marking of neutrals required/revised when multiple neutrals are in the same enclosure
200	6	(A)(3), (B)(3)	5-31, 5-33			Gray stripe permitted in lieu of white stripe for identifying grounded conductors -
200	7		5-35, 5-36			Gray stripes restricted along with white - generally only for grounded conductors - other related proposals
210	4	(D)	2-19	2-7		Numbered wire markers at terminations in panelboards may be used in lieu of grouping for multiwire circuits
210	5	(C)(2)	2-23			Identification of DC branch circuit ungrounded conductors by polarity - methods or colors specified
210	7		2-27			Yoke or "mounting strap" (multiple circuits supplying equipment on the same yoke)
210	8	(A)(10)	2-47			GFCI required for receptacles in laundry areas
210	8	(A)(5)	2-36			Exception for GFCI revised to exclude burglar alarms but not fire alarms - addressed/modified by Article 760
210	8	(A)(9)	2-46			Provision/measurement (from outside - in any direction) for GFCI receptacles from bath tubs and shower stalls
210	8	(B)	2-51, 2-52			GFCI receptacles on rooftops require ready access only from the rooftop (may not have permanent access)
210	8	(B)	2-49, 2-50			GFCI required for all receptacles in non-dwelling garage-type areas - without regard to type of equipment in use - excepting showrooms
210	12	(A)	2-92			AFCI may be at first outlet under specified conditions - metal raceway or wiring method not always required
210	12	(B), Exc	2-115			Exception added for limited extensions of existing circuits that do not require addition of AFCI
210	12		various	2-60		AFCI requirements revised and expanded to kitchens and laundry areas - including "devices" - also extended to dormitory units
210	12		2-116			AFCIs must be installed in readily accessible locations
210	12		various	various		Methods and arrangements for providing AFCI protection expanded
210	13		2-125	2-64		GFPE required for large branch circuits - same criteria as for feeders and services
210	17		2-128a			Outlets for charging electric vehicles (where installed) must be on a separate circuit (not required to be individual branch circuit)
210	19	(A)(1)	2-131	2-70		Rewording and clarification of minimum ampacity requirements for branch circuit conductors
210	22		2-139, 2-140			New section separates permissible loads for individual branch circuits from 210.23
210	52	(E)(1)&(2)	2-168, others			Outdoor receptacles "readily accessible from grade" rather than "accessible while standing at grade level"
210	52	(E)(3)	2-168, others	2-80		Required receptacles accessible from and not over 6-1/2 ft above balcony, deck, or porch (not "within perimeter")
210	52	(F)	2-177			Laundry receptacles are required in the "area designated for laundry equipment."
210	52	(G)	2-178a			Receptacle requirements for basements, garages, and accessory buildings separated and clarified
210	52	(G)(1)	2-178a, others	2-82, others		Garage receptacle circuits may supply no other outlets
210	64		2-191			Receptacle required for electrical service areas (within 50 ft of electrical service equipment) - other than 1- and 2-family dwellings
215	2	(A)(1)	2-201	2-91		Rewording and clarification of minimum ampacity requirements for feeder conductors
215	2	(A)(1) Exc	2-202	2-94 reject		Feeder conductors over 4 ft from an OCD not required to be increased in size for continuous load - rejected

Art	Sec Sub	ROP	ROC	NITMAM	Description
215	2 (A)(4)	2-204b			Section deleted - special rules for dwelling feeder sizing are covered by Article 310
215	12 (C)	2-217	2-100		Identification of DC feeder ungrounded conductors by polarity - methods or colors specified
220	3 Table	2-219			Reference to 625.14 added for calculations of loads for electric vehicle charging
220	12 Exc	2-228			Exception for alternate calculations based on energy codes with power monitoring and alarm
220	14 (B)	2-232			Demand factors for household cooking appliances apply to cooking appliances in institutional programs
225	4	4-15			Overhead conductors within 10 ft of buildings must be insulated - covered is not adequate.
225	10	4-20			"Other structures" included with requirements for open wiring on buildings
225	17	4-30			Revised and clarify language related to masts used as supports
225	21	4-35			"Other structures" included with requirements for multiconductor cables on exterior building surfaces
225	36	4-55			3-way and 4-way switches no longer permitted as disconnecting means for structures
225	38 Exc	4-63			Exception for 3- and 4-way switches deleted as disconnecting means
225	52 (A)	4-69	4-32		Revision to clarify use of remote control or mechanical linkage when disconnect over 1000 volts is not readily accessible
225	56 (A)	4-81			"Protective device study" replaced with a description of the information required for supplies over 600 (now 1000) volts
225	70	4-87 & others			Requirements for labeling/signage moved to Article 490
230	6 (5)	4-103			Mast installations clarified - conduits as masts limited to RMC or IMC
230	24 (A) Exc 4	4-109 & others			Multiple locations - change "service drop conductors" to "overhead service conductors" also 230.26, 230.28
230	30	4-116			"Service lateral conductors" changed to "underground service conductors"
230	30	4-115			Added list of additional acceptable wiring methods for installation of underground service conductors
230	43	4-126			"Equipment bonding jumper" changed to "supply-side bonding jumper" for FMC used for service conductors
230	44 (5)	4-134			Cables for use in cable trays not restricted to thermoplastic insulation - thermoset also permitted "CT" required
230	44	4-133			Markings on cable trays containing service conductors are to be marked at spacings not over 10 ft
230	82 (3)	4-156, 4-154	4-64		Meter disconnects for over 1000 volts to be marked "Meter disconnect not service equipment"
240	11	10-18	10-11		New section requires conductors to be marked with maximum OCP rating if increased in size for voltage drop or other reasons - rejected
240	21 (B)(1)	10-32	10-14		Ten-foot tap rule clarified - rating at termination refers to "equipment containing an overcurrent device(s)"
240	21 (B)(5)	10-36			Outside taps of unlimited length - clarified that conductors referenced are "tap conductors"
240	21 (C)(2)	10-39	10-16		Ten-foot secondary rule clarified - rating at termination refers to "equipment containing an overcurrent device(s)" Exc. for SPDs
240	21 (C)(3)	10-42			Twenty-five-foot secondary rule for Industrial Installations applies only to switchboards and switchgear (not MCC or panelboards)
240	87	10-53a	10-20, 10-24		Requirements for "Arc Energy Reduction" and methods to reduce clearing time revised and clarified - some requirements not just options
250	8	5-53			One or more of the listed methods may be used to make grounding and bonding connections
250	10	5-55			Requirements for protection of ground clamps or other fittings clarified.
250	21 (C)	5-66			Markings required on ungrounded systems to include voltage between conductors
250	24 (A)(1)	5-68			Load end of overhead and underground service conductors added to locations where GEC connection may be made
250	24 (E)	5-75			Load end of overhead and underground service conductors added to locations where GEC connection may be made (ungrounded system)
250	30 (A)(1) Exc 2	5-85			Installation of system bonding jumper at both source and disconnect applies only to outdoor transformers with no parallel neutral path
250	30 (A)(2) Exc	5-88			Supply-side bonding jumper is not required for outdoor transformer with system bonding jumper at both source and disconnect
250	30 (A)(5) Exc 2	5-90			GEC used for feeder or service may also be used only for sep. derived systems located within SUSE equipment
250	30	5-80a			Paralleled separately derived systems must comply with 250.30
250	32 (B) Exc 2	5-244c			New exception details requirement for connections to feeder grounded conductor when SSBJ is in two locations
250	34 (A)	5-95	5-27 reject		New subsection clarifies that required grounding conductors must be connected to generator frame to complete fault path
250	36 (F)	5-99			Location of GEC connection to impedance grounded system clarified
250	64 (B)	3-39	3-13		Burial depths of 300.5 do not apply to GEC and grounding electrode bonding jumpers
250	64 (D)	5-120			Size of busbar for GEC and jumper connections clarified - as long as needed for connections plus 2 in wide and 1/4 in thick
250	64 (D)(1)	5-121			Direct connection of common GEC to overhead and underground service conductors requires sizing to be based on total area of conductors
250	64 (E)	5-124			Section on GEC enclosures changed to list form
250	66 (A)	5-131			Sizing of 6 AWG copper for rods, pipes, and plates applies to any number of rods, pipes, or plates

Art	Sec Sub	ROP	ROC	NITMAM	Description
250	66 (B)	5-135			Sizing of 4 AWG copper for concrete-encased electrodes applies to any number of concrete-encased electrodes
250	68 (C)(2)	5-141	5-49		Revisions to use of metal structural frame to bond electrodes together or to be used as a grounding electrode conductor
250	68 (C)(3)	5-138			Concrete-encased electrode permitted to extend to an accessible location above the concrete
250	Various	5-42	5-56		Multiple references - grounded conductors and supply-side bonding jumpers sized from new Table 250.102(C)
250	102 (C)	5-42	5-56		New table for main B <sub>1</sub> system B <sub>1</sub> and SSB <sub>1</sub> added with notes and clarifications
250	104	5-164			Bonding of structural steel changed to structural metal
250	119 (A)	5-189			"Larger than 6 AWG" changed to "4 AWG and larger" for rules about identification of EGCs
250	119 Exc 2	5-188	5-66		Some flexible cords without an EGC are permitted to have a green outer finish (legalizes christmas tree lights?)
250	119 Exc 3	5-41a			Green wire permitted for ungrounded conductor to green traffic signal (EGC shall have yellow stripe(s))
250	121 Exc				Exception permits wire-type EGC to be used as an GEC if meeting requirements for both
250	122 (B)	5-199	5-64		Rule about increase in size of ungrounded conductors applies when larger than size of sufficient ampacity and only to wire-type EGCs
250	122 (F)	5-201a	5-79 reject		EGCs installed in parallel not required to be larger than the ungrounded conductors in each raceway - rejected
250	122 (F)	5-201a	5-79 reject		EGCs installed in parallel under engineering supervision may be smaller than required in main rule based on total area of EGC - rejected
250	130 (C)	5-209			EGC for nongrounding receptacle replacement may connect to EGC of another circuit
250	146 (D)	5-216			"Isolated Receptacles" changed to "Isolated Ground Receptacles" for consistency
250	162 (A)	5-220			DC voltage threshold for application of requirements changed from 50 volts to 60 volts
250	162 (A) Exc 1	5-221			Ground detector must be installed integral with or adjacent to ungrounded DC source (60 - 300 volts) for application of exception
250	166	5-222			Establishes maximum size of EGC for DC system (3/0 max)
250	167 (new)	5-223	5-90		Ground fault detection required for ungrounded systems, permitted for grounded systems, and marked with grounding type
250	186 (new)	5-234			Requirements similar to those of 250.24 added for services over 1000 volts for establishing effective GF current path
250	194 (new)	5-241			New requirements for grounding/bonding of metal fences, guy wires, and structures in and around substations
285	13	5-244b			Type 4 SPDs added - for factory installation only, not for field installation
300		3-8			Change title of Article to General Requirements for Wiring Methods and Materials - Scope gets similar change
300	3 (C)(2)(c)	3-15			Transformers and switchboards added to equipment where conductors of different voltage ratings are permitted
300	5 (B)	3-40			Conductors in enclosures or raceways underground must comply with 310.10(C) not necessarily listed for wet locations
300	5 (C)	3-42			Conductors as well as cables under buildings must generally be installed in raceways (exceptions still apply)
300	22 (C)(1)	3-86	3-24		Cable ties used in air-handling areas must have adequate fire resistance and be low smoke producing (plenum-rated)
300	38	3-92	3-30		Interior of raceways above or below ground are also wet locations - over 1000 volts same as 1000 volts or less
310	10 (H)(2)(6)	6-15	6-4		Additional requirement for grouping in ferrous raceways added to conditions under which parallel conductors are permitted.
310	15 (B)(3)(a)	6-40	6-38		"Current-carrying conductors" includes all conductors, including spares, other than those that cannot be simultaneously energized
310	15 (B)(3)(c)	6-46			Informational note revised to explain the basis for temperature adders for sunlight
310	15 (B)(3)(c) Exc	6-29	6-14a		Table for ambient temperature adjustment on rooftops revised and simplified and changed to cover cables and all raceways
310	15 (B)(3)(c) Exc	6-31	6-29 reject		Ambient temperature adjustment does not apply to XHHW-2 conductors
310	15 (B)(7)	6-49a			Table for residential service conductors and feeders replaced with an adjustment factor of .83
310	60 (A)	6-67a			Deleted definitions in 310.60(A) - already in 310.2
310	60 (B)(1)	6-68			Clarification of intent for ampacities of shielded cables, some intended to apply to shields grounded at one point with no shield current.
314	15	9-33			Outlet box hoods added to list of items required to be listed for use in wet locations when installed in wet locations (missing in 1st printing)
314	15	9-35	9-26		Specification of maximum size of drainage openings - to be in accordance with mfg instructions
314	16	9-37			Requirements for courting of conductors associated with "connector fittings" or "clamp assemblies" in nonmetallic box fill calculations
314	23 (B)	9-1			Enclosures can be supported from any structural member - not just from structural members of buildings
314	23 (D)	9-45			Boxes supported by ceiling wires must use identified methods - not "identified for the purpose" which is considered redundant
314	25 (B)	9-56			Requirement for covering combustible material between canopy and box depends on requirements of 410.23
314	25	9-55			Screws used for attaching covers or other equipment to a box must be machine screws matching box threads or per mfgs instructions
314	27 (A)(1)	9-58			Rules about supporting luminaires from wall-mounted boxes changed to include other vertical surfaces
314	27 (A)(2)	9-62			Ceiling outlet boxes for support of luminaires over 50 lb must have maximum weight marked on the interior of the box

Art	Sec	Sub	ROP	ROC	NITMAM	Description
314	28	(A)(3)	9-67			Fill for certain listed and marked conduit bodies is limited only to conductor fill for the entering raceways
324	41		7-23			Maximum dimensions for use of carpet squares for Type FCC cable revised to SI units (from 36 in to 1 m)
326	10		7-25			Permitted uses of Type IGS cable changed to include both service laterals and underground service conductors
330	30	(B)	7-29	7-5		Some MC cable may be secured at 10 ft intervals in vertical installations if listed for the application.
330	30	(D)(3)	7-31			Up to 3 ft of interlocked armor MC cable may be "unsupported" where used to connect equipment for flexibility
334	10		7-37			Clarifies that permitted uses of Type NM Cable apply only where not prohibited
334	40	(B)	7-49, 7-50			Devices used without boxes limited to repair wiring in concealed locations only and must be listed (not "rewiring")
344	2		8-47			Delete types of RMC from definition - uses of the different types are covered in 344.10, list added in 344.100
344	30	(A)	8-49			Revise requirements for securing RMC to a list
344	100	new	8-52a			Types (materials) of RMC moved to construction requirements
348	30	(A) Exc 4	8-54			Listed FMC fittings recognized as means of support for up to 6 ft lengths within accessible ceilings
350	30	(A) Exc 4	8-57			Listed LFMF fittings recognized as means of support for up to 6 ft lengths within accessible ceilings
350	42		8-59			LFMC fittings must be listed for use with LFMF - Some straight LFMF fittings may be used for direct burial if identified
356	12		8-81a			Delete prohibition for use of LFNC above 600 volts, but only such use in listing is for GTO cable and enclosing motor leads
356	30	(4)	8-83a			Listed fittings for LFNC-B recognized as means of support for up to 6 ft lengths within accessible ceilings
358	60		8-90	11-4, 11-4a		Proposal to require wire-type EGC in some EMT supplying outdoor HVAC equipment accepted but reported as reject
370	2		8-114			Revised definition of Cablebus
370		Entire Art	8-109a			Cablebus article rewritten for conformity with Chapter 3 format
374	11		8-120a			Minor revision to methods permitted for connections to cabinets and extensions from cells
376	56	(B)(1)	8-140			Power distribution blocks in wireways used ahead of service main must be listed for the purpose
376	56	(B)(5)	8-142			Conductors in wireway must be arranged so they do not obstruct power distribution block terminals (where used)
386	30		8-153			Support requirements extended to cover associated surface metal raceway fittings
386	120		8-154			Marking requirements (manufacturer's identification) added for surface metal raceways - rejected proposal to allow pendant mounting
388	30		8-156			Support requirements extended to associated surface nonmetallic raceway fittings
388	120		8-157			Marking requirements (manufacturer's identification) added for surface nonmetallic raceways - rejected proposal to allow pendant mounting
392	10	(A) Table	8-158a			Table of wiring methods permitted in cable tray revised - including type abbreviations
392	18	(H)	8-182			Maximum spacing of markings on cable trays (over 600 v) modified for some industrial installations
392	20	(A)(8)(B)	8-187			Voltage limits or rules changed to be based on operating voltage rather than cable rating.
393		new	18-10a			New article on Low Voltage Suspended Ceiling Power Distribution Systems
399	2		7-85			Revised definition clarifies that outdoor overhead conductors are installed in free air
399	10		7-87			Permitted uses of outdoor overhead conductors revised to include requirement that they be in free air
400	4	Table	6-77 - many			Added size 15 AWG to table of cord types, revised many notes and other corrections
400	4	Table	6-86			Special cord types - "subject of special investigation deleted" replaced with permission of the AHJ
400	5	(A)	6-93a			Temperature correction factors apply to both Tables 400.5(A)(1) and (2) and 90 deg factors apply to 105 deg types
400	5	(A)(1) Table	6-95, 6-96			Additional cord types, sizes, and ampacities in Table 400.5(A)(1)
400	6	(A)	6-100			Marking on flexible cord or cable must include the maximum operating temperature
400	7	(11)	6-101			Connections to inlets supplying a single receptacle outlet permitted if the entire assembly is listed.
400	8	(9)	6-103	6-73 reject		Up to 6 ft listed nondetachable power supply cord for some equipment permitted above ceilings if not prohibited by 300.22 - rejected
400	23		6-105	6-75		Cords with integral insulation and jacket connected to equipment not requiring grounding may be green
400	30		6-106			Part III also applies to single conductor portable cables
400	31	(B)	6-106a			Only cords with three or more conductors are required to include an equipment grounding conductor
404	2	(C)	9-91			Grounded conductor not required at door jamb switches - Accepted in principle but not incorporated in language
404	2	(C) Exc	9-87	9-44		Grounded conductor not required at switch locations where snap switches with integral enclosures are used
404	2	(C) Exc	9-89	9-44		Grounded conductor not required at some switch locations where multiple switches control the same lighting load
404	8	(C)	9-97	9-47		Multipole snap switches no longer permitted for more than a single circuit unless marked for two- or three-circuits (not based on voltage)

Art	Sec Sub	ROP	ROC	NITMAM	Description
404	10 (B)	9-98			Screws used for attaching a switch to a box must be machine screws matching the thread in the box
406	3 (E) new	18-15			Controlled receptacles other than those used as switched lighting outlets must be marked with a switch symbol
406	4 (D)	18-18			AF-CI and GFCI receptacles must be installed in readily accessible locations
406	5 (E)	18-32			Receptacles in countertops and work surfaces any occupancy not allowed to be installed in face-up position unless listed for countertops
406	5 (F)	18-34			Receptacles in seating areas and similar areas may not be face-up unless listed for the use - including floor boxes
406	9 (B)(1)	18-37	18-23		"Extra-duty" outlet box hoods required for 15/20 A 125 V receptacles in wet locations in all occupancies - not based on mounting method
406	12	18-41			Combine all tamper-proof requirements in one section, exceptions now also apply in guest rooms and child care
406	15	18-53			Receptacles for dimmer-controlled lighting must be non-standard configuration and plug/receptacle specifically listed
408		9-104a			Title of article changed to "Switchboards, Switchgear, and Panelboards"
408	3	9-103a			Include switchgear, add marking requirements for DC and impedance grounded systems, add bus arrangements
408	4 (B)	9-116			Marking of source to include all sources if there is more than one
408	55	9-130			Subdivide requirements for top and bottom, side, and back wiring spaces in panelboards - back wiring space added
408	56 Table	9-133			Revise table of minimum spacings to include DC systems
409	20	11-13			Revised to treat all heating loads (resistive, inductive) the same for conductor sizing
410	6	18-59			Revised to require listing of retrofit kits
410	10 (F)	18-66			Spacing from roof decking required for luminaires - same as for wiring and boxes
410	23	18-69			Only combustible area over 180 sq in between box and luminaire pan or canopy must have noncombustible covering
410	130 (G)(1)	18-80, others	18-31, 18-35		Exception for disconnecting means for double-ended fluorescent lamps in industrial establishments has been deleted.
410	151 (B)	18-84a			Informational note on load calculation for lighting track and luminaires on the track changed to code text - contained a requirement
422	2	17-18a	17-3 reject		New definition of Portable GFCI protection - includes description of tripping modes - rejected
422	5	17-19			GFCI used for appliances must be readily accessible for regular testing (not necessarily a receptacle)
422	11 (F)(3)	17-21			Requirements for resistance-type immersion heaters revised and put into a list
422	16 (B)(1)	17-23			Kitchen waste disposers changed to "in-sink waste disposers" not limited to kitchens
422	19 also 20, 21	17-30			Extend requirements for outlet boxes and canopies for luminaires to paddle fans
422	23 new	17-31			Tire inflation and automotive vacuums installed for public use must have GFCI protection
422	32 (C)	17-35			Clarify that for motor operated appliances over 1/8 hp without a BC device in sight, a disconnect in sight must be provided
422	49	17-18a			High-pressure spray washing GFCI to be provided as part of appliance - voltage/phase limits removed
422	51	17-18a			Vending machines - GFCI to be identified for portable use or, if hard-wired, connected to GFCI protected circuit
422	51	17-38			Vending machines require GFCI protection even when not cord- and plug-connected
424	19	17-49	17-17		Fixed electric space heating can be supplied by more than one feeder or branch circuit - disconnects grouped, marked, lockable
424	66 (A)&(B)	17-75	17-19		Limited working space required around duct heaters - allowing access through T-bar and T-bar allowed in working space
427	2	17-73			Delete unused definition of Integrated Heating System
430	also 440				Delete 13 informational notes determined to be unnecessary - most referred to related sections - relocate others
430	22 (G)	11-29a			Change ampacity to full-load current and include Class 10A overload devices for one condition of use of conductors smaller than 14
430	32 (C) IN	11-33a			Add Class 10A overload devices to informational note (operates in less than 10 seconds)
430	52 (C)(5)	11-35a			Revise to refer to semiconductor fuses - and include the types of electronic devices they may be used for
430	53 (D)	11-36b			Clarifies application of tap rules for multiple motors - length of tap is length of conductor from the point of the tap
430	130 new	11-60a	11-21		Selection of motor BC SC and GF protection for single motor with power conversion equipment - special requirements
430	131 new	11-60a	11-21		Selection of motor BC SC and GF protection for multiple motors with power conversion equipment
430	233	11-68			Guards required for over 50 volts to ground - changed from 150 volts to ground
440	9 new	11-83	many - NC	rejected	HVAC equipment installed outdoors using LPMC or EMT must include an equipment grounding conductor - rejected
445	11	13-11			Certain generator markings are required only for over 15 kW
445	11	13-10	13-3		Marking must indicate if the neutral is bonded to generator frame or not and field modification must be noted
445	16	13-13			Requirements related to protection of generator wiring apply only to field-installed wiring
445	17 new	13-14			Generator terminal housing size does not apply to generators over 600 v

Art	Sec Sub	ROP	ROC	NITMAM	Description
445	18	13-16			Cord and plug may be acceptable means of generator disconnect
445	19	13-16a	various		Section deleted - Article 445 should not address what a generator can supply
445	20 new	13-19			GFCI required for 15/20 A 125 v receptacles on generators 15 kw or smaller
450	3 (A) Table	9-138			Note on fuse sizes revised for over 600 volts - not based on 240.6 but on commercially available sizes
450	10 (A)	9-144			Terminal bar required for separate EGCs and SSBJs - not installed on or over vented portions of transformer
450	11 (A) & (B)	9-145			Nameplate information put in a list, reverse connection allowed in accordance with manufacturer's instructions
480	3 new	13-22			New section addresses battery and cell interconnections and terminations
480		13-23 to 13-45			Numerous revisions to definitions and installation requirements, many from material deleted from NFPA 70E
490	21 (B)(6)	9-157			Field installed danger sign required to warn to disconnect circuit before replacing fuses
490	25 (A)&(B)	9-165			Where backfeed is possible danger sign must be provided with single-line diagram of switching
490	35 (A)	9-171			Danger signs required on panels or doors that provide access to parts over 1000 volts
490	47	9-178			Danger sign must indicate when access is limited to the serving utility
490	48 new	9-179			Single-line diagram permitted to be visible and in the same room or enclosed area -many other details for substations
500	5 (A)	14-15a			Text on areas with pyrophoric materials changed from "not classified" to "outside the scope of the article"
500	6 (A) IN 3	14-18			"Ignition temperature" changed to "autoignition temperature" where it relates to gas and vapor - multiple places
500	8 (C)(4)	14-24			Temperature class for Class II Div 1 locations is based on temperature with maximum amount of accumulated dust
501	10 (A)(1)(e) new	14-32			Adds permission for optical fiber cables in raceways in CI I, Div 1 areas raceways are required to be sealed
501	10 (B)(1)(5)	14-36			Type TC-ER added to list of permitted wiring methods in CI I, Div 2
501	10 (B)(1)(7)	14-37			Adds permission for optical fiber cables in raceways in CI I, Div 2 areas raceways are required to be sealed
501	10 (B)(2)(3)	14-38			Interlocked armor Type MC cable with listed fittings permitted in CI I, Div 2 areas
501	10 (B)(2)(6)	14-37a			Type EO, ETP, and ETT elevator cables permitted in CI I, Div 2 with listed fittings
501	15 (C)(6)	14-48			Fill in seals (25%) applies to "optical fiber tube"
501	15 (D)(2)	14-49			Optical fiber tubes added to sealing requirements for cables in conduit
501	15 (E)(1)	14-50			Cable seals explicitly required to be explosionproof when cables enter enclosures required to be explosionproof (unless factory sealed)
501	17	14-54			Add-on secondary seal permitted as an alternative for process sealing to supplement a single process seal
501	40	14-59			Delete section - all multiwire circuits are now required to have simultaneous disconnection
501	105 (B)(6)(1)	14-62			Switch to disconnect power for disconnection of flexible cord to process instruments not required for nonincendive circuits
501	125 IN 4	14-66			New IN considers issues relating to ignition systems in engine driven compressors and the like in CI I Div 2
501	140 (A)(1)	14-75			Flexible cord attachments to utilization equipment must be listed for the protection technique used for the wiring compartment
502	10 (A)(1)(4)	14-83			New subsection adds optical fiber cables in raceways to CI II Div 1 wiring methods - sealing required
502	10 (A)(2)(5)	14-84			Dusttight fittings changed to dusttight cord connectors for flexible cord in CI II Div 1 locations
502	10 (B)(1)(8)	14-88			Adds permission for optical fiber cables in raceways in CI II, Div 2 areas - raceways are required to be sealed
502	10 (B)(2)(6)	14-88a			Type EO, ETP, and ETT elevator cables permitted in CI II, Div 2 with listed fittings
502	10 (A)	14-80			Section reorganized - boxes and fittings moved and IN relocated to clarify the IN is about the boxes and fittings
502	40 Exc	14-92			Delete section - all multiwire circuits are now required to have simultaneous disconnection
502	140	14-96			Uses of flexible cords in CI II areas revised to mostly mirror the requirements in 501.140 - esp connection methods
502	145	14-97			Receptacles and attachment plugs must be identified for the location - receptacles part of premises wiring
503	5	14-98			Operating temperature - equipment is covered with maximum amount of dust that can accumulate to simulate fibers/flyings
503	10 (A)(1)(4)	14-106			Types TC and TC-ER added to list of permitted wiring methods in CIII, Div 1 and 2
503	10 (A)(3)(6)	14-105a			Type EO, ETP, and ETT elevator cables permitted in CI III with listed fittings
504		14-112			Revisions to definition and installation of associated apparatus, separations, and informational notes
505	5 (A)	14-136a			Text on areas with pyrophoric materials changed from "not classified" to "outside the scope of the article"
505	9 (C)	14-148			Paragraph explaining markings deleted - all equipment now requires group subdivision marking (IIA, IIB, IIC)
505	9 (C)(2) Exc 3	14-152			Cable termination fittings not required to be marked with operating temperature or temperature class
505	9 (C)(2)(4) T	14-150			Table revised to add type of protection "mc" for Zone 2 application

Art	Sec Sub	ROP	ROC	NITMAM	Description
505	9 (C)(2)(5)	14-152a			Marking may be for a specific gas or vapor rather than group subdivision
505	9 (E)(1)	14-155			Listed fittings required for conduit and cable required for use with threaded entries
505	15 (B)(1) & (2)	14-160			Two informational notes added regarding cables, cable connectors, and cord fittings in CI I Zone 2
505	15 (B)(1)(g)	14-162			Wiring methods for type of protection "lb" are the same as for "la"
505	15 (B)(1)(h)	14-163			Adds permission for optical fiber cables in raceways in CI, Zone 1 areas raceways are required to be sealed
505	15 (C)(1)(b)	14-168			Types TC and TC-ER added to list of permitted wiring methods in CI, Zone 2
505	15 (C)(1)(h)	14-169			Adds permission for optical fiber cables in raceways in CI, Zone 2 areas raceways are required to be sealed
505	15 (C)(2)	14-169a			Type EO, ETP, and ETT elevator cables permitted in CI Zone 2 with listed fittings
505	16 (B)(5)	14-172 others			Optical fiber tubes and multifiber cables added to sealing requirements for cables in conduit
505	16 (D)(5)	14-176			Fill in seals (25%) applies to "optical fiber tube"
505	17	14-180			Section retitled, Adds instrumentation connectors for CI I Zone 2, switch not required for intrinsically safe circuits
505	21	14-184			Delete section - all multiwire circuits are now required to have simultaneous disconnection
505	22	14-185			New IN considers issues relating to ignition systems in engine driven compressors and the like in CI I Zone 2
505	26 (4)	14-189			Add-on secondary seal permitted as an alternative for process sealing to supplement a single process seal
506	3	14-199			General statement added requiring compliance with other articles except as modified by 504 and 506
506	6	14-200a			Groups IIIC, IIIB, and IIIA added - new section on material groups
506	8 (E)	14-203			Three types of protection by encapsulation - removes type "mD" replaced by "mc" for Zone 22 locations
506	9 (C)(1)	14-204a, 205a			Material Group added to required markings
506	9 (C)(2) Exc 3	14-209			Temperature classification marking not required for intrinsically safe apparatus not exposed to combustible dust
506	9 (C)(2)(3) T	14-208			Protection by enclosures added for Zone 20
506	9 (C)(2)(3) T	14-206, 14-207			Protection by intrinsic safety (ic) and encapsulation (mc) added to Table for Zone 22
506	9 (D)	14-210			Operating temperature - equipment is covered with maximum amount of dust that can accumulate to simulate fibers/flyings
506	9 (E)(1)	14-211			Cable and conduit fittings for threaded connections must be listed
506	15 (A)&(B)	14-212			Exceptions - Zone 20, 21 wiring methods for intrinsically safe are as permitted by 504.20 (not same as Divisions)
506	15 (A)(6)	14-215a			Type EO, ETP, and ETT elevator cables permitted in Zone 20 with listed fittings
506	15 (A)(7)	14-219, 223			Optical fiber cables permitted in Zone 20, 21, and 22 with appropriate seals
506	15 (C)(6)	14-221			Type TC-ER permitted in Zone 22
506	15 (C)(7)	14-222			Field wiring (any type) for nonincendive circuits in Zone 22 revised to refer to intrinsically safe "ic"
506	20 (D)	14-225			Substitutions of equipment marked for Material Groups IIIC and IIIB - IIIC for IIIA or IIIB, IIIB for IIIA
506	21	14-225a			Delete section - all multiwire circuits are now required to have simultaneous disconnection
514	3 (B)(1) & (2)	14-237			New diagrams for classification of areas for dispenser mounted on aboveground storage tank
514	3 (C)	14-238			Area classification for motor fuel dispensing in marinas and boatyards relocated to 514.3(C)
515	2	14-241a			Section deleted - redundant definition of bulk plant or terminal
516		14-243			Title revised to include printing processes using flammable or combustible materials
517	2	15-13			Deleted "emergency system" - now essential system consisting of life safety, critical, and equipment branches - many locations
517	2	15-12 to 15-24			Revised definitions - extracted from NFPA 99 - not all match NFPA 99 - changed "areas" to "rooms" or "spaces"
517	16	15-31			IG receptacles allowed in health care but not in patient care vicinity (where redundant grounding is required)
517	18 (A)	15-34			Receptacles from Critical Branch in patient bedrooms must be marked with color or other marking and with panelboard and circuit number
517	18 (B)	15-36			Minimum number of receptacles in patient bed locations increased to eight from four
517	19 (A)	15-38			Two or more receptacles in patient bed locations must be supplied from critical branch (previously emergency system)
517	19 (B)	15-39			Minimum number of receptacles in critical care area patient bed locations increased to 14 from six
517	19 (C)	15-41			New section requires 36 receptacles in operating room - 12 from normal branch or critical branch different from others
517	26	15-48			Requirements of Article 700 apply only to Life Safety Branch
517	30 (C)(3)	15-60, 61			RTRC-XW and some MC cable permitted for mechanical protection of the life safety and critical branches
517	30 (E)	15-64, 65		rejected	Receptacles on essential electrical system shall have illuminated faces or indicator lights when powered (rejected for hospitals only)

Art	Sec Sub	ROP	ROC	NITMAM	Description
517	30 (F) new	15-67			Feeder from alternate power source permitted to point of separation of branches (and transfer means)
517	30 (G) new	15-68 - 15-65			Selective coordination only required for fault duration beyond 0.1 seconds. Reported reject due to <2/3 vote, but passed in comment
517	32 (F)	15-70			Generator set accessories may be connected directly to the generator through an overcurrent protective device
517	33 (A)(7)	15-73			Data equipment is permitted on the Critical Branch
517	33 (B) new	15-71	rejected but e/ rejected		Critical branch task illumination may be switched - switches, motion sensors, dimmers, LV control, load control (700 does not apply)
517	34 (A)(8)	15-75			HVAC equipment for telephone and data equipment rooms added to equipment branch
517	35 (C)	15-78			Physical separation of main feeders from alternate source must be considered to prevent simultaneous interruption
517	41 (E)	15-80			Receptacles on essential electrical system shall have illuminated faces or indicator lights when powered (nursing homes)
520	2	15-99			New definition of Stage Lighting Hoist
520	2	15-98			New definitions of Stage Equipment and Stage Switchboard
520	21	15-107, 109			Revise requirements for Fixed Stage Switchboards, listing required, multiple permitted, not necessarily supplying equipment on stage
520	22	15-108			Section deleted - referred to obsolete type of switchboard
520	23	15-108a			Section deleted - part moved to 520-21
520	24	15-110			Section deleted - referred to obsolete type of switchboard
520	26 (D)	15-110a			Add Constant Power switchboards - for lighting controlled by data connection directly to luminaire
520	40	15-111			New section covers Stage Lighting Hoists - listed and special rules for some cables with cable handling systems
520	68 (A)(2)	15-117			Revision allows use of hard-usage cord rather than extra-hard-usage cord with five conditions
547	2	19-11a	19-5		Revised definition of equipotential plane - "minimize" rather than "prevent" potentials in the plane and between plain and other equipment
547	5 (F)	19-20	19-8		Aluminum EGC permitted underground - insulated or covered
547	9 (B)(3)(2)	19-21			Clarifies that EGC connection is to site-isolating device enclosure
550	2 and others	19-27			Delete definition of "distribution panelboard" and change other references to just "panelboard"
550	2	19-28			Delete unused definition of Stationary Appliance
550	15 (H)	19-37, 19-39			Replace under-chassis wiring requirements with requirement for physical protection
551	2 and others	19-45			Delete definition of "distribution panelboard" and change other references to just "panelboard"
551	2	19-44b, 44c			Delete unused definitions of Portable Appliance and Stationary Appliance
551	2	19-48			Relocate part of description of "recreational vehicle" from definition to informational notes
551	4 (C)	19-50	19-23		Label requirements for RVs standardized
551	30 (E)	19-52			Revise requirements for location of termination of supply conductors and add enclosed transfer switches
551	41 (B)	19-56			Receptacle requirements for countertops apply only to those at least 12 in in both width and depth
551	41 (B)(4) new	19-57			Receptacle required for roof top decks if deck is accessible from inside the RV
551	46 (D)	19-63			Requirement for label at electrical entrance reduced to required wording - other requirements moved to 551.4
551	47 (R)(4)	19-74			Requirement for label for future generator connection reduced to required wording - other requirements moved to 551.4
551	47 (S)(4)	19-75			Requirement for label for future load connection reduced to required wording - other requirements moved to 551.4
551	71	19-77			RV sites with 50 A receptacles must also have 30 A receptacles
555	15 (B)(8)(C)	19-106	19-36		Equipment grounding conductor may be insulated aluminum - not copper only
555	21	19-108			Delete area classification for motor fueling at marinas - relocated to 514.3(C)
590	4 (D)(2)	3-102	3-33		All wet location temporary receptacle covers must be "extra duty." (by reference to 406.9(B)(1))
590	4 (D)(2)	3-102			Requirement for weather resistant receptacles and covers applies to temporary installations in 1- and 2-family
590	4 (I)	3-104			Flexible cords and cables connecting to boxes - the termination devices must be listed for connecting cords to boxes
590	4 (J)	3-105	3-35, 3-34		Flexible cord and cable assemblies (other than extension cords) may not be laid on floors or on the ground for temporary wiring
600	2	18-89a			Revised definition of neon tubing includes cold cathode luminous tubing (from informational note)
600	3	18-91			In addition to listing required of all but skeleton tubing, installation instructions must be provided with signs
600	4 (E)	18-93			Except for portable cord-connected signs, markings must include requirements for field wiring and instructions
600	6 (A)(1)	18-99	18-46, 18-47		Sign disconnect located at point of entry of supply conductors - except conductors passing through in raceway
600	7 (A)(1)	18-103			Equipment requiring connection to an EGC includes metal parts of skeleton tubing systems

Art	Sec Sub	ROP	ROC	NITMAM	Description
600	10	18-108			"Factory-Installed" changed to manufacture shall provide . . . GFCI protection for portable signs
600	12 (A)(B)	18-110			Secondary circuit wiring refers specifically to neon (not HID, fluorescent)
600	12	18-109			Retrofit kits must be installed according to installation instructions
600	21	18-113			Requirements for enclosures, accessibility, location, working space, etc apply to Class 2 power sources
605	Entire Art	18-125a			Revised article, added definition of Office Furnishing (replaces "partition") clarified cord connections for Class 2 lighting
610	31 Exception	12-12a			Runway conductor disconnect may be "out of view" of runway contact conductors in electrolytic cell lines or if impracticable
620	31	12-10			Crane disconnect must comply with 430.109 (type)
620	32	12-12b			Crane disconnect must comply with 430.109 (type)
620	13 (B)	12-19a			Motor controller nameplate current is permitted to be derived from rms current based on intermittent duty cycle
620	21 Exception	12-28			Cords of listed cord and plug connected equipment such as computer displays may be run without raceways
620	22 (B)	12-30a			"Dedicated" BC changed to "separate" BC for AC and heating source on elevator cars
620	41	12-32b			IN language changed to code text to define the unsupported length of car or hoistway suspension cable
620	51 (C)(1)	12-37, 12-39	12-16, 12-17		Enclosed, externally operable motor-circuit switch for disconnect in hoistway may be fused or non-fused
620	53 Exc	12-45			"Individual" BC changed to "separate" BC for car lighting, receptacles, and ventilation circuit
620	62	12-50			Selective coordination -selected by licensed professional engineer or other qualified person, documented, available
625		12-52			Article renumbered and reorganized
625	2	12-52			Added definitions of "power supply cord" and "output cable to the electric vehicle"
625	2	12-52, 12-66			Revised definitions of "electric vehicle coupler" and "electric vehicle inlet"
625	28	12-52			Section deleted - general reference to Articles 500-516
625	41 new	12-52, 12-63			EVSE Load management system can be used for feeder and service calculations
625	44 new	12-52, 12-59			Clarify requirements for electric vehicle supply equipment (EVSE) connections (connections to receptacles)
625	44	12-52			Receptacle connections at 15 or 20 A limited to 50 VDC (or 125 VAC)
626	5 new	12-79			Equipment located in electrified truck parking space may be used for EVSE - additional equipment permitted
630	13	12-93	12-53		Clarified that disconnect must be identified to indicate what it supplies- not just identified as a disconnect
640	1 (B)	12-93a			Scope revised to include "not covered;" fire and burglar alarm signaling devices
640	2	12-102, 103			Deleted definitions of Powered Loudspeaker and Rated Load Impedance - not used in Article 640
645	4	12-114			Requirements for HVAC system revised to a list of requirements under two options
645	5 (E)(6)	12-131			Permitted cable types for underfloor use reformatted into a list
645	14	12-138			New provisions clarify application of grounding/bonding requirements for system in ITE rooms
645	15	12-139			Any auxiliary grounding electrodes installed for ITE shall be installed in accordance with Section 250.54
645	27 new	12-143			Selective coordination is required for critical operations data systems
646	new article	12-147			New article on modular data centers - preabridged but similar to Article 645 in many respects
665	2	12-154			"Heating Equipment Applicator" changed to "Applicator" as a defined term
665	26 IN	12-158a			Revise Informational note to explain how grounding of the heated object can reduce unsafe conditions
680	2	17-90			Definition of Storable Swimming, Wading, or Immersion Pools changed to include Storable/Portable Spas and Hot Tubs
680	2	17-83a			Definitions of fixed, stationary, and portable "equipment" changed to "(as applied to equipment)"
680	12	17-96			"Fountain" added to requirements for disconnecting means (including location)
680	21 (C)	17-100			GFCI required for outlets supplying pool pump motors at any rating if single phase 120 or 240 volts
680	22 (A)(1)	17-106			Required receptacles (GFCI) applies to any occupancy, not just dwellings
680	22 (A)(2)	17-101 others	17-31		Receptacles for pool pump motors (between 6 ft and 10 ft from pool) are not required to be locking configuration
680	22 (B)(6)	17-108	17-32, 17-33		Some listed low voltage luminaires (between 6 ft and 10 ft from pool) are not required to be locking configuration
680	23	17-109			Normal water level changed to maximum water level for requirements for luminaires below water
680	25 (A)(1) Exc	17-119	17-37		Exception revised that allowed feeders for pools without insulated EGC if they were existing - not required to be existing
680	26 (C)	17-131			Requirements for "bonding" of pool water revised and clarified without use of the word - minimum surface area in contact with water
680	30 (Part III)	17-137			Spas and Hot Tubs added to requirements for Storable Pools

Art	Sec Sub	ROP	ROC	NITMAM	Description
680	42 (A)(1)	17-140			LFMC and LFNC used as wiring method for Spas and Hot Tubs - length limitation eliminated
680	42 (B)	17-142			Specifies conditions under which equipotential bonding is not required for Spas and Hot Tubs
680	42 (C)	17-145			"One-family dwelling" changed to "dwelling unit" for application of interior wiring methods to outdoors
680	43 Exc 3 new	17-146			Indoor wiring methods of 680.42(C) also apply to indoor installations in dwelling units
680	57 (B)	17-147	17-48		GFCI requirements for signs in fountains applies to feeders as well as branch circuits
680	74	17-148			Clarifies that only piping systems and other grounded metal parts in contact with circulating water are to be bonded
690	1 (A)	4-170			Blocking diodes removed from diagram
690	2	4-172, 4-173	4-81, 4-83		Add definition of Direct Current (dc) Combiner and DC-to-DC Converter to clarify naming of this type of equipment
690	2	4-181			Add definition of Multimode Inverter - capabilities of both utility-interactive and stand-alone inverters
690	4	4-188a, 190			Section rewritten to cover PV Systems, Equipment, Qualified Personnel, and Multiple Inverters - rest moved to 690.31
690	5 (A)	4-214			Revise requirements for function of GF Detection and Interruption - allows opening of grounded conductor to determine insulation/isolation
690	5	4-212			One Exception deleted that allowed PV arrays installed without dc ground fault protection
690	6 (D)	4-218			Delete section for ac modules with a single detection device that detect only ac ground faults
690	7 (F)	4-325	4-91		New section added to cover requirements for disconnects and overcurrent protection
690	8	4-225a			Revise 690.8 to cover only circuit sizing and current calcs - OCD sizing moved to 690.9 - added dc to dc converters
690	9	4-232a, others	various		Revise 690.9 - include OCD from 690.8, location, listing, no supplementary OCD used for BC, ungrounded PV
690	10 (E)	4-246			Requirement to secure back-fed CB applies to stand-alone and multi-mode inverters but not utility-interactive
690	11	4-246a			Arc-fault protection required for both DC source and DC output, other prescriptive operational requirements deleted
690	11	4-251			Arc-fault protection required - applies to all PV arrays, including those not penetrating a building
690	12 new	4-253	various		Emergency shut-down must disconnect all PV source circuits - applies to specific minimum lengths in buildings or from array
690	13	4-254a			Section rewritten to address building disconnect location, marking, SUSE number, and grouping - like Art 230
690	14	4-258			Section deleted - text moved to 690.13 and 690.15
690	15	4-274a			Section revised includes text from 690.14 adds requirements for dc combiner disconnects, PV-side equipment permitted
690	17	4-278a			Retitled "disconnect type" includes operational details, opening of poles, external operation, grounded conductor
690	31	4-284a, others	many		Rewritten - part from 690.4, guarding in place of raceway for PV circuits in readily accessible locations, cable types
690	35 (C)	4-302			Revise requirements for function of GF Detection and Interruption in ungrounded PV systems - determine insulation, listing required
690	35 (D)(1)	4-305a			Add metallic jacketed multiconductor cables and listed direct burial conductors to source wiring methods for ungrounded PV systems
690	41	4-307			Revised to list form for clarity and eliminates voltage minimum or maximum for grounded systems - impedance grounding permitted
690	45	4-308a			690.45(B) deleted - clarifies sizing method for EGCs
690	46	4-309			Solid 6 AWG may be used in raceway for equipment grounding conductor - protection for EGCs is per 250.120@
690	47 (B)	4-310a			AC equipment grounding system is permitted for grounding and for ground detection reference
690	47 (C)	4-310a			Separate dc grounding electrode or GEC not always required - EGC and GEC may be combined, sizing for ungrounded systems added
690	47 (D)	4-315	various		Added auxiliary grounding electrode required at pole-mounted and ground-mounted arrays (close as possible for roof-mounted)
690	53	4-318			Label at PV source required to include "maximum current" from 690.8 rather than "short-circuit current"
690	56	4-320			Markings for Stand-alone, Utility services with PV systems, and PV systems with rapid shut-down revised
690	71 (H) new	4-325			Adds requirements for disconnecting means and OCP for energy storage
690	71	4-323			Proposal to create separate article for "energy storage systems" accepted but rejected by TCC and other panel
690	81	4-227	4-92		PV systems over 1000 volts may be used within listings, burial depths of 300-50 apply to listed DB conductors from 600-2000 volts
690	90 new	4-331			PV systems used directly for charging EVs must also comply with Article 625
690	91 new	4-331			Charging equipment must comply with 625.10 but personnel prot and automatic de-energization do not apply for PV up to 80VDC
694	7 (B)	4-354			"Systems, subassemblies and components" shall be listed for the application (previously inverters)
694	7 (F)	4-356			Added section on poles or towers - may be used as a raceway if evaluated as part of listing of turbine
694	23 new	4-364a			Manual shutdown button or switch required except small turbines (based on "swept area), procedure must be posted
694	30 (B)	4-368			Flexible, fine-stranded cables must be terminated in accordance with 110.14
694	30 (C)	4-370			DC output circuits inside buildings may be installed in MC cable to the first disconnect

Art	Sec Sub	ROP	ROC	NITMAM	Description
694	40	4-370a			Section revised - covering equipment grounding and bonding of tower, lightning protection, and guy wires
694		4-345			"Small" deleted from title, scope now wind electric systems over 100 kW
694					Numerous minor technical corrections - marked rather than identified, other sources, not services.
695	1 (B)	13-48a			Does not cover installation of pressure maint (jockey or makeup) pumps or transfer equipment ahead of fire pump transfer switch
695	3 (F)	13-55a			Transfer - individual source to one alternate source must take place in pump room - listed for fire pump service, instant, trip CB allowed
695	4 (B)(2)	13-58			OCP details added - not to open at 600% for 2 minutes, restart transient up to 24 x FLC, 300% for 10 minutes, no field adjustment
695	4 (B)(2)	13-57			OCP must be rated to carry locked rotor current of only the largest fire pump motor plus FLC of all others
695	4 (B)(3)	13-62			Fire pump disconnect not in same enclosure, panelboard, switchboard, switchgear, or MCC that supplies other loads
695	6 (D)	13-70			Terminations at motor terminals - twist-on, insulation-piercing, and soldered connections not permitted
695	7 (B)	13-82			Voltage drop limit of 5% while running applies at load terminals of controller
700	2	13-91			Add diagram to definition of Emergency Systems
700	2	13-88a			Revised definition of Automatic Load Control Relay - previous definition reported as overly broad and ambiguous
700	8	13-98	13-68, 13-69		Listed SPD required on all emergency system switchboard and panelboards (to protect electronics in emergency system)
700	10 (B)(5)	13-104			Clarification on separation requirements - deletion of apparent rules about standby and other loads
700	10 (D)	13-105			Remove list of occupancy classes - fire protection required for over 1000 persons or in buildings over 75 ft
700	10 (D)(1)	13-109			Delete "listed thermal barrier system" - included in "listed electrical circuit protective system"
700	12 (B)(6)	13-111			Disconnecting means meeting requirements of 445.18 and in sight of building are sufficient
700	12 (F) Exc	13-116			Exception allowing separate circuits for unit equipment is three circuits not part of a multiwire BC
700	19	13-118			Branch circuits for emergency lighting and power may not be part of a multiwire branch circuit
700	23	13-120			"Dimmer systems" changed to "dimmer or relay systems" for energizing emergency lighting
700	24 new	13-121	13-81		New section covers Directly Controlled Luminaires - must be individually listed
700	27	13-122			Ground fault indication required only where GFPE is not provided - not providing is permissive
700	28	13-126		13-85	Selective coordination must be done by LPE or others qualified and must be documented and available
701	2	13-130			Added figure for illustration of connections in legally required standby system
701	12 (B)(5)	13-111			Disconnecting means meeting requirements of 445.18 and in sight of building are sufficient
701	26	13-138			Ground fault indication required only where GFPE is not provided - not providing is permissive
701	27	13-139	13-92		Selective coordination must be done by LPE or others qualified and must be documented and available
702	2	13-141			Added figure for illustration of connections in optional standby system
702	7 (C) new	13-146			Signage required warning of type of system to be connected through a power inlet
702	12 (A)	13-148			Cord-and-plug type connections do not require additional disconnecting means for generators 15KW or less
702	12	13-111			Disconnecting means meeting requirements of 445.18 and in sight of building are sufficient
705	2	4-379			Deleted definition of Point of Common Coupling
705	2	4-378			New definition of Multimode Inverter - having characteristics of both utility-interactive and stand-alone
705	2	4-375b			Deleted definition of Hybrid System - original proposal was to clarify that elevator regeneration is not a hybrid system
705	12 (D)	4-375a - many	many		Rewritten section on connections to utility-interactive converters see 3-394 and 3-396
705	12 (D)(3)	4-399			Section deleted - covered by 705.32 - Ground-Fault Protection
705	31 new	4-410a			Max 10 ft of power production source conductors from service to first OCD - unless other current limiting means are used
707	new	13-152			Proposed new article on stand-alone electric systems rejected
708	2	13-156			New explanation and diagram added to definition of COPS
708	10 (A)(1)	13-159			Identification of COPS components required only when another power system is present
708	14 (7)	13-171			Emergency communications cables must nser rated including CI rated cables (GMR-CI) - if not CI must have 2-hour protection
708	14 (1)&(2)	13-170			Cables and shields are to be installed per manufacturer's instructions - not necessarily shielded twisted pair
708	20 (F)(5)	13-172a			Cord-and-plug type connections do not require additional disconnecting means for generators 15KW or less
708	52 (D)	13-175			GF P - Six-cycle separation of curves deleted - follow mfg's recommendations for 100% selectivity - 517 changed in 2011
708	54	13-176	13-110		Selective coordination must be done by LPE or others qualified and must be documented and available

Art	Sec Sub	ROP	ROC	NITMAM	Description
708	54 Exc new	13-177			Selective coordination not required between two OCDs in series - no loads in parallel with downstream device
710	new	13-179			New article on DC microgrids rejected - technicalities and lack of substantiation - for direct use of dc
725	2	7-15	3-45a		New definition of Power-Limited Tray Cable (PLTC)
725	3 (K)&(L) new	3-122a	3-46		725 cables may not be run with other (non-electrical) systems, must be acceptable for use in corrosive, wet, damp locations if applicable
725	49 (B)	3-138			Conductor insulation changed from 600 volt to "rated for system voltage and not less than 600 volts"
725	135				New section covers installation of cables - separated from 725.154 covering applications
725	154 Table	3-154			Table of cable types with prohibited and permitted uses added - table limited to applications - installation covered by 725.135
725	179 (F)	3-165	3-74, 3-75		Separate requirements for CI cable and electrical circuit protective systems into separate subsections
725	179	3-163a			Change nonmetallic signaling raceways to nonmetallic communication raceways
728	new	3-170			New article on fire resistive cable systems - most installation details refer to listing or manufacturer's instructions
750	new	13-180			New article on energy management systems
760	3 (D)	3-173			Add reference to 300.5(B) and 300.9 for installations in wet locations
760	24 (B) new	3-178			Add minimum spacings of supports for CI Cable - supports and fasteners must be steel
760	32	3-178a			All fire alarm circuits extending beyond one building must have transient protection and installed to Part I of Art 300
760	49 (B)	3-182			Conductor insulation changed from 600 volt to "rated for system voltage and not less than 600 volts"
760	51	3-183			This section on raceway fill applies only to NPLFA conductors installed with power supply conductors (but see 760.3)
760	135				New section covers installation of cables - separated from 760.154 covering applications
760	154 Table	3-202			Table of cable types with prohibited and permitted uses (applications) added
760	179 (G)(1)&(2)	3-208			Separate requirements for CI cable and electrical circuit protective systems into separate subsections
770	2	16-26a			Add definition of Electrical Circuit Protective System and add to 770.179
770	2	16-28			Add definition of Innerduct
770	2	16-30			Revise definition of Optical Fiber Cable to include field assembly with IN
770	2	16-31			Revised definition of Point of Entrance to remove grounding requirement for RMC and IMC
770	3 (B)	16-36			Added reference to 300.22(A) for conductive optical fiber cables (other parts of 300.22 not referenced)
770	12	16-38a			Replace references to optical fiber raceways with communication raceways see 16-62
770	24	16-42			Cable ties in plenums must be "listed as having low smoke and heat release properties"
770	47 new	16-46			Added section correlates requirements for Underground OFC with those for communications - separations
770	49 new	16-48			New section details requirements for grounding RMC or IMC entrance conduits
770	100 (A)(4)	16-50			Length limitations of bonding conductor or grounding electrode conductor added with exception - like 800.100
770	100 (A)(6)	16-51			Clarify bonding and physical protection requirements for bonding conductors and GECs - like 800.100
770	110	16-57, 16-58	many		Added installation requirements for Cable Routing Assemblies - changed "other permitted raceways" to "communications raceways"
770	133 (C)	16-70			Allows OFC with other limited energy circuits in IT rooms as permitted in Article 645
770	154 Table	16-71			Application table of cable types with prohibited and permitted uses revised
770	179 (G) new	16-79			Separate requirements for CI cable and electrical circuit protective systems - deleted raceways and cable routing assemblies
770	179	16-75			Added marking requirements for field assembled optical fiber cables
770	180 new	16-80			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
770	182	16-81			Deleted section - optical fiber raceways replaced with communications raceways
800	2 new	16-85a			New definition of Electrical Circuit Protective System
800	2	16-87			New definition of Innerduct - a nonmetallic raceway placed within a larger raceway
800	2	16-88			Revised definition of Point of Entrance to remove grounding requirement for RMC and IMC
800	3 (D)	16-92			Add general reference to 110.3(B) and delete the reference in 800.18
800	3 (G)	16-93			Delete references to Art 770 for definition and installation of Cable Routing Assemblies
800	12 new	16-97			Permitted uses of innerduct and materials permitted for use as innerduct
800	24	16-100			Cable ties in plenums must be "listed as having low smoke and heat release properties"
800	26	16-103			Added cable routing assemblies (spread of fire and smoke)

Art	Sec Sub	ROP	ROC	NITMAM	Description
800	49 new	16-104			Added section requires bonding/grounding of RMC or IMC used to extend point of entrance (removed from revised definition)
800	106 (A)(1)	16-114			Clarifies that connection of GEC or bonding conductor to primary protector is to grounding terminal of the protector
800	110	16-116			Adds Cable Routing Assemblies to installation methods permitted - Includes support requirements
800	113	16-120			Adds Cable Routing Assemblies to installation methods for cables
800	133	16-124			Adds Cable Routing Assemblies to requirements for separations
800	154	16-131			Adds Cable Routing Assemblies to table of permitted/prohibited uses
800	170 (C)	16-135			Adds requirements for plenum grade cable ties
800	179 (G)	16-85a, 16-137	16-40, 16-65		CI cables or Electrical Circuit Protective System - two methods of survivability
800	180 new	16-139			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
800	182	16-140			Adds Cable Routing Assemblies to listing requirements
810	6 new	16-144			Antenna Lead-in protectors must be listed and connected between conductors and grounded elements
810	7 new	16-145			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
810	16 (B)	16-147			"Dish" antennas deleted and replaced by "flat" and "parabolic"
820	2	16-159			Revised definition of Point of Entrance to remove grounding requirement for RMC and IMC
820	3 (D)	16-162			Add general reference to 110.3(B)
820	3 (B) & (C) new	16-161			Added reference to 300.22(A) and 300.22(C)(3) for coaxial cables in air-handling spaces
820	24	16-166			Cable ties in plenums must be "listed as having low smoke and heat release properties"
820	26	16-169			Remove references to CATV raceways - term removed in 2011
820	49	16-176			Added section requires bonding/grounding of RMC or IMC used to extend point of entrance (moved from revised definition)
820	106 (A)(2)	16-190			Clarifies that connection GEC to surge arrester is to grounding terminal
820	110	16-191			Adds Cable Routing Assemblies to requirements for raceway installations - including support requirements
820	113	16-195			Adds Plenum Cable Routing Assemblies to methods permitted in vertical runs and plenums
820	133 (A)(1)(b)(1)	16-202			Adds separation requirements in IT rooms that comply with Article 645
820	133	16-199			Adds Cable Routing Assemblies to requirements for separations
820	154	16-204			Adds Cable Routing Assemblies to table of permitted/prohibited applications for coaxial cables
820	180 new	16-211			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
830	2	16-217			Revised definition of Point of Entrance to remove grounding requirement for RMC and IMC
830	3 (B) & (C)	16-219, 220			Added reference to 300.22(A) and (C)(3) for NPB cables
830	24	16-225			Cable ties in plenums must be "listed as having low smoke and heat release properties"
830	49 new	16-234			Added section requires bonding/grounding of RMC or IMC used to extend point of entrance (moved from revised definition)
830	106 (A)(2)	16-244			Clarifies that GEC connection to cable shield, metallic members, or NIU is to grounding terminal
830	110	16-245			Adds Cable Routing Assemblies to requirements for raceway installations - including support requirements
830	113	16-247			Adds Plenum Cable Routing Assemblies to methods permitted in vertical runs and plenums
830	133	16-250, 251			Adds Cable Routing Assemblies to requirements for separations
830	154	16-255, 256			Adds Cable Routing Assemblies to table of permitted/prohibited uses
830	180 new	16-258			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
840	2	16-267			Revised definition of Fiber-to-the-Premises (FTTP)
840	3 (B) & (C)	16-269, 270			Added reference to 300.22(A) and (C)(3) for PPB cables
840	3 (D)	16-272			Add general reference to 110.3(B)
840	49 new	16-280			New section references 770.49 for grounding of metallic entrance conduit
840	103	16-282			Section deleted - redundant - covered by 840.101(C)
840	106 (A)(1)&(2)	16-283, 284			Clarification of grounding requirements for mobile homes without service equipment or disconnect within 30 ft
840	180 new	16-285			Connections to a GEC or bonding conductor must be made with listed devices or be part of listed equipment
900	Tbl 1 Note 10 new	6-112			Dimensions are based on round concentric-lay-stranded conductors (solid conductors are smaller)
900	Tbl 1 Note 6	6-111			For conductors of different sizes, use actual dimensions - or Table 5

Art	Sec	Sub	ROP	ROC	NITMAM	Description
900	Tbl 1	Note 7	8-198, 199			Rounding up from .8 for number of conductors permitted to apply to a single conductor and to cables
900	Tbl 1	Note 9	8-200			Add optical fiber cable
900	Tbl 1		8-202			Title of table changed to include cables
900	Tbl 4		8-204			Layout of Table 4 revised - columns in a different order
900	Tbl 5		6-113, 114	6-78, 6-79		Layout of Table 5 revised - columns in a different order, addition of insulations types for some sizes, corrections
900		Table 4	8-92			Dimensions for ENT revised
1000	Ax A		1-186, 186a			Revised Annex A to include additional items, and correct alphabetizing, remove reference to paragraphs
1001	Ax C		8-204a			Revised Annex C tables for raceway fill - add and remove insulation types in some sizes
1002	Ax D	D.3(a)	2-264			Revised example to "retain full instructional value" after revised ampacity of 1 AWG 90 deg in 2011
1002	Ax D	D7	6-117a			Revise example of sizing dwelling unit service conductors to correlate with change to 310.15(B)(7)
1003	Ax I		1-190, 191			Added Annex I for recommended tightening torque
1004	Ax J		1-191a			Added Annex J for ADA Standards for Accessible Design