

Minnesota Electrical - 2020 NEC Knowledge Areas

	NEC Article	AM	AJ	EM	EC	MN	PL	IB	SI	Notes
Introduction										
Mandatory rules, permissive rules and explanatory material	90.5	X	X	X	X	X	X	X	X	
The authority having jurisdiction for enforcement of the Code	90.4	X	X	X	X	X	X	X	X	
The purpose and adequacy of the NEC	90.1	X	X	X	X	X	X	X	X	
The scope of the NEC: installations covered and not covered	90.2	X	X	X	X	X	X	X	X	
Chapter 1 – General										
Definitions	100	X	X	X	X	X	X	X	X	
Approval, listing and labeling of electrical equipment required	110.2-3	X	X	X	X	X	X	X	X	
Interrupting rating of electrical equipment	110.9	X	X							
Mechanical execution of work	110.12	X	X	X	X	X	X	X	X	
Electrical connections, terminals, splices and temperature limitations of equipment	110.14	X	X	X	X	X	X	X		
Identification of disconnecting means	110.22	X	X	X	X	X		X		
Working space about electrical equipment and dedicated equipment space	110.26	X	X	X	X	X	X	X		
Working space about electrical equipment and dedicated equipment space over 1000 volts	110.34	X	X							
Chapter 2 – Wiring and Protection										
Means of identifying grounded circuit conductors	200.6	X	X	X	X	X		X		
Use of conductors with white or gray color	200.7	X	X	X	X	X				
Connection of grounded circuit conductors to equipment	200.7	X	X	X	X	X		X		
Use of multiwire branch circuits; limitations and identification of ungrounded conductors	210.4	X	X	X	X	X				

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Voltage limitation of branch circuits and branch circuit receptacle requirements	210.6	X	X							
Ground-fault circuit-interrupter protection for personnel	210.8	X	X	X	X	X				
Number and types of branch circuits required	210.11	X	X							
Arc-fault circuit-interrupter protection required	210.12	X	X			X				
Branch circuit ratings; overcurrent protection and permissible loads	210.20 – 23	X	X							
Required receptacle outlets for dwellings, guest rooms and equipment requiring service	210.50 – 71	X	X							
Required lighting outlets	210.70	X	X							
Minimum rating, size and overcurrent protection of feeders	215.2, 3	X	X							
Means of identifying a conductor with a higher voltage to ground	215.12	X	X	X	X	X		X		
Computation of branch circuit loads including lighting, receptacles and household appliances	220.10 – 14	X	X							
Maximum loads permitted to be supplied by branch circuits	220.18	X	X							
Computation of feeder and service loads for dwellings, non-dwellings and farms	220.61	X	X							
Computation of feeder and service neutral load	220.80 – 88	X	X							
Lighting equipment installed outdoors	225.7	X	X							
Branch circuit and feeder conductors installed overhead	225.6, 18, 19	X	X							
Number of supplies to additional structures	225.30	X	X							
Requirements for disconnecting means at additional structures; suitable for service equipment	225.31	X	X							
Number of services permitted to a building or structure	230.2	X	X							

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Service conductors considered outside of a building	230.6	X	X							
Other conductors not permitted in service raceways or cables	230.7	X	X							
Clearances from building openings, above roofs and vertical clearance from ground	230.9	X	X							
Size and rating of service drop conductors; point and means of attachment	230.23	X	X							
Size and rating of service lateral conductors; protection against damage and spliced conductors	230.31	X	X							
Number of service-entrance conductor sets	230.40	X	X							
Minimum size and rating of service entrance conductors	230.42	X	X							
Requirements for overhead service locations; drip loops and arranged that water will not enter	230.54	X	X							
Service disconnecting means; readily accessible location and suitable for use	230.70	X	X							
Maximum number of service disconnects; grouping of disconnects and access to occupants	230.71, 72	X	X							
Minimum rating of service disconnecting means and combined rating of disconnects	230.76, 80	X	X							
Equipment permitted to be connected to the supply side of the service disconnect	230.82	X	X							
Overload protection for service conductors	230.90 – 94	X	X							
Ground-fault protection of equipment; settings and performance testing	230.95	X	X			X				
Overcurrent protection of conductors; devices rated 800 amperes or less	240.4(B)	X	X							
Overcurrent protection of conductors; devices rated over 800 amperes	240.4(C)	X	X							
Overcurrent protection of small conductors, tap conductors, and transformer secondary conductors	240.4(D – F)	X	X			X		X		

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Standard ampere ratings of fuses and circuit breakers	240.6	X	X			X	X	X		
Location of overcurrent protection in a circuit; branch circuit and feeder tap rules	240.21	X	X							
Conditions where overcurrent protection is allowed in series with the grounded circuit conductor	240.22	X	X			X		X		
Location of overcurrent devices; readily accessible, accessible to occupants	240.24(A)	X	X			X				
Locations where overcurrent devices are not permitted	240.24(C – F)	X	X							
Maximum voltage and limitations of plug fuses	240.50 – 54	X	X			X				
Marking of circuit breakers; interrupting rating; use as switches and voltage rating	240.83	X	X	X	X	X		X		
Application of straight voltage rating; slash voltage rating; and series ratings of circuit breakers	240.85, 86	X	X	X	X	X		X		
Definitions of terms associated with grounding and bonding	250.2	X	X	X	X	X	X	X	X	
General requirements for grounding and bonding	250.4	X	X	X	X	X	X	X	X	
Grounding connections arranged to prevent objectionable current over the grounding system	250.6	X	X			X		X	X	
Grounding and bonding connections required to be made by listed means	250.8	X	X	X	X	X	X	X	X	
Alternating-current circuits and systems required to be grounded or not required to be grounded	250.20	X	X					X		
Grounding A-C Services: grounding electrode conductor connected to the grounded conductor	250.24(A)	X	X					X		
Grounding A-C Services: additional grounding connection made at outdoor transformers	250.24(A)(2)	X	X					X		
Grounding A-C Services: main bonding jumper required; material, construction, attachment, and size	250.28	X	X					X		

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Grounding A-C Services: grounded conductor required to be brought to the service equipment, minimum size	250.24(C)(1)	X	X					X		
Grounding A-C Systems: conductor required to be grounded	250.26	X	X					X		
Grounding separately derived systems: bonding jumper and equipment bonding jumper size	250.28	X	X			X				
Grounding separately derived systems: grounding electrode and grounding electrode conductor and taps	250.30	X	X							
Grounding A-C Services: two or more buildings or structures supplied from a common service	250.32(D)	X	X							
Electrodes permitted for grounding; installing the grounding electrode system; supplemental electrode required	250.52, 53	X	X					X		
Requirements for installing the grounding electrode conductor; material; minimum size required; protection from physical damage	250.62, 64	X	X					X		
Connections to the grounding electrode	250.66, 70	X	X			X		X	X	
Methods of bonding at the service; provisions for bonding other systems required	250.92	X	X			X	X	X	X	
Bonding for circuits over 250 volts	250.97	X	X			X		X		
Bonding in hazardous (classified) locations	250.100	X	X			X	X			
Equipment bonding jumpers: size on supply side of the service; size on load side of the service	250.102	X	X					X		
Bonding of piping systems and exposed structural steel	250.104	X	X					X		
Equipment grounding and equipment grounding conductors	250.110, 116	X	X	X	X	X	X	X		
Types of equipment grounding conductors and means of identification of equipment grounding conductors	250.118, 119	X	X	X	X	X	X	X		

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Size of equipment grounding conductors; multiple circuits, and conductors in parallel	250.122	X	X	X	X	X	X	X		
Methods of equipment grounding	250.130 – 140	X	X	X	X	X	X	X		
Use of the grounded circuit conductor for grounding equipment; supply-side equipment, load-side equipment	250.142	X	X			X		X		
Connection of the receptacle grounding terminal to the outlet box; continuity and attachment of equipment grounding conductors to boxes	250.146	X	X	X	X	X	X	X		
Chapter 3 – Wiring Methods and Materials										
All conductors of the same circuit contained in the same raceway, trench, cable, etc.	300.3(B)	X	X	X	X	X		X		
Conductors of different systems permitted in the same enclosure or raceway	300.3(C)	X	X	X	X	X	X	X		
Conductors protected from physical damage, bored holes, notches in wood, through and parallel to framing members	300.4	X	X				X		X	
Insulating fittings required for conductors 4 AWG and larger	300.4(G)	X	X	X	X	X		X		
Underground installations, minimum cover requirements for various wiring methods and locations	300.5(A)	X	X			X	X	X		
Underground installations, protection from damage, splices and taps, bushings required, all conductors of the same circuit, ground movement	300.5(D, E, H – J)	X	X				X	X		
Sealing raceways exposed to different temperatures, expansion fittings	300.7	X	X	X	X	X	X	X	X	
Requirements for securing and supporting raceways, boxes, etc.	300.11	X	X	X	X	X	X	X	X	
Ceiling wires as means of support, raceways used as a means of support	300.11(A, B)	X	X			X	X		X	

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Mechanical and electrical continuity of conductors; device removal; and length of free conductor required at outlets and switch points	300.13, 14	X	X			X				
Boxes required at each outlet, switch, or splice point	300.15	X	X	X	X	X	X	X	X	
Raceways installed in complete runs; number and size of conductors installed in raceways	300.16 – 18	X	X	X	X	X	X	X		
Requirements for supporting conductors in vertical raceways	300.19	X	X	X	X		X			
Conductors carrying alternating current in metal raceways arranged to avoid heating by induction	300.20	X	X	X	X	X		X		
Spread of fire or products of combustion	300.21	X	X	X	X	X	X		X	
Wiring in ducts, plenums and other spaces used for environmental air	300.22	X	X	X	X	X	X		X	
Minimum cover requirements for various wiring methods over 1000 volts nominal	300.31	X	X							
Requirements for conductors connected in parallel	310.10(H)	X	X			X		X		
Conductors in dry locations; damp locations; wet locations; conductors exposed to direct sunlight and temperature limitations of conductors	310.10(A – D), 15(A)(3)	X	X	X	X	X	X	X		
Selection of conductor ampacity from applicable tables, corrections for ambient temperature and adjustment factors	310.15	X	X	X	X	X		X		
Conductors determined to be current carrying conductors	310.15(B)(3)	X	X	X	X			X		
Conductor ampacities for 120/240-volt 3-wire, single-phase dwelling services and feeders	310.15(B)(7)	X	X							
Conductors entering cabinets, panelboards and meter socket enclosures	312.5	X	X	X	X		X			
Wire bending space at terminals and minimum width of wiring gutters	312.6	X	X	X	X			X		
Installation and use of boxes and conduit bodies	314.15, 16	X	X	X	X			X		

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Number of conductors permitted in outlet, device, junction boxes, and conduit bodies; application of volume allowances	314.16	X	X	X	X	X		X		
Conductors entering boxes, conduit bodies, or fittings	314.17	X	X	X	X	X	X	X	X	
Boxes installed in walls or ceilings, boxes required to be supported by approved methods	314.19, 20	X	X	X	X	X	X	X	X	
Outlet boxes installed for luminaires	314.27(A)	X	X	X	X	X				
Requirements for enclosures and conduit bodies used as pull or junction boxes	314.28	X	X	X	X			X		
Manholes and other electric enclosures intended for personal entry	300.15(L)	X	X							
Pull and junction boxes for use on systems over 1000 volts, nominal	314.70, 71	X	X							
Installation requirements for Type AC, MC, NM, and UF cable: Uses permitted, uses not permitted, exposed and concealed, securing and supporting	320, 330, 334, 340	X	X	X	X	X	X			
Installation requirements for Type TC cable, uses permitted, uses not permitted, bending radius and ampacity	336	X	X							
Installation requirements for Type SE and USE cable, uses permitted	338	X	X					X		
Installation requirements for Type IMC and RMC: uses permitted; uses not permitted; bends; threading and reaming; securing and supporting; number of conductors permitted	342, 344	X	X	X	X	X	X	X		
Installation requirements for Type RNC: uses permitted, uses not permitted, bends, securing and supporting and expansion fittings, number of conductors permitted	355	X	X	X	X	X	X	X		changed to RTRC, no mention since 2008
Installation requirements for Type FMC, LFMC, and LFNC: uses permitted; uses not permitted; securing and supporting; grounding and bonding; number of conductors permitted	348, 350, 356	X	X	X	X	X	X	X		

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Installation requirements for Type EMT: uses permitted; uses not permitted; bends; securing and supporting; number of conductors permitted	358	X	X	X	X	X	X	X		
Sheet metal and nonmetallic auxiliary gutters; number of conductors; ampacity of conductors; splices and taps; support	366	X	X	X	X	X				
Busways; uses permitted, uses not permitted and support	368	X	X							
Metal and nonmetallic wireways: uses permitted; uses not permitted; number and size of conductors; securing and supporting	376, 378	X	X	X	X	X				
Surface metal and surface nonmetallic raceways: uses permitted; uses not permitted; size and number of conductors; combination raceways	386, 388	X	X	X	X	X	X			
Cable trays; uses permitted; supports; raceways, cables, and boxes supported from cable tray systems; installation of conductors	392	X	X				X			
Chapter 4 – Equipment for General Use										
Types of flexible cords and cables; ampacities for flexible cords and cables; uses permitted and uses not permitted	400.4 – 5	X	X	X	X	X		X		
Switch connections; enclosures not to be used as raceways; mounting height; voltage between adjacent devices; ratings of snap switches	404	X	X			X		X		
Receptacles required to grounding type and grounded; replacements, nongrounding type, GFCI requirements; wet locations	406	X	X	X	X	X				
Switchboards and panelboards; used as service equipment; phase arrangement; circuit directory required; clearance for conductors	408.3 – 5	X	X							
Classification of panelboards; number of overcurrent devices on one panelboard; overcurrent protection for panelboards; back-fed devices	408.30 – 40	X	X							

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Grounded conductor required to terminate in an individual terminal within panelboards	408.41	X	X		X	X		X		
Luminaires in specific locations, over combustible material, in clothes closets; luminaires required to be supported and grounded	410.10, 12, 16, 30 – 36, 40 – 46	X	X							
Cord-connected luminaires; luminaires used as raceways; wiring supplying luminaires connected together	410.62	X	X			X				
Special provisions for flush and recessed luminaires; spacing from combustible materials; installation within thermal insulation	410.110, 115	X	X			X				
Special provisions for electric-discharge lighting systems of more than 1000 volts; track lighting, connected load, locations not permitted	410.140 – 146, 151	X	X			X				
Requirements for lighting systems operating at 30 volts or less; locations not permitted; secondary circuits not to be grounded	411	X	X			X	X			changed to Low-Voltage Lighting
Appliances: branch-circuit rating and overcurrent protection; individual circuit required for central heating equipment	422.10 – 15	X	X			X	X			
Appliances: connected with flexible cords; support of ceiling suspended paddle fans; disconnecting means required	422.16	X	X			X				
Fixed electric space-heating equipment: branch circuit requirements and sizing; disconnecting means required; overcurrent protection	424.3, 19, 22	X	X			X				
Electric space-heating cables: GFCI required for heated floors of bathrooms, in hydromassage bathtub, spa, and hot tub locations	424.34 – 45	X	X			X				
Clearances of wiring above electrically heated ceilings; branch-circuit and feeder wiring in walls	424.94, 95	X	X			X				
Fixed outdoor electric deicing and snow-melting equipment: expansion and contraction; requirements for ground-fault protection of equipment	426.20(E), 28	X	X			X				

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Fixed electric heating equipment for pipelines and vessels: branch circuit sizing; requirements for ground-fault protection of equipment	427.22, 57	X	X			X				
Motors, motor circuits and controllers: ampacity and motor rating determination (use tables); branch circuit conductors for a single motor	430.6, 22	X	X	X	X	X		X		
Conductors supplying several motors and other loads; motor overload protection required	430.24, 31 – 44	X	X	X	X	X		X		
Motor branch-circuit short-circuit and ground-fault protection: individual motor circuit; several motors or loads on one branch-circuit	430.51 – 58	X	X	X	X	X		X		
Motor feeder short-circuit and ground-fault protection: rating or setting for a specific load	430.61 – 63	X	X	X	X	X		X		
Motor control circuits: definition; overcurrent protection required; control circuit transformers; disconnecting means required	430.71 – 75	X	X	X	X	X		X		
Disconnecting means required: location in relation to the controller; location in relation to the motor; ampere rating and interrupting capacity	430.101 – 113	X	X	X	X	X		X		
Air conditioning and refrigeration equipment: branch-circuit conductor ampacity, short-circuit and ground-fault protection; disconnect required	440.31 – 55	X	X	X	X	X	X	X		
Branch circuit requirements for room air conditioners	440.62	X	X							
Ampacity of conductors tapped from generator terminals	445.13	X	X			X				
Overcurrent protection for transformers and auto-transformers 1000 volt, nominal, or less	450.3(B), 4	X	X			X				
Overcurrent protection for transformers over 1000 volt, nominal	450.3(A)	X	X			X				
Dry-type transformers installed indoors; dry-type transformers installed above suspended ceilings	450.21	X	X			X				nothing about above suspended ceiling in section 450
Ampacity of capacitor circuit conductors; motor circuits including a capacitor	460.8, 9	X	X			X				

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Equipment over 1000 volts, nominal; circuit interrupting devices	490	X	X			X				
Chapter 5 - Special Occupancies										
Hazardous (classified) locations: Classes I, II, and III; Divisions 1 and 2; definitions, classifications of locations and material groups	500.5	X	X			X	X			definitions moved to section 100 in 2017 NEC
Class I locations: wiring methods including flexible connections; sealing requirements, location of fittings, thickness of compound, grounding and bonding; multiwire branch circuit limitations	501	X	X			X	X			
Class II locations: wiring methods including flexible connections; boxes and fittings; sealing; luminaires; grounding and bonding; multiwire branch circuit limitations	502	X	X			X	X			
Class III locations: wiring methods including flexible connections; grounding and bonding	503	X	X			X	X			
Commercial garages: classified and unclassified locations; wiring and equipment in Class I locations; wiring and equipment installed above Class I locations; GFCI for personnel; grounding and bonding	511	X	X			X	X			
Motor fuel dispensing facilities: unclassified and classified locations; wiring and equipment in and above Class I locations; underground; wiring; sealing and circuit disconnects	514	X	X			X	X			
Spray application processes: definitions; classifications of locations; wiring, equipment and luminaires in Class I locations	516	X	X			X	X			
Health care facilities: definitions; grounding of receptacles and fixed electrical equipment in patient care areas; panelboard bonding; general care areas; critical care areas; essential electrical systems	517	X	X			X				

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Places of assembly: Scope and general classifications; wiring methods	518	X	X		X					name changed to assembly occupancies. EC requirement looks like a typo. Probably applies to MN trade instead.
Carnivals and fairs: overhead conductor clearances; wiring methods permitted, support and protection; GFCI protection for personnel; grounding and bonding	525	X	X							
Temporary installations: time constraints; feeders, branch circuits, receptacles, splices and support; GFCI protection for personnel	590	X	X			X		X		
Agricultural buildings: definitions; wiring systems, equipment enclosures, boxes and fittings suitable for the location; GFCI protection for personnel; electrical supply from a distribution point; equipotential planes	547	X	X							
Mobile homes, manufactured homes and mobile home parks: definitions; distribution system demand factors; service rating and mounting height	550	X	X							
Recreational vehicle parks: distribution system; grounding RV site supply equipment; RV site supply equipment	551	X	X							
Marinas and boatyards: definitions; location of service equipment; load calculations; wiring methods; equipment grounding; shore power receptacles	555	X	X							
Chapter 6 – Special Equipment										
Electric signs and outline lighting: required branch circuit; disconnect within site of sign and controller; ballasts, transformers and electronic power supplies in soffits and suspended ceilings; neon signs	600	X	X			X				
Office furnishings: cord-and-plug connected freestanding-type partitions	605	X	X			X				

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Elevators and escalators: live parts enclosed to protect against accidental contact; installation of conductors; minimum size of conductors; feeders and branch circuit conductors	620.4, 11 – 13	X	X	X	X					
Elevators and escalators: wiring methods in hoistways, wellways and runways; branch circuit requirements for elevator cars, machine rooms, control rooms	620.21 – 25	X	X	X	X					
Elevators and escalators: number of conductors in wireways; supports for cables and raceways in hoistways, wellways and runways	620.32 – 38	X	X	X	X					
Elevators and escalators: requirements for disconnecting means and overcurrent protection; grounding and GFCI protection for personnel	620.51 – 55	X	X	X	X	X				
Information technology equipment: special requirements for information technology equipment rooms; wiring methods under raised floors; disconnecting means required	645	X	X				X			
Electrically driven or controlled irrigation machines: disconnecting means; grounding; bonding; methods of grounding	675	X	X			X		X		
Swimming pools, similar installations: definitions; clearance from overhead conductors; location and depths of underground wiring; wiring methods of permanently installed pools; area lighting, receptacles, and equipment	680.2, 9, 11, 21, 22	X	X				X			
Swimming pools, similar installations: bonding of metallic structural components; common bonding grid; GFCI protection for personnel	680.26	X	X							
Spas and hot tubs: outdoor installations, wiring methods; indoor installations, locations of receptacles, luminaires, walls switches; bonding and grounding	680.40 – 44	X	X							
Solar photovoltaic systems: definitions; disconnecting means; wiring methods	690	X	X			X				

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Small wind electric systems	694	X	X							
Fire pumps	695	X	X							
Chapter 7 – Special Conditions										
Emergency systems: capacity and rating; separation from other wiring and equipment; sources of power	700	X	X			X	X			
Legally required standby systems: capacity and rating; sources of power	701	X	X							
Class 1, 2 and 3 remote-control signaling and power limited circuits: definitions; power source requirements; overcurrent protection; wiring methods; conductors of different systems in same raceway, enclosure, etc.; cable uses and permitted substitutions	725.2, 41, 43, 46, 48	X	X	X	X	X	X			
Class 1, 2 and 3 remote-control signaling and power limited circuits: abandoned cables; access to equipment of above suspended ceilings; remote-control circuits for safety-control equipment	725.25, 21, 31	X	X			X	X			
Fire alarm systems: non-power-limited and power-limited circuits	760	X	X			X	X			
Optical fibers cables and raceways: cables within buildings; cable markings; optical fibers installed with electrical conductors; cable substitutions	770	X	X				X			
Critical operations power systems	708	X	X			X	X			

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Chapter 8 Communication Systems										
(Common requirements from 805 through 830)	800									should be studied for AM, AJ, MN, PL and SI
Communication circuits: mechanical execution of work; protective devices; cable and primary protector grounding; raceways for wires and cables within buildings; cable markings, permitted uses and substitutions	805	X	X			X	X		X	formerly article 800
Radio and television equipment: grounding receiving stations and metal support structures	810	X	X				X		X	
Community antenna television: ground cable shields; grounding methods and materials; cables installed within buildings; coaxial cable uses and permitted substitutions	820	X	X				X		X	
Network-powered broadband communication systems: wiring methods within buildings	830	X	X				X			
(Premises-powered broadband communications systems)	840									not included in exam guide but may be on test for AM, AJ and PL
Chapter 9 – Tables										
Notes to tables: percent of cross section of raceways for conductors; use Annex C for conductors all the same size and insulation type; dimensions and percent area of conduit and tubing; dimensions of insulated conductors	Table 4, 5	X	X	X	X	X	X	X		
Notes to tables: conductor properties; alternating-current resistance; Annex D, examples of branch-circuit, feeder, service, and motor circuit calculations; Annex E, types of construction	Table 8	X	X	X	X			X		
Notes to tables: class 2 and 3 alternating-current power source limitations	Table 11(A), 11(B)	X	X				X			
Applied Electrical Theory, Electrical Systems and Equipment										

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General mathematics including transposing equations; calculating area, volume, and percentages		X	X	X	X	X	X	X	X	
Ohm's law, Watt's law, and voltage drop calculations		X	X	X	X	X	X	X	X	
Characteristics of series and parallel circuits		X	X	X	X	X	X			
Voltage, current, and power of single-phase and three-phase systems		X	X	X	X	X	X	X		
Motor and transformer connections: single-phase; three-phase; transformer taps; wye and delta configurations; 115/230, 230/460 volt connections		X	X	X	X	X				
Transformers: auto-transformers; short-circuit current available at secondary		X	X			X				
Motor control circuits: three-wire, start-stop; start-stop-jog; control circuit transformers		X	X			X		X		
Power factor and power factor correction		X	X							
Trouble shooting common electrical problems		X	X	X	X	X	X	X		