

SUPPLEMENT

The changes and additional requirements which were adopted by the Underwriters' National Electric Association at the annual meetings of 1908 and 1909 have also been adopted by the Associated Factory Mutual Fire Insurance Companies. The most important of these amendments are given below, the minor changes and additions being left until the next edition of the Rules is printed.

The changes and additions apply to the Code rules and fine print notes, not to the Mutual fine print notes, which are to be retained in all cases unless otherwise noted.

1. Generators.

Rule 1 *g*, page 25. Add new section to read as follows:—

The use of soft rubber bushings to protect the lead wires coming through the frames of generators is permitted, except when installed where oils, grease, oily vapors or other substances known to have rapid deleterious effect on rubber, are present in such quantities and in such proximity with motor or dynamo as may cause such bushings to be liable to rapid destruction. In such cases hard wood properly filled, or preferably porcelain or micanite bushings must be used.

2. Conductors.

Rule 2 *c*, page 27. Amend the first line to read as follows:—

Must where not in conduit be kept rigidly in place etc.

Rule 2 *e*, page 27. Amend by striking out second fine print note.

7. Testing of Insulation Resistance.

Rule 7 *c*, page 34. Amend by striking out. Also strike out fine print note.

8. Motors.

Rule 8 *c*, page 36. Amend by adding to the first sentence the following:—

(except as provided for electric cranes, see Rule 34 A *c*, page 163.)

Rule 8 *j*, page 40. Amend by substituting "Adjustable" for "Variable," as the first word in the first line.

12. Wires.

Rule 12 *a*, page 42. Amend by inserting after the word "line" in the seventh line the words "except when run in conduit."

Rule 12 *b*, page 42. Amend by inserting after the word "them" in the second line the words "and except when run in conduit."

Also amend by adding a second paragraph to read as follows:—

For conduit work, wires must be placed so as to conform to rules for unlined conduit except that conduit system must be waterproof.

Rule 12 *d*, page 43. Strike out rule and both fine print notes.

Rule 12 *e*, page 43. Amend to read as follows:—

Must, where exposed to the weather, be provided with petticoat insulators of glass or porcelain; porcelain knobs or cleats and rubber hooks will not be approved. Wires on the exterior walls of buildings must be supported at least every fifteen feet, the distance between supports to be shortened if wires are liable to be disturbed.

Where not exposed to the weather, low potential wires may be supported on glass or porcelain knobs which will separate the wires at least one inch from the surface wired over, supports to be placed at least every four and one half feet.

13. Transformers.

Rule 13 *a*, page 53. Amend fifth line to read as follows:—
sub-stations (except as provided in Rule 30 A, page 160) unless etc.

14. Wires.

Rule 14 *b*, page 59. Amend to read as follows:—

Tie wires must have an insulation equal to that of the conductors they confine. For wire smaller than No. 8 B. & S. gage split knobs or cleats shall be used except at dead ends, and tie wires and knobs will not be approved.

Screws must be used for fastening all cleats and knobs which are arranged to grip the wire.

Also add a Factory Mutual fine print note as follows:—

In Factory Mutual Work nails will be accepted in place of the screws provided they have been so driven as to firmly hold the cleats or knobs without injuring them.

17. Switches, Cut-Outs, Circuit-Breakers, etc.

Rule 17 *a*, page 64. Amend to read as follows:—

On constant potential circuits, all service switches and all switches controlling circuits supplying current to motors or heating devices, and all fuses, unless otherwise provided (for exceptions as to switches see Rules 8 *c*, 23 *a* and 34A *c*, pages 36, 74 and 163, for exceptions as to cut-outs see Rule 21 *a* and *b*, page 68) must be so arranged that the fuses will protect and the opening of the switch will disconnect all of the wires; that is, in the two-wire system the two wires, and the three-wire system the three wires, must be protected by the fuses and disconnected by the operation of the switch.

When installed without other automatic overload protective devices automatic overload circuit breakers must have the poles and trip coils so arranged as to afford complete protection against overloads and short circuits, and if also used in place of the switch must be so arranged that no one pole can be opened manually without disconnecting all the wires.

Rule 17 *d*, page 65. Amend to read as follows:—

Time switches, sign flashes and similar appliances must be of approved design and enclosed in an approved cabinet.

Also amend by striking out fine print notes.

21. Automatic Cut-Outs.

Strike out fine print note preceding Rule 21 *a* on page 68.

Rule 21 *a*, page 68. Amend second line to read as follows:—

or underground, in the nearest accessible place to the point where they etc.

Rule 21 *d*, page 69. Insert after the word "lights" in the fourth line of second paragraph the words "also rule for electric signs in the 'Approved Electric Fittings List.'"

Rule 21 *e*, page 70. Amend by adding the following:—

in which event the circuit breaker may be set as high as 100 per cent above such capacity.

Rule 21 *f*, page 70. Add new section to read as follows:—

Each phase of A. C. motor circuits, except on main switchboard or when otherwise subject to expert supervision, must be protected by an *approved* fuse whether automatic overload circuit breakers are installed or not. Single phase motors may have one side protected by an *approved* automatic overload circuit breaker only if the other side is protected by an *approved* fuse. For circuits having a maximum capacity greater than that for which enclosed fuses are approved circuit breakers alone will be approved.

22. Switches.

Rule 22 *a*, page 70. Amend second and third lines to read as follows:—

or underground, in the nearest readily accessible place, to the point where etc.

Rule 22 *b*, page 72. Amend fourth line to read as follows:—

will not tend to close them. Double-throw

Rule 22 *d*, page 73. Amend second and third lines of first sentence to read as follows:—

with conduit systems or not, they must be enclosed in an *approved* box constructed of iron or steel, in addition to the porcelain enclosure of the switch or receptacle.

Rule 22 *f*, page 73. Amend by adding the following:—

or they may be omitted if the switch is approved for mounting directly on the moulding.

24. Wires.

Rule 24 *a*, page 75. Amend to read as follows:—

Where entering cabinets must be protected by approved bushings, which fit tightly the holes in the box and are well secured in place. The wires should completely fill the holes in the bushings so as to keep out the dust, tape being used to build up the wires if necessary. On concealed knob and tube work *approved* flexible tubing will be accepted in lieu of bushings, providing it shall extend from the last porcelain support into the cabinet.

Also amend by striking out fine print note.

Rule 24 *h*, page 79. Amend by adding a third Code fine print note as follows:—

Must not be "dead-ended" at a rosette, socket or receptacle unless the last support is within twelve inches of the same.

Also amend by striking out third Factory Mutual fine print note.

Rule 24 *k*, page 80. Amend to read as follows:—

Must have an *approved* rubber insulating covering, and must be in continuous lengths from outlet to outlet, or from fitting to fitting, no joints or taps to be made in moulding. Where branch taps are necessary in moulding work *approved* fittings for this purpose must be used.

Rule 24 *u*, page 82. Amend by adding a new paragraph as follows:—

Where the surface at any outlet is broken, it must be repaired so as to leave no holes or open spaces at such outlet.

Rule 24 *v*, page 83. Amend by adding a new paragraph as follows:—

In wiring certain designs of show-case fixtures, ceiling bulls-eyes and similar appliances in which the wiring is exposed to temperatures in excess of 120° Fahr. (49° Cent.), from the heat of the lamps, *approved* slow-burning wire may be used. All such forms of fixtures must be submitted for examination, test and approval before being introduced for use.

Rule 24 *y*, page 83. Amend by adding the following:—

Wires of different systems must never be contained in or attached to the same fixture.

24A. Armored Cables.

Rule 24 A *c*, page 84. Amend by adding a second fine print note to read as follows:—

It is suggested that cables, outlet boxes and fittings having conductive coatings be used in order to secure better electrical contact at all points throughout the cable system.

Rule 24 A *d*, page 84. Amend by adding a new paragraph as follows:—

The lead covering is not to be required when the cable is run against brick walls or laid in ordinary plaster walls unless same are continuously damp.

25. Interior Conduits.

Rule 25 *e*, page 85. Amend by inserting after the word "bushings" in the third line the words "or fastening plates"

25A. Metal Mouldings.

Rule 25 A *d*, page 86. Amend by adding a second fine print note to read as follows:—

It is suggested that outlet boxes and fittings having conductive coatings be used in order to secure better electrical contact at all points throughout the conduit system.

26. Fixtures.

Rule 26 *a*, page 86. Amend by adding a new paragraph as follows:—

In straight electric fixtures where the insulation of conductors and the metal of fixtures are the equivalent of a conduit or armored cable system, or where used with approved wireless clusters or where the double braided wire extends directly into an *approved* porcelain socket, the insulating joint may be omitted.

Rule 26 *e*, page 87. Insert new section as follows:—

The so-called flat canopy sometimes used on electric and combination fixtures will not be approved except in connection with outlet boxes.

Rule 26 *f*, page 87. Insert new section as follows:—

Must, when installed on the outside of frame buildings, be of water-tight construction.

Rule 26 *g*, page 87. Insert new section as follows:—

Must not, when wired on the outside, be used in show windows or in the immediate vicinity of especially inflammable stuff.

29A. Mercury Vapor Lamps.

Page 91. Insert new rule as follows:—

Enclosed Mercury Vapor Lamps.

a. Must have cut-out for each lamp or series of lamps except when contained in single frame and lighted by a single operation, in which case not more than five lamps should be dependent upon single cut-out.

b. Must only be furnished with such resistances or regulators as are enclosed in non-combustible cases, such resistances to be treated as sources of heat. In locations where these resistances or regulators are subject to flyings of lint or combustible material, all openings through cases must be protected by fine wire gauze.

High Potential Vacuum Tube Systems.

c. The tube must be so installed as to be free from mechanical injury or liability to contact with inflammable material.

d. High potential coils and regulating apparatus must be installed in approved steel cabinet not less than 1-10 inch in thickness; same to be well ventilated in such a manner as to prevent the escape of any flame or sparks, in case of burnout in the various coils. All apparatus in this box must be mounted on slate base and the enclosing case positively grounded. Supplying conductors leading into this high potential case to be installed in accordance with the standard requirements governing low potential systems, where such wires do not carry a potential of over 300 volts.

30A. Transformers.

Page 91. Insert new rule as follows:—

Oil Transformers.

a. Must not be placed inside of any building except central stations and sub-stations, unless by special permission of the inspection department having jurisdiction.

Air Cooled Transformers.

The following sections do not apply to apparatus or fittings, the operation of which depends either wholly or in part upon

special transformers embodied in the devices, but all such apparatus or fittings must be submitted for special examination and approval before being used.

b. Must not be placed inside of any building excepting central stations and sub-stations, if the highest voltage of either primary or secondary exceeds 550 volts.

c. Must be so mounted that the case shall be at a distance of at least one foot from combustible material or separated therefrom by non-combustible, non-absorptive, insulating material, such as slate, marble or soapstone. This will require the use of a slab or panel somewhat larger than the transformer.

31B. Outline Wiring.

Page 91. Insert new rule as follows:—

Wiring. (Other than Signs on Exterior of Buildings):—

a. Must be connected only to low-potential systems.

b. Open or conduit work may be used, but moulding will not be permitted.

c. For open work, wires must have an *approved* rubber insulating covering. Must be rigidly supported on non-combustible, non-absorptive insulators, which separate the wires at least one inch from the surface wired over, and must be kept apart at least two and one-half inches for voltages up to 300, and four inches for higher voltages.

Rigid supporting requires, under ordinary conditions where wiring over flat surfaces, supports at least every four and one-half feet. If the wires are liable to be disturbed, the distances between supports should be shortened.

d. Where flexible tubing is required, the ends must be sealed and painted with moisture repellent, and kept at least one-half inch from surface wired over.

e. Wires for use in rigid or flexible steel conduit must comply with requirements for unlined conduit work. Where armored cable is used, the conductors must be protected from moisture by lead sheath between armor and insulation.

f. Must be protected by its own cut-out, and controlled by its own switch. Cut-outs, switches, time switches, flashers and similar appliances, must be of approved design, and must, if located inside the building, be installed as required by the Code for such devices. If outside the building they must be enclosed in a steel or cast-iron box.

If a steel box is used, the minimum thickness of the steel must be 0.128 of an inch (No. 8 B. & S. gage).

Boxes must be so constructed that when switch operates

the blade shall clear the door by at least one inch, and they must be moisture proof.

h. Circuits must be so arranged that not more than 1,320 watts will be finally dependent upon a single cut-out; nor shall more than 66 sockets or receptacles be connected to single circuit.

i. Sockets and receptacles must be of the keyless porcelain type, and wires must be soldered to lugs on same.

83. Car Houses.

Rule 33 *e*, page 92. Amend paragraph "3" by substituting "No. 0 B. & S." for "No. 00 B. & S." wherever it occurs.

84. Lighting and Power from Railway Wires.

Rule 34 *a*, page 93. Amend the third and fourth lines to read as follows:—

electric car houses, power houses, passenger and freight stations connected with the operation of street railways.

34A. Electric Cranes.

Page 93. Insert new rule as follows:—

All wiring, apparatus, etc., not specifically covered by special rules, herein given, must conform to the Standard Rules and Requirements of the National Electrical Code, except that the switch required by Rule 8c for each motor may be omitted.

a. Wiring.

1. All wires except bare collector wires, those between resistances and contact plates of rheostats and those subjected to severe external heat, must be *approved* rubber-covered and not smaller in size than No. 12 B. & S. Insulation on wires between resistances and contact plates of rheostats must conform to Section *d*, while wires subjected to severe external heat must have *approved* slow-burning insulation.

2. All wires excepting collector wires and those run in metal conduit or approved flexible cable must be supported by knobs or cleats which separate them at least one inch from the surface wired over, but in dry places where space is limited the distance between wires as required by Rule 24 *h*, page 79, cannot be obtained, each wire must be separately encased in approved flexible tubing, securely fastened in place.

Collector wires must be supported by *approved* insulators so mounted that even with the extreme movement permitted the wires will be separated at all times at least 1 1-2 inches from the surface wired over. Collector wires must be held at the ends by *approved* strain insulators.

3. Main collector wires carried along the runways must be rigidly and securely attached to their insulating supports at least every 20 feet, and separated at least six inches when run in a horizontal plane; if not run in a horizontal plane, they must be separated at least 8 inches. If spans longer than 20 feet are necessary the distance between wires must be increased proportionately but in no case shall the span exceed 40 feet.

4. Where bridge collector wires are over 80 feet long, insulating supports on which the wires may loosely lie must be provided at least every 50 feet.

Bridge collector wires must be kept at least 2 1-2 inches apart, but a greater spacing should be used whenever it may be obtained.

5. Collector wires must not be smaller in size than specified in the following table for the various spans.

Distance between rigid supports. Feet.	Size Wire required. B. & S.
0 to 30	6
31 to 60	4
Over 60	2

b. **Collectors.**

Must be so designed that sparking between them and collector wires will be reduced to a minimum.

c. **Switches and Cut-Outs.**

1. The main collector wires must be protected by a cut-out and the circuit controlled by a switch. Cut-out and switch to be so located as to be easy of access from the floor.

2. Cranes operated from cabs must have a cut-out and switch connected into the leads from the main collector wires and so located in the cab as to be readily accessible to the operator.

3. Where there is more than one motor on a single crane, each motor lead must be protected by a cut-out located in the cab if there is one.

d. **Controllers.**

Must be installed according to Rule 4, page 30, except that if the crane is located out doors the insulation on wires between resistances and contact plates of rheostats must be rubber where the wires are exposed to moisture and insulation is necessary and also where they are grouped. If the crane operates over readily combustible material, the resistances must be placed in an enclosure made of non-combustible material, thoroughly ventilated and so constructed that it will not permit any flame or molten metal to escape in the event of burning out the resistances. If the resistances are

located in the cab, this result may be obtained by constructing the cab of non-combustible material and providing sides which enclose the cab from its floor to a height at least 6 inches above the top of the resistances.

e. **Grounding of Iron Work.**

The motor frames, the entire frame of the crane and the tracks must be permanently and effectively grounded.

45. Flexible Cord.

Rule 45, page 101. Amend to read as follows:—

Cords for pendant lamps and for portable use including Elevator, Lighting and Control Cables and Theatre Stage and Border Cable (for cords for Portable Heating Apparatus, see Section d, page 165.)

a. Must be made of copper conductors, each built up from wires not larger than No. 26, or smaller than No. 36 B. & S. gage. Each conductor must have a carrying capacity equivalent to not less than a No. 18 B. & S. gage wire, and must be covered by an *approved* insulation and protected from mechanical injury according to the following specifications for the several types of cord or cable. Each conductor must be covered with a tight close wind of fine cotton, or some other approved method must be employed to prevent a broken strand puncturing the insulation and to keep the rubber compound from corroding the copper, and must have a distinctive marking as required by Rule 40 *b*, page 98.

b. The insulating covering on each conductor must comply with Rule 41 *b* and *d*, page 98 (for exceptions see below) for thickness of wall and dielectric strength and must also comply with Rule 41 *c*, page 98, except that insulation less than 3-64 of an inch in thickness (conductors having a capacity less than No. 14 B. & S. gage wire) must show an insulation resistance of not less than 50 megohms per mile during two weeks' immersion in water at 70° Fahr. (21° Cent.).

c. Must have an outer protecting covering as follows:—

1. **For Pendant Lamps**—In this class is to be included all flexible cord, which, under usual conditions, hangs freely in air, and which is not likely to be moved sufficiently to come in contact with surrounding objects.

It should be noted that pendant lamps provided with long cords, so that they can be carried about or hung over nails, or on machinery, etc., are not included in this class, even though they are usually allowed to hang freely in air.

Each conductor must have an approved braided covering so put on and sealed in place that when cut it will not fray out.

For use in damp places the insulation must be at least 3-64 of an inch thick and the braided coverings must either be

thoroughly saturated with a moisture proof preservative compound or be enclosed in an outer braided moisture-proof preservative covering over the whole.

2. For Portables.—Flexible cord for portable use except in offices, dwellings or similar places, where cord is not liable to rough usage and where appearance is an essential feature, must meet all the requirements for flexible cord for pendants and in addition must have a tough, braided cover over the whole. There must also be an extra layer of rubber between the outer cover and the flexible cord.

For use in damp places the insulation must be at least 3-64 of an inch thick and the cord must have its outer covering saturated with a moisture-proof preservative compound thoroughly slicked down or must have a filler of approved material instead of the extra layer of rubber and have two outer braids saturated with a moisture-proof compound with the exterior surface thoroughly slicked down.

In offices, dwellings, or in similar places where cord is not liable to rough usage and where appearance is an essential feature, flexible cord for portable use must meet all of the requirements for flexible cord for "pendant lamps," both as to construction and thickness of insulation, and in addition must have a tough, braided cover over the whole, or providing there is an extra layer of rubber between the flexible cord and the outer cover, the insulation proper on each stranded conductor of cord may be 1-64 of an inch in thickness instead of as required for pendant cords.

Flexible cord for portable use may, instead of the outer coverings described above, have an approved metal, flexible armor.

d. For Portable Heating Apparatus.—*Applies to all smoothing and sad irons and to any other heating device requiring over 250 watts. Must be made up as follows:—*

1. Conductors must comply with Section *a* or may be of braided copper. If braided, each wire to be not larger than No. 30, or smaller than No. 36 B. & S. gage, except for conductors having a greater carrying capacity than No. 12 B. & S. gage when each wire may be as large as No. 28 B. & S. gage.

2. An insulating covering of rubber or other approved material not less than 1-64 inch in thickness.

3. A braided covering of not less than 1-32 inch thickness, composed of best quality long fibre asbestos, containing not over 5 per cent of vegetable fibre.

4. An outer reinforcing covering not less than 1-64 inch thick, especially designed to resist abrasion, must enclose either all the conductors as a whole or each conductor separately.

e. Theatre Stage Cable.—Shall consist of not more than three flexible copper conductors, each of a capacity not exceeding

No. 4 B. & S. gage, each of which shall be built up of wires not larger than No. 26 B. & S. gage, each conductor to have a tight close wind of cotton or some other *approved* method must be employed to prevent a broken strand puncturing the insulation and to keep the rubber compound from corroding the copper. The insulation proper to be of rubber complying with Rules 41 *b* and *d*, page 98, and with requirements of Rule 41 *c*, page 98, except that insulations less than 3-64 of an inch in thickness (conductors having a capacity less than No. 14 B. & S. gage wire) must show an insulation resistance of not less than 50 megohms per mile during two weeks' immersion in water at 70° Fahr. (21° Cent.), must have on each conductor an outer protective braided covering properly saturated with a preservative compound. The conductors to be twisted together, a filler of *approved* material being used to make cable round and to act as a cushion, and finished with two weather-proof braids over the whole.

The completed cable must be of such a flexible nature as to be readily handled, and when laid on the floor must align itself to the floor level.

f. Border Cables.—Shall consist of flexible copper conductors, each of which shall be built up of wires not larger than No. 26 B. & S. gage, each conductor to have a tight close wind of cotton, or some other approved method must be employed to prevent a broken strand puncturing the insulation, and to keep the rubber compound from corroding the copper. The insulation proper, to be of rubber complying with requirements of Rules 41 *b*, *c* and *d*, page 98, must have on each conductor an outer protective braided covering properly saturated with a preservative compound. The conductors to be cabled together and finished with two weather-proof braids over the whole.

g. Elevator Lighting and Control Cables.—Must comply with the requirements for theatre cable as regards insulation proper and the construction and covering of the individual conductors, except that none of these conductors shall be smaller than No. 14 B. & S. gage for elevator lighting cables, or No. 16 for elevator control cables. The outer covering shall consist either of three braids or of an extra layer of rubber and one or more outer braids. All braids must be properly treated with a preservative compound.

49. Interior Conduits.

Rule 49 *h*, page 106. Amend by omitting the words "when removed from the pipe entire"

49A. Switch and Outlet Boxes.

Rule 49 A, page 107. Amend heading to read:—

Outlet, Junction and Flush Switch Boxes.

Also amend by inserting the following paragraph preceding rule 49 A a:—

For boxes for panel-boards, cut-outs and switches other than flush switches see Rule 54, page 123.

Rule 49 A a, page 107. Amend by adding the following:—

Junction boxes of larger sizes must comply with requirements of Rule 54, page 123, but in all cases must be of metal.

Rule 49 A b, page 107. Amend by adding a fine print note as follows:—

It is recommended that the protective coating be of conductive material such as tin or zinc.

51. Switches.

Rule 51 j, page 113. Amend fine print note to read as follows:—

Triple pole switches designed with 125 volt spacings, between adjacent blades, should be marked 125 volts, and may be used on D. C. 3-wire systems having 125 volts between adjacent wires and 250 volts between the two outside wires.

Rule 51 n, page 114. Amend the first sentence by striking out everything following "at full load."

Also amend by striking out the fine print note.

Rule 51 o, page 114. Amend by striking out second sentence.

Rule 51 s, page 115. Amend by inserting the following fine print note after the first paragraph:—

Snap switches of the spring break pattern, normally complying with the above requirements, but with movement of the contact carrier under control of the operator at any point in the operation of the device, must be considered in a class with switches of the regular knife blade pattern and conform to the specifications of Rule 51 k, page 113.

Also amend the second paragraph by adding the following:—

For switches rated higher than 10 amperes this test shall be at 25 per cent. overload instead of 50 per cent.

Rule 51 t, page 115. Amend the first sentence of the second paragraph by omitting reference to the face plate.

51A. Circuit Breakers.

Rule 51 A, page 115. Insert new rule as follows:—

Circuit Breakers for operation on circuits of 550 volts or less must be made to comply with the following specifications, except in those few cases where peculiar design allows the breaker to fulfill the general requirements in some other way, and where it can successfully withstand the test of Section d. In such cases the breakers should be submitted for special examination and approval before being used.

a. Base.—Must be mounted on non-combustible, non-absorptive insulating bases, such as slate or marble. Bases with an

area of over twenty-five square inches must have at least four supporting screws. Holes for the supporting screws must be so located or countersunk that there will be at least one-half of an inch space measured over the surface between the head of the screw or washer and the nearest live metal part, and in all cases when between parts of opposite polarity must be countersunk.

b. Mounting.—Pieces carrying contact parts must be screwed to the base by at least two screws, or else made with a square shoulder, dowel pin, or equivalent device, to prevent possible turning, and the nuts or screw heads on the under side of the base of "front connected" breakers must be countersunk not less than 1-8 inch, and covered with a waterproof compound which will not melt below 150° Fahr. (65° Cent.). All breakers must be provided with easily accessible means of tripping them by hand without injury to the operator.

c. Breaking Capacity.—Must successfully operate three times with two minute intervals intervening without incapacitating the breaker, the conditions of the testing current to be as given in the following table:—

Current rating of breakers.	Per cent. of Voltage drop in test circuit with rated current flowing.	Maximum available capacity of supply system not including overload capacity.
0 to 100 Amp.	2	1,000 Amp.
101 to 300 Amp.	3	3,000 Amp.
400 Amp.	4	4,000 Amp.
500 Amp.	5	5,000 Amp.

No filing of contacts or other repairing of the breaker to be made during the test.

Multiple breakers must comply with above requirements whether the test is on all poles at once or on one pole individually.

d. Voltage Test.—Must successfully withstand 2,000 volts A. C. for one minute between live metal and ground, between poles in multi-polar breaker, and between terminals with breaker open.

e. Carrying Capacity.—The maximum rise in temperature at rated current must not exceed 50° Cent. for coils, or 30° Cent. for other parts.

f. Calibration.—Must not have a plus or minus error greater than 10 per cent at any point of its calibration.

g. Mechanism.—Metal work of automatic overload circuit breakers must be substantial in construction, and must have ample metal for stiffness. The contact parts shall be arranged so that thoroughly good bearings are obtained; the entire device must be mechanically well made throughout.

h. Marking.—Must be plainly marked, where it will be visible when installed, with the name of the maker and the current and voltage for which the device is designed.

52. Cut-Outs and Circuit Breakers.

Rule 52, page 115. Amend heading to read "**Cut-Outs.**"

Rule 52 *d*, page 116. Omit.

Rule 52 *k*, page 117. Omit.

Rule 52 *s*, page 119. Omit.

53. Fuses.

Rule 53 *f*, page 120. Amend the 0-30 and 31-60 ampere classifications as follows:—

0-30 Amps.	}	A. Cartridge fuse (ferrule contact).
		B. Approved plugs for Edison cut-outs not exceeding 125 volts, but including 3-wire circuits with grounded neutral and 250 volts between outside wires.
31-60 "	}	Cartridge fuse (ferrule contact).

53A. Tablet and Panel Boards.

Rule 53 A, page 122. Amend to read as follows:—

The following specifications are intended to apply to all panel and distributing boards used for the control of light and power circuits, but not to such switchboards in central stations, sub-stations or isolated plants as directly control energy derived from generators or transforming devices.

a. Design.—The specifications for construction of switches and cut-outs (see Rules 51 and 52, pages 111 and 115,) must be followed as far as they apply.

In the relative arrangement of fuses and switches, the fuses may be placed between the bus-bars and the switches, or between the switches and the circuits, except in the case of service switches, when Rule 21 *a*, page 68, must be complied with. When the branch switches are between the fuses and bus-bars, the connections must be so arranged that the blades will be dead when the switches are open.

When there are exposed live metal parts on the back of board, a space of at least one-half inch must be provided between such live metal parts and the cabinet in which board is mounted.

b. Spacings.—The following minimum distance between bare live metal parts (bus-bars, etc.) must be maintained:—

	Between parts of opposite polarity, except at switches and linkfuses.		Between parts of same polarity.
	When mounted on the same surface.	When held free in air.	At link fuses.
0-125 volts.	3/4 inch.	1/2 inch.	1/2 inch.
126-250 "	1 1/4 "	3/4 "	3/4 "
251-600 "	2 "	1 3/4 "	

At switches or enclosed fuses, parts of the same polarity may be placed as close together as convenience in handling will allow.

It should be noted that the above distances are the minimum allowable, and it is urged that greater distances be adopted wherever the conditions will permit.

The spacings given in the first column apply to the branch conductors where enclosed fuses are used. Where link fuses or knife switches are used, the spacings must be at least as great as those required by Rules 51 and 52, pages 111 and 115.

The spacings given in the second column apply to the distance between the raised main bars and between these bars and the branch bars over which they pass.

The spacings given in the third column are intended to prevent the melting of a link fuse by the blowing of an adjacent fuse of the same polarity.

Panel boards of special design in which the insulation and separation between bus-bars and between other current-carrying parts is secured by means of barriers or insulating materials instead of by the spacings given above, must be submitted for special examination and approval before being used.

c. Marking.—Must be marked where the marking can be plainly seen when installed, with the name or trade-mark of the manufacturer and the maximum capacity in amperes and the voltage for which the board is designed.

54. Cut-Out Cabinets.

Rule 54, page 123. Amend to read as follows:—

For panel and distributing boards, cut-outs and switches.

(For Installation Rule see Rules 8 d, 17 b, 17 c, 17 d, 21 c and 22 b, pages 37, 64, 65, 69 and 72.)

a. Design.—Must in all cases be so constructed as to insure ample strength and rigidity and be dust-tight.

The hard usage to which cabinets are often subjected, especially during process of installation, makes it necessary so to construct them that they will be strong enough to keep their shape, thus permitting doors to close tightly and making possible the proper installation of wiring and conduit.

When doors are of metal, and less than 0.109 inch (No. 12 U. S. gage) in thickness and are not lined with insulating material there must be a space of at least one inch between the door and an enclosed fuse or any live metal part. A space of at least two inches must be provided between open-link fuses and metal, metal-lined or glass paneled doors of cabinets. Except as above specified there must be a space of at least $\frac{1}{2}$ inch between the walls, back or door of any cabinet and any exposed live metal part.

There must be a space of at least $\frac{1}{2}$ inch between the walls and back of any cabinet and the nearest exposed current-carrying part.

For use in theatres, however, a 6-inch spacing must be provided between any fuse and the front of door of enclosing cabinet as called for in Rule 31A e, 2.

b. Material.—May be either of cast or sheet metal, wood or approved composition.

All metal used in construction of cabinets including linings, if any, must be thoroughly painted or otherwise treated to prevent corrosion.

c. Wooden Cabinets.—Wood must be well seasoned and at least 3-4 inch thick and be thoroughly filled and painted, and must be lined with a non-combustible material.

d. Linings.—Except for metal conduit systems or when armored cable or metal moulding is used linings may be of

stiff asbestos board of approved make not less than 1-8 inch thick firmly secured by shellac or tacks.

In all cabinets, linings of slate, marble or approved composition must be at least 1-4 inch in thickness and firmly secured in place, and when metal is used for the lining it must be at least .0625 inch thick (No. 16 U. S. gage). On metal conduit systems or when armored cable or metal moulding is used metal linings must be bonded so as to provide for suitable bonding for ground connections.

e. Composition Cabinets.—Only approved material should be used, and in no case less than 3-4 of an inch in thickness. Cabinets of this type must not be used with metal conduit, armoured cable or metal moulding, unless metal lined as required for wooden cabinets.

f. Metal Cabinets.—If cast metal is used a thickness of at least 1-8 inch must be provided. Sheet metal must not be less than .0625 inch thick (No. 16 U. S. gage), and must in every case be of sufficient thickness or so reinforced as to comply with Section (a) "Design." In cabinets having an area of more than 800 square inches for any surface or having a single dimension greater than 4 feet, sheet metal must be at least .078 inch thick (No. 14 U. S. gage).

g. Doors.—Must close against a rabbet or have flanges over edges so as to make cabinets dust-tight. Hinges must be of strong and durable design. A strong spring catch or some equivalent device must be provided so as to keep the door closed, and a lock may be used in addition to the catch, if desired.

When doors have glass panels the glass must be at least 1-8 inch thick (commercial thickness), and must not have a greater area than 450 square inches unless plate glass at least 1-4 inch in thickness is used.

h. Marking.—Must be marked with manufacturer's name where the name can be plainly seen when the cabinet is installed.

54A. Rosettes.

Rule 54 A c, page 126. Amend first line by changing ".07 inch" to ".06 inch."

55. Sockets.

Rule 55 b, page 127. Amend second sentence to read as follows:—

All sockets and receptacles must be marked with the capacity in watts and the voltage for which they are designed.

Rule 55 j, page 128. Amend to read as follows:—

The base on which the current carrying parts are mounted

must be of porcelain and all insulating material used must be of *approved* type.

57. Arc Lamps.

Rule 57 *d*, page 130. Add new section as follows:—

Terminals must be designed to secure a thoroughly good and permanent contact with the supply wires, which contact must not become loosened by motion of the lamp during trimming.

60. Rheostats.

Rule 60 *a*, page 130. Amend by adding the following fine print notes:—

Wood or other suitable material may be used for parts of the casings or covers of drum controllers, providing these parts are properly lined or treated with fire resisting materials, and so arranged that should the combustible parts within the casing be ignited, the fire would be confined within the casing or cover.

In drum controllers and apparatus of like nature where the controlling mechanism is entirely enclosed in a substantial tight metal case or compartment, hard wood or other suitable material may be used for bases for mounting current carrying parts, or for other parts which cannot readily be made of non-combustible material, provided such combustible material is present only in such amount and so disposed that, even if it be totally destroyed by fire or excessive heat, the effect shall be confined to the interior of the case.

Rule 60 *f*, page 131. Amend by inserting after the word "and" in the third line the words "for direct current circuits"

Also amend by adding another sentence as follows:—

In motor starting rheostats for alternating current circuits the automatic interrupting device may be omitted.

Rule 60 *h*, page 131. Amend by adding two new paragraphs as follows:—

Starting duty resistances shall either be so constructed that if the resistance conductor be fused the arc, or any attendant flame or molten droppings shall be confined within the rheostat, or they shall be constructed with such capacity that when the rated full-load current is passed through the entire resistance for a period of five minutes there shall be no resultant flaming, or molten droppings.

Continuous duty resistances shall either be so constructed that if the resistive conductor be fused the arc or any attendant flame or molten droppings shall be confined within the rheostat or they shall be constructed with such capacity that if subjected to a current flow throughout the entire rheostat, 25 per cent in excess of that at which they are rated, for a period of two hours, there shall be no resultant flaming, or molten droppings.

62. Transformers.

Rule 62 *b* 2, page 133. Amend to read as follows:—

When heated to normal full load operating temperature, the insulation of transformers, the normal primary voltage of which does not exceed 5,000 volts, shall withstand continuously for one minute a difference of potential of 10,000 volts (alternating) between primary and secondary coils and between the primary coils and the core. For higher primary voltages the test shall be at double the normal voltage. Transformers shall also withstand a no-load "run" at double voltage for thirty minutes.

64. Signaling Systems.

Rule 64 *b*, page 134. Amend last line by changing 26 to 24.

Insert the following note in italics just preceding Rule 64 *c*, page 134.

When the wires are carried in approved cables, the next three sections (c, d and e) do not apply.

Rule 64 *d*, page 134. Amend by striking out everything after the word "apart" in next to last line.

Rule 64 *l* 3, page 136. Amend by replacing the second and third paragraphs of sub-section 3 by the following:—

When the ground wire is attached to a water pipe or a gas pipe, it may be connected by means of an approved ground clamp fastened to a thoroughly clean portion of said pipe, or the pipe shall be thoroughly cleaned and tinned with rosin flux solder, and the ground wire shall then be wrapped tightly around the pipe and thoroughly soldered to it.

Rule 64 *n*, page 137. Amend second sentence to read as follows:—

They must not come nearer than three inches to any electric light or power wire in the building, unless separated therefrom by some continuous and firmly fixed non-conductor creating a permanent separation; this non-conductor to be in addition to the regular insulation on the wire.

65. Electric Gas Lighting.

Rule 65 *a*, page 138. Amend to read as follows:—

Electric gas lighting, unless it is the *frictional* system, must not be used on the same fixture with the electric light.