

## Wisconsin State Electrical Code

### SUPPLEMENT

In this supplement amending the code are included the additions to and changes in the Fourth Edition of the Wisconsin State Electrical Code. These orders became effective July 22, 1936, except that note j and the two exceptions to note i of Table 1, Order 1232, became effective July 25.

These amendments have been printed on only one side of the paper in order that the changes can be pasted into the code in the proper places. It is suggested that you paste these changes into your code immediately upon the receipt of this supplement in order to eliminate the possibility of using obsolete orders.

#### Introduction.

Page 13

Add the following to the list of laws given on page 13.

Section 196.171—Examination of Meters, Pipes, Fittings, Wires and Works; Entering Buildings For.

Section 343.175—Fraudulent Use of Gas, Electricity, Water and Steam.

#### Order 1030A

Page 29

Drop the portion of the present Order 1030A which is located on page 29 and substitute the following:

(A) The following orders apply to where and how supply equipment and lines, wiring systems, utilization equipment, arresters except those on communication systems, cable armor, conduit, or other metal raceways and the like shall be grounded when such grounding is intended as a

This is a new order which has been added.

(4) A grounded primary conductor of a supply system operating between 0 and 15,000 volts whether a part of a three phase or single phase circuit may come under the clearance requirements specified for 0 to 750 volts in Section 123, if grounded in one of the following ways: (1) the conductor shall be grounded at the supply station and at each transformer location to an extended metallic underground piping system. If this does not result in one ground connection in each 1,000 feet of line, additional ground connections shall be made as necessary; (2) the grounded primary conductor shall be grounded to an artificial ground at the supply station and at each consumer's transformer location. If this results in less than 9 primary grounds per mile of line, additional grounds shall be placed first on poles adjacent to each consumer's location, and then approximately equally spaced between the transformer locations in order that 9 grounds per mile shall be provided.

(a) If the primary conductor is grounded as indicated above, the grounded primary wire and the secondary neutral may be tied together. Tying the primary neutral and secondary neutral together does not change the requirements of Order 1031(B) (2) except that the primary and secondary ground at the transformer may be combined in one ground.

(b) One ground electrode the size of which complies with 1035F is all that is required at each of the ground locations on the primary conductors except the ground at the supply station end.

## Order 1035(D) (2)

Page 33

The following note was added below the exception to 1035(D)(2):

Note: See Order 1031(B) (4) for the requirements covering the grounding of a primary conductor in order to obtain reduced clearances.

## Order 1036(J) (4)

Page 42

The following note was added to Order 1036(J)(4):

Note: For the purpose of this sub-paragraph a range is to be considered as fixed equipment.



The present Orders 1037(J) (1) and (2) were repealed and the following new Order 1037(J) adopted.

Acceptable lightning protective devices having valve characteristics may have their ground leads connected to the secondary neutral either directly or through a gap, provided that the protective device is connected to ground at the transformer and the utility connects the neutral to ground at least 20 feet from the transformer. The second ground may be omitted if the neutral is solidly connected to the protective device ground and is connected to an extended underground metallic piping system at at least two customers' locations.

The following notes were added to the table:

g. A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031(B) (4) may be included in the classification of a 0 to 750 volt supply line conductor.

h. The references to streets, alleys, and roads in urban or rural districts relate to conductors within the limits of the highways or other public rights-of-way for travel.

i. Where wires (including guys, cables, and messengers) cross over spaces or ways not specifically covered in Table 1 such as lines over fields, etc., the allowable minimum clearances in urban districts shall be the same as the clearances where wires run within the limits of streets and alleys in urban districts except as noted in the exceptions below.

Where the above types of wires run over spaces outside the limits of highways in rural districts they shall have the same clearance above ground as the wires run within the limits of roads in rural districts except as noted in the exceptions below.

Exceptions:

1. Where the wires do not cross over driveways for general farm purposes, this clearance may be reduced to 13 feet for communication conductors limited to 160 volts to ground and transmitted power of 50 watts. Where the ground under the line is such that loaded hayracks or other high vehicles or machinery will not traverse it the clearance may be further reduced to 10 feet.

2. Where wires cross over marshes, woods, or other spaces or ways generally accessible to pedestrians only, or are located relative to fences, ditches, embankments not likely to be traversed by vehicles, or on private fenced rights-of-way, the clearance in Table 1 for "spaces or ways accessible to pedestrians only" together with foot-notes as indicated shall apply. This exception does not include supply conductors of over 150 volts to ground located along or across the yard or space near to the buildings of a farmstead, rural or urban residence or school.

j. The clearances specified for guys and communication cables or conductors along streets or alleys in urban districts may be reduced to 14 feet where the line does not overhang any part of the street or alley which is travelled.



The present Order 1031(B) and (4) shall be repealed and the following new Order 1031(B) adopted:

Secondary neutral either directly or through a gap, provided that the protective device is connected to ground at the transformer and the utility connects the neutral to ground at least 20 feet from the transformer. The second ground may be omitted if the neutral is solidly connected to the protective device ground and is connected to an extended underground metallic piping system at at least two transformers' locations.

The following note was added to the table:

A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031(B) (4) shall be included in the classification of a 0 to 750 volt supply line conductor.

The present Order 1304.04b was repealed and the following new order with the same number adopted:

The service entrance conductors supplying installations of three or more branch circuits shall consist of at least two No. 6 insulated conductors and one No. 8 bare conductor. Installations having only one or two branch circuits may be served by two No. 8 conductors.

In the case of supply systems, the secondaries of which have a maximum voltage to ground of not more than 150 volts, and which meet the conditions of Order 1036 for the use of a common grounding conductor for circuit and equipment, a grounded service entrance conductor without an insulating covering shall be permitted. Such an uninsulated grounded conductor shall be in rigid conduit, electrical metallic tubing or an approved type of service entrance cable.

The present Order 1304.04e was repealed and the following substituted therefor:

In the case of supply systems, the secondaries of which have a maximum voltage to ground of not more than 150 volts, and which meet the conditions of Order 1036 for the use of a common grounding conductor for circuit and equipment, a grounded service entrance conductor without an insulating covering shall be permitted. Such an uninsulated grounded conductor shall be in rigid conduit, electrical metallic tubing or an approved type of service entrance cable.

The present Order 1304.04e was repealed and the following substituted therefor:

In the case of supply systems, the secondaries of which have a maximum voltage to ground of not more than 150 volts, and which meet the conditions of Order 1036 for the use of a common grounding conductor for circuit and equipment, a grounded service entrance conductor without an insulating covering shall be permitted. Such an uninsulated grounded conductor shall be in rigid conduit, electrical metallic tubing or an approved type of service entrance cable.

The following note was added to Table No. 3:

f. A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031(B) (4) shall be included in the classification of line wires operating at 0 to 750 volts but not in the classification 0 to 300 volts to ground as far as footnote c is concerned.

The following note was added to Table No. 9:

e. For 0 to 750 volts this clearance may be reduced to 3 inches. This refers to supply lines as indicated in line 2, columns 3 and 4.

The following note was added to Table No. 11:

f. A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031(B) (4) shall be included in the classification of a 0 to 750 volt supply line conductor.

The present Order 1304.04b was repealed and the following new order with the same number adopted:

b. The service entrance conductors supplying installations of three or more branch circuits shall consist of at least two No. 6 insulated conductors and one No. 8 bare conductor. Installations having only one or two branch circuits may be served by two No. 8 conductors.

The present Order 1304.04e was repealed and the following substituted therefor:

e. In the case of supply systems, the secondaries of which have a maximum voltage to ground of not more than 150 volts, and which meet the conditions of Order 1036 for the use of a common grounding conductor for circuit and equipment, a grounded service entrance conductor without an insulating covering shall be permitted. Such an uninsulated grounded conductor shall be in rigid conduit, electrical metallic tubing or an approved type of service entrance cable.

**Order 1304.04g**

Page 230

The last sentence of Order 1304.04g was repealed and the following substituted:

Service raceway shall be equipped with approved rain-tight service heads. Service entrance cable shall be equipped with an approved raintight service head or be formed into a gooseneck and taped and painted. Drip loops shall be formed on individual wires and on cables.

**Order 1304.05b**

Page 231

The following was added to the first paragraph of Order 1304.05b:

The service switch and service fuses, when not a part of a switchboard, shall be of the accessible fuse or deadfront type in which the fuses are dead when accessible and no live parts are exposed to accidental contact.

**Order 1304.05b-1**

Page 231

The last two sentences of Order 1304.05b-1 were repealed and replaced by the following:

Taps may be used for the connection of the individual sets of equipment. The size of the service entrance conductor and taps shall be determined in accordance with the table in Order 1306.12 and Order 1320.11.

**Order 1305.03q—Table 4**

Page 246

The requirement for a 3/4 inch conduit for four No. 14 single conductor cables was changed to one inch conduit.

**Order 1305.08h**

Page 256

Order 1305.08h was repealed and the following new Order 1305.08h adopted:

Electrical metallic tubing shall not be used for interior wiring systems of more than 600 volts nor for conductors larger than No. 0.

Page 230

Order 1333—Table 3

The following note was added to Table No. 3:

1. A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031.12 (4) shall be included in the classification of line wires operating at 0 to 750 volts but not in the classification 0 to 500 volts to ground as far as footnote 2 is concerned.

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Order 1333(A) (3)—Table 3

The following note was added to Table No. 3:

2. For a 0 to 750 volt system the primary conductor shall be included in the classification 0 to 500 volts to ground as far as footnote 2 is concerned.

Page 232

Order 1333—Table 11

The following note was added to Table No. 11:

1. A primary conductor of a system operating between 0 and 15,000 volts which has been permanently and effectively grounded in the manner specified in Order 1031.12 (4) shall be included in the classification of a 0 to 750 volt primary conductor.

Page 233

Order 1304.04b

The present Order 1304.04b was repealed and the following new order with the same number adopted:

b. The service entrance conductors supplying installations of three or more branch circuits shall consist of at least two No. 6 insulated conductors and one No. 8 bare conductor. Installations having only one or two branch circuits may be served by two No. 8 conductors.

Page 230

Order 1304.04c

The present Order 1304.04c was repealed and the following new order with the same number adopted:

c. In the case of supply systems the secondary of which have a maximum voltage to ground of not more than 150 volts and which meet the conditions of Order 1030 for the use of a common grounding conductor for circuit and equipment, a grounded service entrance conductor without an insulating covering shall be permitted. Such an insulated grounded conductor shall be in rigid conduit, electrical metallic tubing or an approved type of service entrance cable.



The following new Orders 1305.17a and b were adopted:

a. Approved service-entrance cable may be used in interior wiring systems if all of the conductors of the cable are of the rubber-covered type. For range circuits only, an approved service-entrance cable without individual insulation on the grounded conductor may be used if all of the following conditions are met:

1. The cable has a final non-metallic outer covering.
2. The supply is alternating current not exceeding 150 volts to ground.
3. There is at least one ground at the transformer or elsewhere in addition to the ground at the service.

b. Cable shall be installed in accordance with the applicable provisions of Orders 1305.05, 1305.07, 1305.12.

## Order 1306.13a

Page 276

Order 1306.13a was repealed and the following new order added in its place:

a. Flexible cord shall be used only for pendants, wiring of fixtures, portable appliances and when a part of approved stationary devices where the transmission of noise or vibration makes such construction desirable, or when it is necessary to use plug and receptacle connections to facilitate interchange of devices.

## Order 1311.02h

Page 315

The following new paragraph was added:

h. Transformers filled with an approved liquid that will not burn shall comply with Order 1350.04f.

## Order 1314.05i

Page 329

The following was added to Order 1314.05i:

unless an integral part of a device or appliance, in which case a built-in toggle switch or chain pull switch with an insulating cord or link shall be used.

The "250 watts rating" in the second line of the order was changed to "300 watts rating."

The following new order was added:

f. Transformers adapted for and filled with an approved liquid that will not burn may be used in the same manner as an ordinary transformer or may be installed as indicated below. The name plate on these transformers shall specify the liquid to be used.

In sizes of 25 KVA or less the transformers may be located indoors without using inclosing compartments, pans or basins.

In sizes larger than 25 KVA the transformers may be located indoors without using inclosing compartments if

1. A metal pan or concrete basin is provided which is large enough to retain the liquid from the largest transformer involved, or
2. A means for absorbing the gases which might be generated if arcing occurs inside the case is provided, or
3. A pressure relief vent connected to a chimney or flue which will carry such gases outside the building is provided.

Such transformers may be installed on roofs without any inclosure, pan or basin if located away from doors and so that any leaking liquid will not reach windows or doors.

The guarding and grounding requirements for ordinary transformers installed indoors also apply to these transformers.

The following note was added to the Order:

Note: Other kinds of insulation approved for the purpose may be used.

Approved service-entrance cable may be used in inclosing compartments if all of the conductors of the cable are of the rubber-covered type for range circuits only. An approved service-entrance cable without individual insulation on the grounded conductor may be used if all of the following conditions are met:

1. The cable has a final non-metallic outer covering.
2. The supply is alternating current not exceeding 150 volts to ground.
3. There is at least one ground at the transformer or elsewhere in addition to the ground at the service.

Cable shall be installed in accordance with the applicable provisions of Order 1305.05, 1305.07, 1305.12.

Order 1306.12a was repealed and the following new order added in its place:

a. Flexible cord shall be used only for portable wiring of fixtures, portable appliances and when a part of approved stationary devices where the transmission of noise or vibration makes such construction desirable or when it is necessary to use plug and receptacle connections to facilitate interchange of devices.

The following new paragraph was added:

h. Transformers filled with an approved liquid that will not burn shall comply with Order 1350.04f.

The following was added to Order 1314.02:

unless an integral part of a device or appliance to which a built-in toggle switch or chain pull switch with an insulating cord or link shall be used.



The reference to paragraph "b below" in the third line was changed to Order 1360.06e.

## Appendix G

The following table was added as Table 3:

TABLE 3  
Dimensions of Lead-Covered Conductors

Size AWG	Approx. Diam. Over Lead Inches	Approx. Area Over Lead Sq. Inches	Size AWG	Approx. Diam. Over Lead Inches	Approx. Area Over Lead Sq. Inches
14	.25	.0491	500,000	1.22	1.17
12	.26	.0531	550,000	1.34	1.41
10	.32	.0804	600,000	1.37	1.47
8	.38	.1130	650,000	1.41	1.56
6	.46	.168	700,000	1.44	1.63
4	.51	.204	750,000	1.48	1.72
2	.57	.255	800,000	1.51	1.79
1	.64	.322	850,000	1.53	1.84
1/0	.68	.363	900,000	1.57	1.94
2/0	.72	.407	950,000	1.59	1.99
3/0	.78	.478	1,000,000	1.63	2.09
4/0	.83	.541	1,250,000	1.81	2.57
250,000	.99	.770	1,500,000	1.94	2.96
300,000	1.04	.849	1,750,000	2.05	3.30
400,000	1.14	1.02	2,000,000	2.16	3.66
450,000	1.18	1.09			

Nos. 14 to 8, solid conductor; No. 6 and larger, stranded.