

2009 ELECTRICAL CODE REQUIREMENTS

ANTRIM COUNTY – BUILDING DEPARTMENT

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Electrical requirements for residential buildings per the 2009 Michigan Residential Code Chapters 33 thru 42.

Signed & sealed construction documents prepared by a registered design professional for a electrical **layout** plan is required for all commercial projects and projects that meet the requirements as on the electrical application for large residential projects (exceeds 400 amp and over 3500 sq. ft.) for plan review. See the following example pages for electrical requirements.

1. Two grounding rods (8 feet long) minimum 6 feet apart for all services.
2. Contact the Electric Company for meter location and mounting height.
3. Smoke detectors with battery backup each bedroom, each floor on house circuit. R-314.1. CO2 outside bedrooms. R315.21.
4. All kitchen counter top receptacles shall be GFI'd protected.
5. Bedrooms outlets shall be Arc fault protected.
6. Connection of the grounding electrode to the reinforcing rod must be inspected prior to pour. Must use #4 bare wires. E3508.1.2

Manufacturer's installation instruction shall be present on site for all electrical inspections that are to be conducted.

RESIDENTIAL REQUIREMENTS

1. A minimum 100 ampere three (3) wire service is required, in most cases, for any individual residence, (house, cabin, apartment, etc.). E-3602.1. The service must be adequate for the load served. E3602.2 Wires must be listed for direct sun light E3605.6.
 1. Bushing required per table 3702.1.
2. Always consult the serving agency for meter location and mounting height, acceptable wiring methods and raceway for service entrance conductors are listed in E-3603.1. The service entrance equipment must be bonded as per E-3608. The service must be grounded as per E-3607. Interior metal water piping shall always be bonded to the service equipment, the grounded conductor, the grounding electrode conductor and other electrodes available. E3608.
3. If a service mast is used to support the service drop, it must comply with Power Company in area require 2" Receptacle minimum - E3504.5. If underground service conductors are used and any parts of them are exposed to earth fill, they must be listed as direct burial conductor's type.
4. Lighting outlets required. Lighting outlets shall be installed where specified in Sections E-3903.
 - a. Dwelling Unit(s). At least one wall switch-controlled lighting outlet shall be installed in every habitable room; in bathrooms, hallways, stairways, attached garages, and detached garages with electric power, and at outdoor entrances of exits.
 - b. A vehicle door in a garage is not considered as an outdoor entrance. E3903.3.
 - c. At least one lighting outlet controlled by a light switch located at the point of entry to the attic, under-floor space, utility room and basement shall be installed where these spaces are used for storage or contain equipment-requiring servicing. The lighting outlet shall be provided near the equipment requiring service.
 - d. Where lighting outlets are installed according to (a) above in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the difference between floor levels is six (6) steps or more. *Exception # 1: In habitable rooms, other than kitchens and bathrooms, one or more receptacles controlled by a wall switch shall be permitted in lieu of lighting outlets. Exception #2: In hallways, stairways and at outdoor entrances, remote, central or automatic control of lighting shall be permitted.* E3903.3.
 - e. Guest Rooms. At least one wall switch-controlled lighting outlet or wall switch-controlled receptacle shall be installed in guest rooms in hotels, motels or similar occupancies.
 - f. Other locations. At least one wall switch-controlled lighting shall be installed at or near equipment requiring servicing such as heating, air-conditioning and refrigeration equipment in attics or under-floor spaces. The wall switch shall be located at the point of entry to the attic or under-floor space.
5. A lighting outlet shall be installed in each basement, also in any attic or crawlspace or utility room that contains equipment that could required servicing, or if the space is used for storage. Locate the lights at or near the equipment and the switches near the point of entry to the spaces mentioned above. E3903.
6. Receptacle outlets must be installed in every habitable room of the residence so that no point on any walls is over (6) feet from an outlet in the unbroken wall space of that room. In other words, you need an outlet within six (6) feet of a doorway or fireplace, but the rest of the outlets may be twelve (12) feet apart if there is no break in the wall between them. It is permissible to measure around corners. Any wall space two (2) feet wide or greater requires a receptacle outlet. Receptacle outlets in the ends of permanently installed baseboards heaters may be counted to meet the above requirements. Such receptacles outlets shall not be connected to the heater circuit. An outlet over five feet six inches (5' 6") above the floor cannot be counted as an outlet in that space. Outlets on the floor near the wall may be counted as an outlet in that space. E-3901.
 - Tamper resistant receptacles required per E3901.1 & E4002.14.
 - You shall install a receptacle outlet in any hallway of ten (10) feet or more in length. See E-3901.10.
 - You shall install a receptacle outlet adjacent to the basin in every bathroom. See E3801.6 & E-

3901.6.

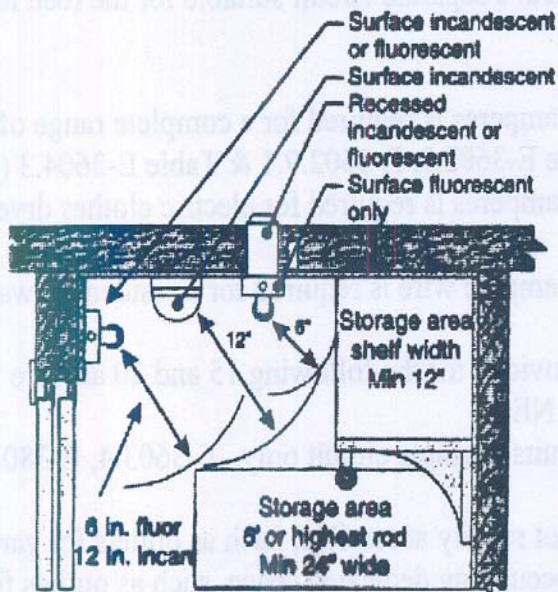
- You shall install at least one receptacle outlet for laundry facilities. E-3703.3. A 20-ampere circuit must feed the laundry receptacle outlets and this circuit shall have no other receptacles outlets or lights.
 - 3 or more cables passing thru wood framing shall be de-rated E3705.3.
7. For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacles outlet accessible at grade level shall be installed at the front and back of the dwelling; also decks over 200 square feet. These receptacles shall be marked water resistant. E4002.8.
 8. For one and two family dwellings you must install a receptacle outlet for the servicing of heating, air conditioning and refrigeration equipment in attics and crawlspaces. These receptacles shall be on the same level and within 25' of the equipment. Rooftop equipment will also be included on multi-family dwellings. E-3901.11.
 9. For a one-family dwelling, at least one receptacle outlet in addition to any provided for laundry equipment must be installed in each basement and in each attached garage and detached garage with electric power. See E-3901.8.
 - Bathroom Receptacle at least 1- 20 amp circuit. E3603.4. within 36" of sink. E3901.6.
 10. In kitchens and dining areas, a receptacle outlet must be installed at each counter space 12 inches or wider. Receptacles shall be installed so that no point along the counter wall is over 24 inches from a receptacle. Island or peninsular counter tops 12 inches or wider shall have at least one receptacle. A counter top broken by a sink or other item leaves a new wall space. Receptacle outlets behind refrigerators, freezers, or other fixed or stationary equipment shall not count as an outlet in that wall space. See E-3901.
 11. This kitchen counter area must have receptacle outlets supplied by at least two (2) 20-ampere circuits. The receptacle outlets in the dining area must also be fed from a 20-ampere circuit, which may extend from the kitchen circuits. The circuits listed in this paragraph shall supply no other receptacle outlets or lights. See E-3901.
 12. If a dishwasher is to be installed, to manufacturer specifications. E-4101.2.
 13. If a garbage grinder or compactor, or both, are installed, must be installed to manufacturer specifications. E-4101.2.
 1. Ceiling fan support must comply. E4001.5.
 14. A circuit suitable for the load with a minimum of 40 amperes is required for a complete range of 8 ¾ KW or more, either free standing or drop in type. E3702.9.
 15. A circuit suitable for the load with a minimum of 30 amperes is required for electric clothes dryer. E-3702.4.
 16. A circuit suitable for the load with a minimum of 30-ampere wire is required for a residential water heater. See E-3702.4
 17. Appliances disconnects must meet Table 4101.5 requirements.
 18. Ground fault circuit interrupter protection must be provided for the following 15 and 20 ampere 125 volt receptacles at dwelling units. See Article 210.8. NEC.
 - a. All bathroom receptacles. On 20-ampere circuits; a single circuit only. E-3902.
 - b. All garage receptacles, except those that are not readily accessible, such as outlets for garage door openers, and receptacles for appliances occupying dedicated space, such as outlets for refrigerators or freezers. E-3902.
 - c. All outdoor receptacles except roof snow melting equipment. E-3902.
 - d. All receptacles in crawlspaces in crawlspaces at or below finished grade. E-3902.
 - e. All the receptacles in unfinished basement; except a single receptacle on a dedicated circuit for an appliance such as a refrigerator or freezer. The laundry circuit is also exempt as is a single receptacle for a permanently installed sump pump. E-3902.
 - f. All the receptacles in boathouse. E-3902
 - g. Outdoor receptacle exposed to rain shall have bubble cover. E4002.10

h. Arc fault receptacle required in bedrooms. E3902.4.

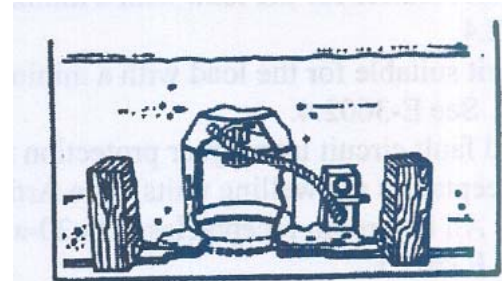
19. Panel boards shall be labeled.

20. E-4003. Fixture in Clothes Closets.

- a) Definitions. Storage space: Storage space shall be defined as a volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 6 ft. (1.83m) or the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 24 in. (610 mm) from the sides and back of the closet walls respectively and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance or 12 in. (305 mm) or the width of the shelf, whichever is greater. See below. For a closet that permits access to both sides of a hinging rod, the storage space shall include the volume below the highest rod extending 12 in. (305 mm) on either side of the rod on a plane horizontal to the floor extending the entire length of the rod.
- b) Fixture Types Permitted. Listed fixtures of the following types shall be permitted to be installed in a closet:
 - a. A surface-mounted or recessed incandescent fixture or lamp holders shall not be permitted.
 - b. A surface-mounted or recessed fluorescent fixture.
- c) Fixture Types Not Permitted. Incandescent with open or partially enclosed lamps and pendant fixtures or lamp holders shall not be permitted.
- d) Location. Fixtures in clothes closet shall be permitted to be installed as follows:
 - a. Surface-mounted incandescent fixtures installed on the wall above the door or on the ceiling, provided there is minimum clearance of 12 in. (305mm) between the fixture and the nearest point of a storage space.
 - b. Surface-mounted fluorescent fixtures installed on the wall above the door or on the ceiling, provided there is a minimum clearance of 6 in. (152 mm) between the fixture and the nearest point of a storage space.



A listed type IC recessed fixture power suitable for use in insulated ceilings in direct contact with thermal insulation. Shall have thermal protection ... shall so be identified as thermally protected. E-3904.8



Fixtures in closet. Minimum clearances for lighting fixtures in clothes closets. E-4003

120/240 VOLTS, 3-WIRE, SINGLE-PHASE
DWELLING
SERVICES AND FEEDERS

TABLE E-3503.1

AMPERAGE	WIRE SIZE	
	CU	AL
100	4	2
125	2	1/0
150	1	2/0
175	1/0	3/0
200	2/0	4/0

ALLOWABLE AMPACITIES FOR
COPPER/ALUMINUM INSULATED
WIRE, INTERIOR WITH GROUND

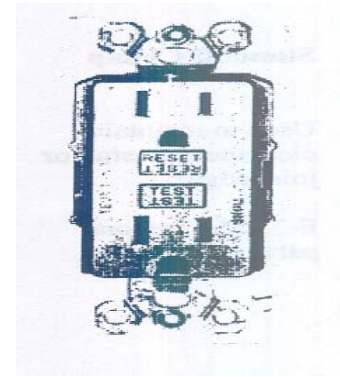
WIRE SIZE		AMPACITY
CU	AL	
14		15
12		20
10	8	30
8	6	40
6	4	55
4	2	70

- a. Clearance from building openings. E-3504.1 Fig. E-3504.1.
- b. Clearance from ground. Service-drop conductors when not in excess of 600 volts, shall have the following minimum clearance from ground. E-3501.2.2.
 1. 10 feet – above finished grade, sidewalks or from any platform or projection from which they might be reached.
 2. 12 feet – over residential driveways and commercial areas such as parking lots and drive-in establishments not subject to truck traffic.
 3. 18 feet – over public streets, alleys, roads and driveways on other than residential property.

Size of Conductor	Free Space within box for each Conductor
No. 14	2 Cubic inches
No. 12	2.25 Cubic inches
No. 10	2.5 Cubic inches
No. 8	3 Cubic inches
No. 6	5 Cubic inches

E-3905.13.2.1

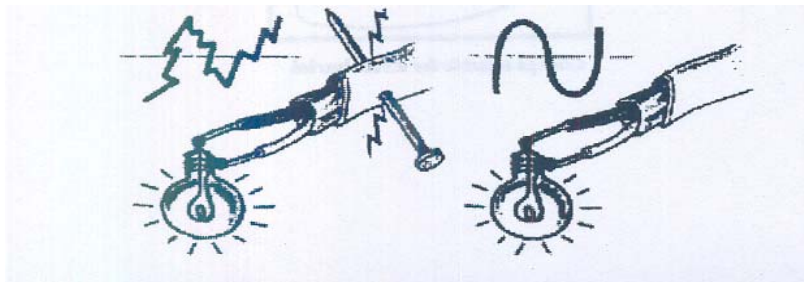
Ground fault circuit interrupter protects against shock hazards caused by ground faults in portable tools and equipment. Rated at 15 & 20 AMP, 120 VA, 20 Hz, the unit also protects downstream standard receptacles.



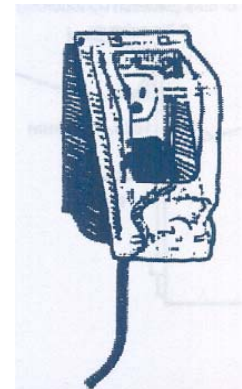
Arc-Fault Circuit Interrupters

Arc-fault circuit interrupters are relatively new devices intended to provide fire protection by opening the circuit if an arcing fault is detected. They look very similar to GFCI breakers, though they do not provide protection against shock hazards in the manner of a GFCI.

AFCI protect all bedroom 15 amp & 20 amp outlet circuits (including lights and smoke detectors). E-802.11



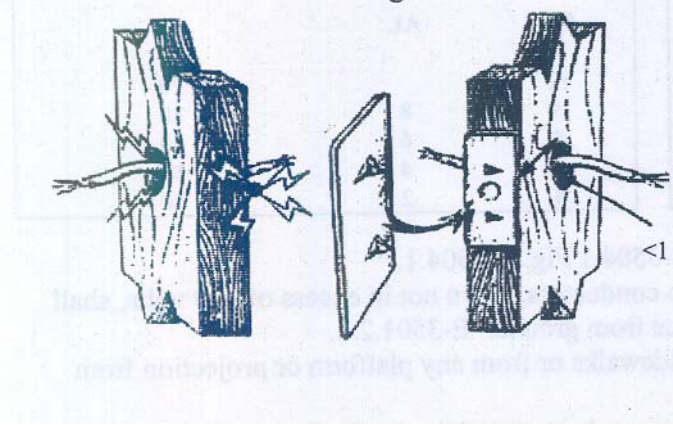
Rain-Tight Cover



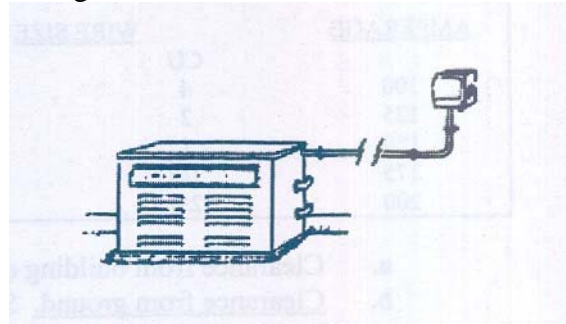
To be used for unattended equipment outdoors.

Nail-Plate Protection

Protect cable when
<1 1/4 in. to stud or joist
edge.



In-Sight Disconnect

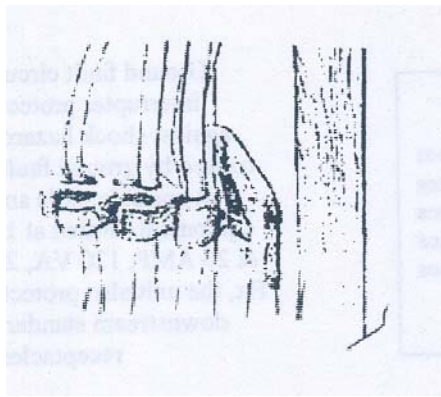


Disconnect must be within sight of electrical
equipment but no more than 50'.

Standoff Clamp

Used to maintain clearances
to stud or joist edge.

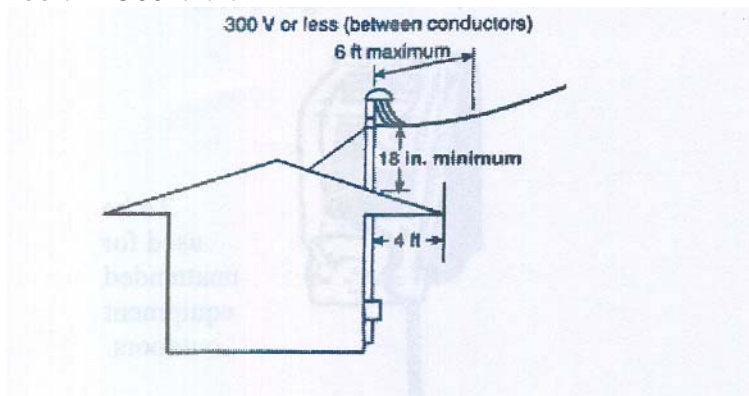
E3702.1 (second paragraph)



Breaker Lockout



Service-drop conductors passing over the overhang portion of
the roof. E-3604.2.1.



Grounding & clamps: E-3611.

