

Cheboygan County Department of Building Safety

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ONE- AND TWO-FAMILY DWELLING ELECTRICAL CODE HANDOUT

(2009 Michigan Residential Code – Effective March 9, 2011)

Service Entrance

1. Size
 - a. 100 amperes minimum (E3602.1)
2. Grounding Electrode System
 - a. All grounding electrodes (metal underground water pipe, re-rod in footings ½" x 20 feet, ground rods) that are present at each building shall be bonded together to from the grounding electrode system. If no metal underground water pipe or re-rod are present, two ground rods shall be installed six feet apart. (E3608.1)
 - b. The grounding electrode conductor shall be continuous (no splices). (E3610.1)
3. Location
 - a. The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service conductors. (E3601.6.2)
 - b. The service panel shall NOT be located in: (E3705.7)
 1. Bathrooms
 2. Clothes closet
 3. Over the steps of a stairway
4. Access
 - a. The panel must be in a space 30 inches wide, 36 inches deep and 6 feet-6 inches high, with clear access. (E3405.2)
5. Height
 - a. Disconnect handle must be 6 feet, 7 inches maximum. (E4001.6)

Table 310.15(B)(6) Conductor Types and Sizes for 120/240 Volt
3-Wire, Single-Phase Dwelling Services and Feeders.

Conductor (AWG or kcmil)		
	Aluminum or Copper-Clad Aluminum or	Service or Feeder Rating (Amperes)
Copper		
4	2	100
3	1	110
2	1/0	125
1	2/0	150
1/0	3/0	172
2/0	4/0	200
3/0	250	225
4/0	300	250
250	350	300
350	500	350
400	600	400

6. Identification
 - a. Each circuit breaker and main breaker must be labeled to indicate its' purpose. (E3404.12)
7. 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders
For dwelling units, conductors, as listed in Table 310.15(B)(6), shall be permitted as

120/240-volt,3-wire, single-phase service-entrance conductors, service lateral conductors, and feeder conductors that serve as the main power feeder to a dwelling unit and are installed in raceway cable or cable with or without an equipment grounding conductor.

8. Service Conductors
 - a. To be sunlight resistant where exposed. (E3605.6)

Ground-Fault Circuit Protection for Personal Dwelling Units (E3902)

1. All 15- and 20-ampere receptacles installed in bathrooms.
2. All 15- or 20-ampere receptacles installed in garages and unfinished accessory buildings.
3. All 15- and 20-ampere receptacles installed outdoors.
4. All 15- and 20-ampere receptacles installed in crawl spaces and unfinished basements.
5. All 15- and 20-ampere receptacles to serve the kitchen countertop surfaces and within 6 feet of the outside edge of wet bar sinks, laundry sinks, or utility sinks.
6. All 15- or 20-ampere receptacles installed in boathouses.
7. All boat hoist receptacles, 125 Volt, 15- or 20- ampere.
8. All 15- and 20-ampere receptacles used for construction, temporary or permanently installed. (MEC 590.6)
9. Hydromassage bathtubs and their associated electric components shall be protected by a ground-fault circuit-interrupter. (E4109.1)
10. All 15- and 20-ampere 125 Volt receptacles that are located within 6' of laundry, utility or wet bar sinks. (E3902.7)

Smoke Detectors Required (R314)

1. Location
 - a. In each bedroom
 - b. In the immediate vicinity of the bedrooms
 - c. On each floor (Exception: crawlspaces and uninhabitable attics)
2. Interconnection
 - a. If more than one detector is required, the activation of any alarm will activate all the alarms.
3. In addition to the required AC power source, the alarms will have battery backup.
4. The alarms will be installed according to manufacturer's recommendations.

Carbon Monoxide Alarms

(R315)

For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the vicinity of the bedrooms in dwelling units within which fuel-fired appliances are installed and in dwelling units that have attached garages. (R315.1)

Where work requiring a building permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel-fired appliances exist, carbon monoxide alarms shall be provided in accordance with section R315.1. (R315.2)

Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions. (R315.3)

Required Receptacle Outlets

(E3901.2)

In every kitchen, family room, dining room, living room, parlor, library, den, bedroom, recreation room, sun room, or similar room or area of dwelling units, receptacle outlets shall be installed so that no point along the floor line in any wall space is more than 6 feet measured horizontally, from an outlet in that space, including any wall space 2 feet or more in width. Receptacle outlets over 5 feet-6 inches above the floor do not count for the required number of outlets.

Tamper-resistant Receptacles

(E4002.14)

All 125 Volt, 15- and 20-ampere receptacles in the following locations shall be tamper proof - Kitchen, family room, dining room, living room, parlor, library, den, sun room, bedroom, recreation room, outdoor, laundry, basements, garages, hallways and HVAC outlet.

Damp Location Receptacles

(E4002.8)

Receptacles installed in wet or damp locations shall be listed as weather resistant type (WR Rated).

Arc-Fault Circuit – Interrupter Protection

(E3902)

ALL receptacles, lights, smoke detectors, A/C units and etc. in bedrooms shall be protected by an Arc-Fault Circuit Interrupter listed to provide protection of the ENTIRE branch circuit.

Small Appliances

(E3901.3)

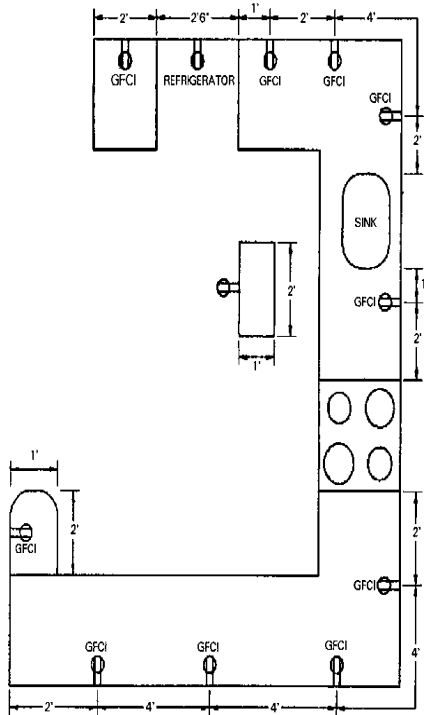
In the kitchen, for the countertop outlets, two or more 20 amp circuits are required.

1. The following are permitted to be on countertop circuits:
 - a. Refrigeration equipment
 - b. Electric clocks
 - c. Power supplemental equipment and lighting on gas-fired range, oven or counter-mounted cooking units
 - d. All countertop receptacle outlets are to be GFCI protected

Countertops

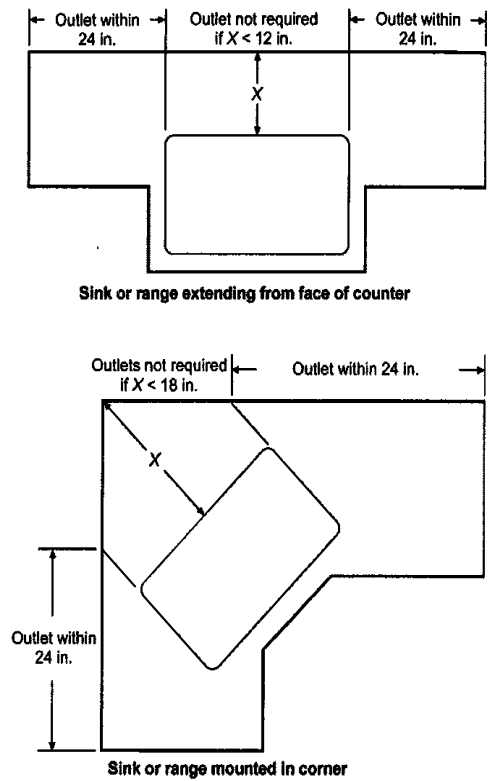
(E3901.4)

A receptacle outlet shall be installed at each wall counter space 12 inches or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 24 inches measured horizontally from a receptacle outlet in that space.



For SI: 1 foot = 304.8 mm.

FIGURE E3801.4
COUNTERTOP RECEPTACLES



For SI: 1 inch = 25.4 mm.

FIGURE E3801.4.1
DETERMINATION OF AREA BEHIND SINK OR RANGE

Islands

(E3901.4.2)

At least one receptacle outlet shall be installed at each island counter space with a long dimension of 24 inches or greater and a short dimension of 12 inches or greater.

Peninsular Counter Space

(E3901.4.3)

At least one receptacle outlet shall be installed at each peninsular counter space of 12 inches or more in length.

Separate Spaces

(E3901.4.4)

Countertop spaces separated by range tops, refrigerators, or sinks shall be considered as separate countertop spaces.

Receptacle Outlet Location

(E3901.4.5)

Receptacle outlets shall be located not more than 20 inches above the countertop. Receptacle outlets shall not be installed in a face-up position in the work surfaces or countertops.

Bathrooms

(E3901.6)

In dwelling units, at least one wall receptacle outlet shall be installed within 36 inches of basin location. All receptacles in bathrooms are to be GFCI protected. Bathroom receptacle outlets shall be supplied by at least one 20-ampere branch circuit. Such circuits shall have no other outlets.

Outdoor Outlets

(E3901.7)

At least one receptacle outlet accessible at grade level and not more than 6 feet, 6 inches above grade shall be installed at the front and back of the dwelling. All outdoor receptacle outlets are to be GFCI protected and weather proof with cord plugged in (bubble cover wet locations).

Laundry

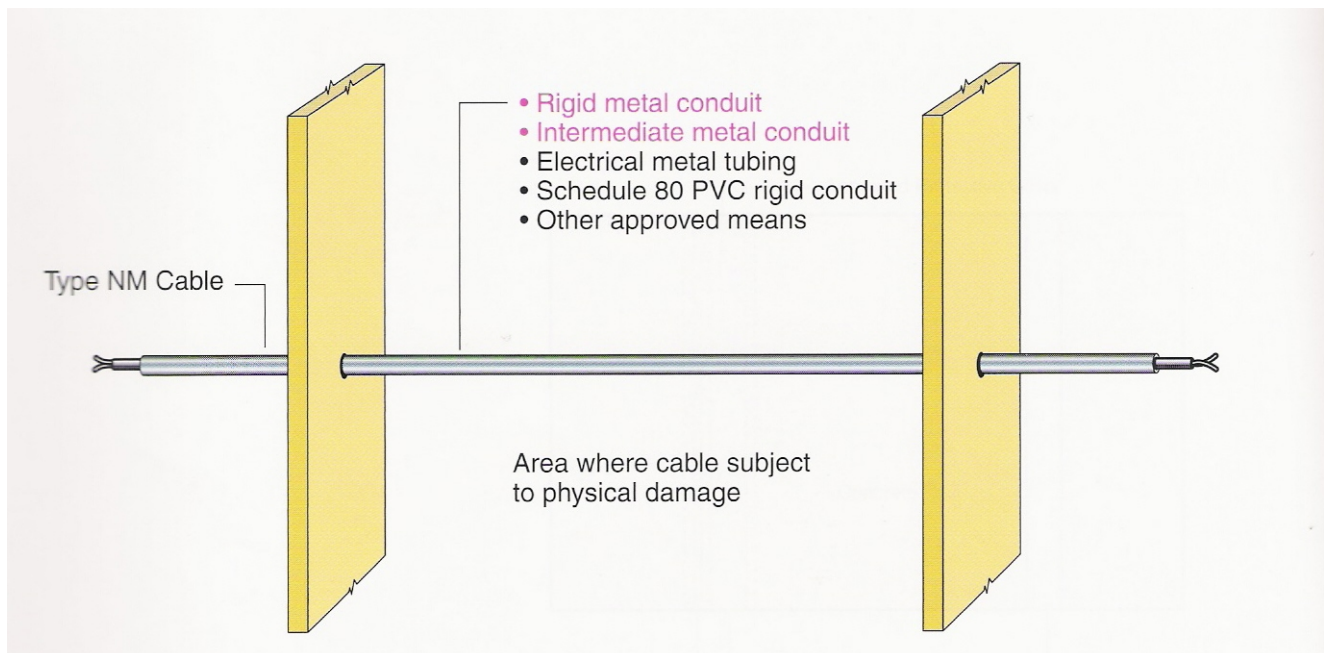
(E3901.8)

In dwelling units, at least one receptacle outlet shall be installed for the laundry. This is to be a 20 amp circuit with no other outlets.

Open Walls in Garage and/or Unfinished Basement

(E3802.4 & E3802.3.2)

Where subject to physical damage, cables shall be protected by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit, or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC rigid nonmetallic conduit or other approved means extending not less than 6 inches above the floor.



Basements and Garages

(E3901.9)

At least one receptacle outlet, in addition to any provided for laundry equipment, shall be installed in each basement and in each attached garage, and in each detached garage with electric power.

Hallways

(E3901.10)

Hallways of 10 feet or more in length shall have at least one receptacle outlet.

Crawl Spaces or Attics

(E3901.11)

At least one GFCI protected outlet shall be provided within 25 feet of heating, air-conditioning and refrigeration equipment installed in crawl spaces. The receptacle outlet shall not be connected to the load side of the HVAC equipment disconnecting means.

Unfinished Basements and Crawl Spaces

(E3802.4)

Where type SE or NM cable is run at angles with joists in unfinished basements and crawl spaces, cable assemblies containing two or more conductors of sizes 6 AWG and larger and assemblies containing three or more conductors of sizes 8 AWG and larger shall not require additional protection where attached directly to the bottom of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with Table E3802.1. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point where cable enters the raceway. The NM or SE cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than ¼ inch (6.4 mm). The cable shall be secured within 12 inches (305 mm) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor.

Lighting Outlets Required

(E3903.2 & E3903.3)

At least one wall switch-controlled lighting outlet shall be installed in every habitable room, bathrooms, hallways, stairways, attached garages, and detached garages with electric power, and at the exterior side of outdoor entrances or exits. A vehicle door in a garage shall not be considered as an out-door entrance or exit.

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 at or near the equipment requiring servicing.

Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the difference is six steps or more.

At least one wall switch controlled lighting outlet 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.

Electric Ranges and Dryers

(E3908.7)

Cords and receptacles shall be FOUR wire.

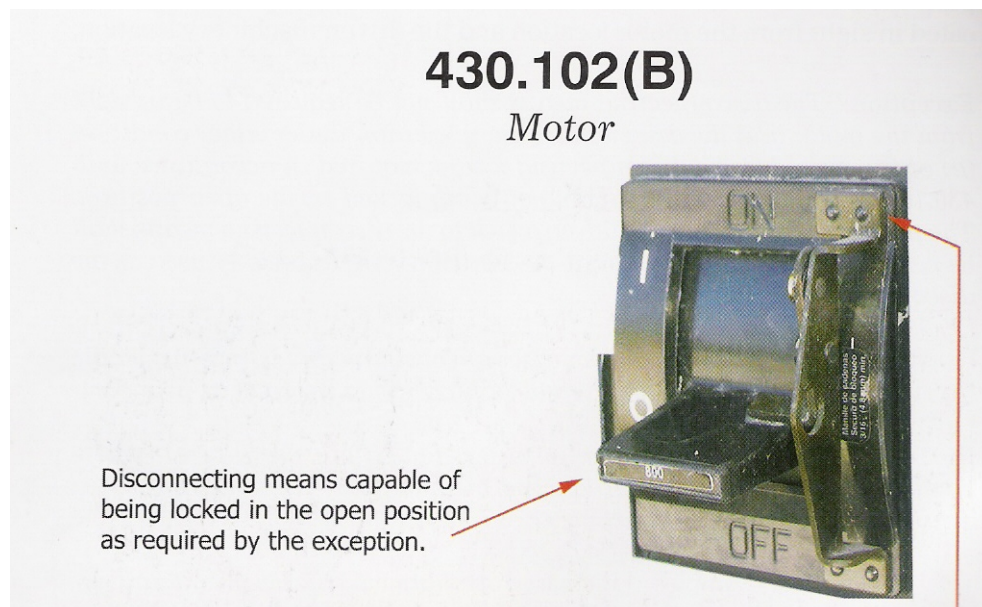
Disconnects Required

1. Main service panel (if more than six circuits) (E3601.7)
2. Central heating equipment
 - a. Disconnect shall be within sight and readily accessible (E4101.5)
 - b. It shall be supplied by an individual branch circuit (E3703.1)
3. Electric storage type water heaters
 - a. Disconnect shall be within sight and readily accessible (E4101.5)
4. Central air conditioners
 - a. Disconnect shall be within sight and readily accessible and individually lockable. (Table E4101.5)
5. Specific appliances ie: (dishwashers, trash compactors and disposals) (E4101.3)
 - a. Appliances shall be permitted to be cord and plug connected with a flexible cord where all the following conditions are met.
 1. The length of the cord is not less than 18 inches or more than 36 inches.
 2. Receptacles shall be located to avoid physical damage to the flexible cord.
 3. The receptacle is accessible.
6. Water tank pressure switch (E430-102a, 2008 MEC)
 - a. Disconnect shall be within sight and readily accessible and individually lockable (E430.102b, 2008 MEC).

Lockable Motor Disconnects

(E430.102B)

The lock-off device to be permanently mounted to the switch or circuit is individually capable of being locked in the open position. As an example, a lockable cover on the panelboard does not comply with this rule.



Bonding CSST Gas Piping

