**SOUTH DAKOTA ELECTRICAL COMMISSION**
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**electrical.sd.gov**

# HOMEOWNER WIRING MANUAL

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## HOMEOWNER WIRING

South Dakota allows homeowners to install electrical wiring under what is known as the homeowner exemption. Statute 36-16-15 states in part, that no license is required of an individual installing electrical wiring in his own residence or farmstead. Chapter 20:44:14:01 (12) "Owners Exemption" states an exemption from licensure requirements for an individual owner who is **PERSONALLY** installing electric wiring and fixtures in a **residence or farmstead** which is **owned and resided** in or on by the person installing the electrical wiring or fixtures. **This exemption does not allow licensed electricians or electrical contractors or any other person to do work under a homeowner wiring permit nor does it allow for homeowners to do work under a contractor's wiring permit.**

A homeowner wiring permit may **not** be used to install wiring for **mobile homes on rented** lots or **in mobile home parks, rental property or property for commercial use.**

## RESIDENTIAL ELECTRICAL INSPECTION

All electrical installations must meet the National Electrical Code and the requirements of the South Dakota State Laws and Rules. The standard for compliance with the national electrical code is universal. The National Electrical Code is updated every three years, as is the South Dakota State Wiring Bulletin. **Please note additional consultation and/or inspections over and above the typical inspection process will be charged an addition fee per SD Administrative Rule 20:44:19:07(4)**.

Any installer must provide at least 72-hour notification to the inspector or the Commission office for an inspection. You are required to notify your local inspector and have a ***rough-in*** inspection completed prior to insulating, sheet rocking, paneling or covering the installation with any other type of material which would inhibit the rough-in inspection. Underground wiring must be inspected before the trench is back-filled. A ***final*** inspection is required for all jobs prior to occupancy.

All wiring permits are good for three years, if the job is not completed by the end of three years you will need to purchase another wiring permit to complete the job. Failure to do so could result in a $100 administrative fee.

Please be cautious if you are not certain as to the requirements of a South Dakota electrical installation. It is the installer's responsibility to understand the laws and rules which govern installations. Utilize a licensed electrical contractor as a consultant or an installer to mitigate costly expenses due to nonprofessional advice, noncompliant materials or poor installation techniques.

If you need further assistance, please call the Electrical Commission office at 605.773.3573.

**YOU ARE REQUIRED TO CONTACT YOUR INSPECTOR FOR INSPECTIONS**

An electronic version of the Homeowner Wiring Manual can be found at:
https://dlr.sd.gov/electrical/documents/homeowner_wiring_manual.pdf

## ELECTRICAL INSPECTORS

Any installer must provide at least 72-hour notification to the commission office when an electrical job is at a rough-in stage requiring inspection to assure compliance with the National Electrical Code, a stage of correcting or completing items on a report, or prior to occupancy for final inspection.

| District | Inspector | Phone Number | Home Base | Preferred Method of Contact |
|---|---|---|---|---|
| **District 1** | **Brent Schoulte** | 605.222.1683 | Presho | No preference |
| **District 2** | **Stan Rogers** | 605.517.2478 | Hot Springs | Text |
| **District 3** | **Kyle Dahl** | 605.592.2029 | Brookings | Text |
| **District 5** | **Jason Wingert** | 605.201.0520 | Hartford | Email |
| **District 6** | **Dan Larson** (part-time) | 605.380.8981 | Aberdeen | Phone |
| **District 8** | **Thad Stoddard** | 605.390.1638 | Meade County | Email |
| **District 9** | **Dan Urban** | 605.222.0143 | Watertown | Text |
| **District 11** | **Scott Ochsner** | 605.370.8801 | Tea | Text |
| **District 12** | **Dan Schoenfelder** | 605.661.1691 | Scotland | Text |
| **District 13** | **Aaron Dimitt** | 605.390.4423 | Pennington County | Email |
| **District 14** | **Jeff Hotchkiss** | 605.220.6885 | North Central South Dakota | Text |
| **District 17** | **Tom Kelly** (part-time) | 605.290.2121 | Aberdeen | Phone |
| **District 21** | **Doug Brende** | 605.251.5454 | Southeast South Dakota | Text |
| **District 22** | **Curt Mitchell** | 605.205.0084 | Wessington Springs | No preference |
| **District 21** | **Tim Heairet** | 605.639.1178 | Spearfish | Email |

**To view a current list of inspectors:** https://dlr.sd.gov/electrical/inspections.aspx

**To calculate inspection fees:** https://dlr.sd.gov/electrical/fees.aspx

## PLAN YOUR WIRING PROJECT

This brochure is intended to be a general overview of residential electrical requirements. No claim is made that this information is complete or beyond question. Additional information and knowledge is needed to properly install electrical wiring that is essentially free from fire and electric shock hazard. Ultimately it is the installers responsibility to implement the most current code and requirements as adopted by the South Dakota electrical commission. For assistance, please reference authoritative publications based on the 20~~14~~20 National Electrical Code© (the NEC).

The four new exceptions to NEC 2020 are summarized as follows:

1. 210.8(F) GFCI for AC units
2. 230.67 Surge protection
3. 210.8(A) GFCI for 250 Volt (Guidance: reverts to 2017 verbiage)
4. 406.9(C) Bathroom GFCI (Guidance: reverts to 2017 verbiage)

## GENERAL CIRCUITRY

Except for the final connection to switches, receptacles and lighting fixtures, all ground wires and other wire in boxes must be spliced and pigtailed for the rough-in inspection. The inspector will check, yet is not limited to, proper spacing of boxes, fastening of conductors, routing of conductors, conductor size, box size, box fill and general wiring practices.

**NEC 210.11 & 422.12** – in addition to the branch circuits installed to supply general illumination and receptacle outlets in dwelling units, the following **minimum** requirements apply:

- Two or more 20-amp circuits for receptacles serving countertops in kitchens
- One 20-amp circuit for the laundry area receptacles
- One 20-amp circuit for the bathroom receptacles
- One 20-amp circuit for garage receptacles
- One separate, individual branch circuit for central heating equipment

**NEC 300.3** – All conductors of the same circuit, including grounding and bonding conductors, shall be contained in the same raceway, cable or trench.

**NEC 408.4** – Every circuit and circuit modification shall be legibly identified as to its clear, evident and specific purpose or use in sufficient detail on a directory located on the face or inside of the electrical panel doors. Example: Upstairs northwest bedroom **(NOT KIDS BEDROOM)**.

**NEC 240.4** – Generally, the rating of the fuse or circuit breaker determines the minimum size of the circuit conductor, per the following table:

| | *Minimum Wire Size* | |
|---|---|---|
| Fuse or Circuit Breaker Size | Copper Conductor | Aluminum Conductor |
| **15 amp** | **14** | **n/a** |
| **20 amp** | **12** | **n/a** |
| **30 amp** | **10** | **8** |
| **40 amp** | **8** | **6** |
| **50 amp** | **6** | **4** |

**NOTE:** ***Conductors that supply motors, air-conditioning units, and other special equipment may have overcurrent protection that exceeds the general information in the above chart.***

**NEC 406.4** – Receptacle outlets shall be of the grounding type, be effectively grounded, and have proper polarity.

**NEC 406.12 –** Requires all receptacles in dwelling units to be tamper-resistant as listed in 210.52, this includes garages and accessory buildings (attached and detached).

**NEC 210.52 (A)** – Receptacles shall be installed in rooms so that no point measured horizontally along the floor line of any wall is more than 6 feet from a receptacle outlet (no more than 12 feet between outlets). Any wall space 2 feet or more in width shall have an outlet.
**NEC 210.52(B)** – At least two separate small appliance branch circuits are required for kitchen countertop receptacles. These outlets shall be GFCI protected. The dishwasher and garbage disposal are not permitted on these circuits and must have their own circuit.
**NEC 210.52(C)** – At kitchen countertops 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. Countertop spaces separated by range tops, sinks, or refrigerators are separate spaces. A receptacle outlet shall be installed at each wall countertop that is 12 inches or wider. Receptacles shall be located not more than 20 inches above the countertop, or mounted below a countertop less than 6 inches beyond the support base, not more than 12 inches below the countertop.

**SDAR 22:44:22:23 Dwelling unit receptacle outlets** – Countertops and peninsulas. Island and peninsular countertops in dwellings units are exempt from the National Electrical Code requirements.

**NEC 210.52(E)** – At least one receptacle outlet accessible while standing at grade level and located not more than 6 and one half feet above grade level shall be installed at the front and back of the dwelling. At least one receptacle outlet shall be installed on any balcony, deck, or porch that is accessible from inside the dwelling. These receptacles shall be listed as WR and shall have covers that are weatherproof whether or not an attachment plug is inserted.
**NEC 210.52(G)** – At least one receptacle outlet must be installed for each car space in the garage, this circuit shall not supply outlets outside of the garage. *Exception: this circuit shall be permitted to supply readily accessible outdoor receptacle outlets.*
**NEC 210.52(H)** – At least one receptacle outlet shall be installed in any hallway that is 10 feet or more in length.
**NEC 210.52(I)** – Foyers that have an area that is greater than 60 square feet shall have a receptacle outlet located in each wall space 3 feet or more in width and unbroken by doorways, floor to ceiling windows and similar openings.

**NEC 210.63** – a 15- or 20-amp 125 volt weatherproof GFCI protected outlet shall be installed within 25 feet of the outside air conditioning unit. This is required for servicing the unit.

**NEC 210.70** – At least one wall-switched controlled light shall be installed in every habitable room, hallway, stairway, attached and detached garages and outdoor entrances. Where a light is installed in a stairway, it shall be switched at each level. For attics, crawl spaces, utility rooms, and basements at least one light containing a switch or controlled by a wall switch shall be installed.

**NEC 210.19** – Electric ranges require a 40 or 50 amp 120/240 volt 4-wire circuit and a 4-wire receptacle. Electric dryers require a 30 amp 120-/240 volt 4-wire circuit and a 4-wire receptacle.

**NEC 404.2** – Where lights are controlled by switches there shall be a grounded conductor or neutral for the circuit at each switch box. Where multiple switch locations control the same lighting load such that the entire floor area of the room or space is visible from the single or combined switch locations, the grounded circuit conductor shall only be required at one location.

**NEC 422.31(B)** – Electric water heaters usually require a 30 amp 240 volt 3-wire circuit. If it is not in sight of the electrical service, it must have a disconnecting means at the water heater. A receptacle and cord is not acceptable.

**NEC 250.94** – An intersystem bonding termination shall be provided at the service equipment for the purpose of bonding communications systems such as cable TVs and phones.

## GROUND-FAULT PROTECTION

**NEC 210.8** – Ground-fault Circuit-interrupter (GFCI) protection shall be provided for all 125-volt, 15 and 20 amp receptacle outlets. Installed outdoors, in boat houses, garages, unfinished accessory buildings, crawl spaces at or below grade level, basements, bathrooms, at kitchen countertops and within 6 ' of the outside edge of the sink, in laundry areas, utility rooms and at wet-bars this includes garages and accessory buildings (attached and detached.).

**NEC 680.71** – A hydro-massage bathtub, (a bathtub with a re-circulating piping system, designed to discharge water upon each use) and its associated components shall have individual branch circuit(s) and protected by a readily accessible ground-fault circuit-interrupter protection.

**NEC 680.71** – All 125-volt receptacles not exceeding 30 amperes installed within 6 foot of the inside walls of a hydro-massage bathtub shall be GFCI protected.

**NEC 680.73** – Hydro-massage bathtub electrical equipment shall be accessible without damaging the building structure or finish.

**NOTE:** ***South Dakota exempts the requirement for GFCI protection of life support systems.***

**NEC 682.33** – All circuits rated not more than 60 amps at 120 through 250-volt installed outdoors for equipment in or adjacent to natural and artificial bodies of water shall have GFCI protection.

## ARC-FAULT CIRCUIT-INTERRUPTER PROTECTION

**NEC Definitions** – Arc-Fault Circuit Interrupter is a device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

**NEC 210.12 (A)** – All 120 volt, single phase, 15 and 20 ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, kitchen, laundry area, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination type, installed to provide protection of the branch circuit.

**NOTE:** ***South Dakota exempts the requirement for AFCI protection of Life Support Systems.***

**NOTE:** ***Do not let the term outlet confuse you. An outlet by definition is: A point on the wiring system at which current is taken to supply utilization equipment. A receptacle is an outlet; a lighting box is an outlet.***

## WIRING METHODS

**NEC 314.27(C)** –Outlet box or outlet box system used as the sole support of a ceiling-suspended (paddle) fan. shall be listed, shall be marked by their manufacturer as suitable for this purpose. A fan rated box is required for all ceiling boxes more than 3 feet from any wall in habitable rooms.

**NEC 334.30** – Type NM (nonmetallic) cable shall be secured at intervals not exceeding 4.5' and within 12 inches of each box with listed strapping equipment (Note: non-insulated metal staples are not listed for this method).

**NEC 314.17** – The outer jacket of NM cable shall be secured to the box and extend into the box a minimum of 1/4 inch..

**NEC 300.14** – The minimum length of conductors, including grounding conductors, at all boxes shall be 6 inches with at least 3 inches extending outside the box.

**NOTE:** ***Don't skimp on the length of wire here. Leave plenty of wire for make up. The amount of wire saved is not worth the grief of not having enough wire.***

**NEC 300.4** – Where cables are installed through bored holes in joists, rafters, or wood framing members, the holes shall be bored so that the edge of the hole is not less than 1¼ inch from the nearest edge of the wood member. If this distance cannot be maintained, or where screws or nails are likely to penetrate the cable, it shall be protected by a steel plate at least 1/16 inch thick and of appropriate length and width.

> **Note*: Check with local building codes to determine where holes or notches may be made in joists and supports*.**

**NEC 300.22** – Type NM cable shall not be installed in spaces specifically fabricated for environmental air, but may pass perpendicular through joist or stud spaces used as such.

**NEC 110.14** – Only one conductor shall be installed under a terminal screw. In boxes with more than one grounding wire, the grounding wires shall be spliced with a "wire tail" or "pigtail" which is then attached to the grounding terminal screw of the device.

> **NOTE:** ***Pig tailing of all conductors is a good practice and will provide a more trouble-free installation, especially with the AFCI requirements.***

**NEC 200.7(c)** – Where permanently re-identified at each location where it is visible and accessible, the conductor in type NM cable with white colored insulation may be used as an ungrounded conductor.

**NEC 250.134; 314.4; 404.9** – All Electrical equipment, metal boxes, cover plates, and plaster rings shall be grounded. All Switches, including dimmer switches, shall be grounded.

**NEC 110.12 & 314.17** – Unused openings in boxes shall be effectively closed. If openings in non-metallic boxes are broken out and not used the entire box must be replaced.

**NEC 408.41** – Each grounded conductor shall terminate within a panelboard in an individual terminal that is not used for any other conductor.

**NEC 110.14** – Splices shall be made with an approved splice cap or "wire nut" and shall be made in approved electrical boxes or enclosures.

**NEC 314.25 & 410.22** – In completed installations, each box shall have a lamp-holder, canopy or device with an appropriate cover plate.

**NEC 314.29** – Junction boxes shall be installed so that the wiring contained in them can be rendered accessible without removing any part of the building.

**NEC 314.16** – The volume of electrical boxes shall be sufficient for the number of conductors, devices, and cable clamps contained within the box. Nonmetallic boxes are marked with their cubic inch capacity. Use the following table to calculate each box size.

| **Conductor Size** | **14 AWG** | **12 AWG** |
|---|---|---|
| Each separate insulated wire | 2 $in^3$ | 2.25 $in^3$ |
| All ground wires (combined) | 2 $in^3$ | 2.25 $in^3$ |
| For each device (switch/receptacle) | 4 $in^3$ | 4.5 $in^3$ |
| All internal cable clamps (combined) | 2 $in^3$ | 2.25 $in^3$ |

**Sample Calculation:** Four 14/2 w/ground type NMB cables:

| | |
|---|---|
| 8 insulated wires | 16 cubic inches |
| All ground wires | 2 cubic inches |
| 1 switch | 4 cubic inches |
| 1 receptacle | 4 cubic inches |
| All clamps (combined) | 2 cubic inches |
| **Total box volume required** | **28 cubic inches** |

**NEC 410.16** – Luminaries (lighting fixtures) installed in clothes closets shall have the following minimum clearances from the defined storage area (see below):

- 12 inch for surface incandescent or LED fixtures
- 6 inch for recessed incandescent or LED fixtures
- 6 inch for florescent fixtures

**NEC 410.2** – Storage space, as applied to an electrical installation in a closet, is the volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a heights of 6' or the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 24 inches 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 of 12 inches or the shelf width, whichever is greater.

**NEC 410.16(B)** – Incandescent luminaries with open or partially enclosed lamps and pendant fixtures or lamp-holders are not permitted in clothes closets.

**NEC 410.116** – Recessed lighting fixtures installed in insulated ceilings or installed within ½ inch of combustible material shall be approved for insulation contact and labeled Type IC.

## EQUIPMENT LISTING AND LABELING

**NEC 110.3** – All electrical equipment shall be installed and used in accordance with the listing requirements and manufacturer's instructions.

## ELECTRICAL SERVICES

**NEC 310.12** – Conductor Size for 120/240 volt 3-wire, single-phase, Dwelling Service and Feeders.

| Copper | Aluminum | Service Rating |
|---|---|---|
| 4 AWG | 2 AWG | 100 amps |
| 1 AWG | 2/0 | 150 amps |
| 2/0 | 4/0 | 200 amps |

**NEC 110.14** – Listed anti-oxidant compound shall be used on all aluminum conductor terminations, unless information specifically states that it is not required.

**NEC 300.7** – Portions of raceways or sleeves subject to different temperatures (i.e. passing from interior to the exterior of a building) shall be sealed with an approved material to prevent condensation from entering equipment.

**NEC 230.53** – Raceways containing service entrance conductors shall be rain-tight and arranged to drain.

**NEC 300.4** – Where raceways containing insulated circuit conductors No. 4 or larger, enter a cabinet, box or enclosure, the conductors shall be protected by a bushing providing a smoothly rounded insulating surface.

**NEC 230.70** – The service disconnecting means shall be installed at a readily accessible location either outside a building or structure or inside nearest the point of entrance of the service-entrance conductors.

**NEC 230.70 & 240.24** – Electrical panels shall be readily accessible and shall not be located in bathrooms or in the vicinity of easily ignitable materials such as clothes closets.

**NEC 110.26** – Sufficient working space shall be provided around electrical equipment. The depth of that space in the direction of access to live parts shall be a minimum of 3 feet. The minimum width of that space in front of electrical equipment shall be the width of the equipment or 30 inches whichever is greater. This workspace shall be clear and extend from the floor to a height of 6.5'. This space shall not be used for storage.

**NEC 110.26** – Illumination shall be provided for all working spaces about service equipment and panelboards.

## GROUNDING

***All individuals qualifying for a HomeOwner permit and building a new home must contact your local State Electrical Inspector for explanation of a concrete enclosed electrode commonly called a ~~UFFER~~ UFER ground.***

**NEC 250.50** – All grounding electrodes that are present at each building or structure served shall be bonded together to form the grounding electrode system.

**NEC 250.50** – Permitted electrodes include:

1. Metal underground water pipe in direct contact with earth for 10 feet or more.
2. Metal frame of the building of structure
3. Concrete encased electrodes
4. Ground ring
5. Rod or pipe electrode
6. Plate electrode
7. Other metal underground systems or structures

**NEC 250.53** – A metal underground water pipe shall be supplemented by an additional electrode.

**NEC 250.64** – The grounding electrode conductor shall be continuous, securely fastened and protected from physical damage.

**NEC 250.66** – The size of the grounding electrode conductor shall be determined by the size of the service-entrance conductors per the following chart.

| Equivalent Size of Service Entrance Conductor | | Size of the Grounding Electrode Conductor | |
|---|---|---|---|
| **Copper** | **Aluminum** | **Copper** | **Aluminum** |
| 4 AWG | 2 | 8 | 6 |
| 1 AWG | 2/0 | 6 | 4 |
| 2/0 or 3/0 | 4/0 or 250 | 4 | 2 |

- The conductor that is the sole connection of the rod, pipe or plate electrode is not required to be larger than #6 AWG copper, however smaller conductors require physical protection.

- The conductor that is the sole connection to a concrete encased electrode shall be #4 AWG copper.

**NEC 250.28** – A main bonding jumper or the green bonding screw provided by the panel manufacturer shall be installed in the service panel.

**NEC 250.104** – The interior metal water pipe and other metal piping that may become energized shall be bonded to the service equipment with a bonding jumper sized the same as the grounding electrode conductor.

## UNDERGROUND WIRING

**NEC 300.5** – Direct buried cable or conduit or other raceways shall meet the following minimum cover requirements.

| Direct Burial Cable | Rigid or Intermediate Metal Conduit | Non Metallic Raceway (PVC) |
|---|---|---|
| 24” | 6” | 18” |
| Residential branch circuits rated 20 amps or less at 120 volts or less and with GFCI protection at their source are allowed a minimum cover of 12 inches | | |

**NOTE*: This table does not apply to the underground wiring for outdoor pools, spas, or hot tubs – see NEC Article 680***

**NEC 300.5** – Where subject to movement, direct buried cables or raceways shall be arranged to prevent damage to the enclosed conductors or connected equipment.

**NEC 300.5** – Conductors emerging from underground shall be installed in rigid metal conduit, intermediate metal conduit, or Schedule 80 rigid nonmetallic conduit from 18 inches below grade or the minimum cover distance to the point of termination above ground.

SOUTH DAKOTA DEPT. OF **LABOR** & **REGULATION**


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