

## GENERAL ELECTRICAL REQUIREMENTS

<b>RECEPTACLE SPACING</b>	
HABITABLE ROOMS:	Within <b>6-feet</b> of the edge of any door
	Not more than <b>12-feet</b> apart along wall
	At all wall spaces <b>24"</b> or more wide
KITCHEN:	Within <b>24"</b> of edge of sink, range, refrigerator, and end of counter
	Not more than <b>4-feet</b> apart along counter top
	At all counter spaces <b>12"</b> or more wide
	At all kitchen island counter spaces
	At all kitchen peninsula countertops
	Not more than <b>20"</b> above countertops
BATHROOM:	Within <b>3-feet</b> of each basin
GARAGE:	A minimum of <b>1</b> receptacle required in garage
HALLWAY:	<b>1</b> receptacle required for hallways <b>10-feet</b> or more in length
OUTDOOR:	<b>1</b> receptacle required at the front and back of dwelling, located less than <b>6-1/2</b> feet above grade
H. V. A. C.	<b>1</b> receptacle within 25-feet on air conditioning unit.

<b>G. F. C. I. RECEPTACLES</b>	
KITCHEN:	All kitchen countertop receptacles must be GFCI protected
OUTDOOR:	All outdoor receptacles must be GFCI protected
GARAGE:	All general purpose garage receptacle must be GFCI protected
BATHROOM:	All bathroom receptacles must GFCI protected
WET BAR SINK:	Receptacles within 6-feet of sink must be GFCI protected
WORKSHOP:	Receptacles in grade level workshop/storage buildings must be GFCI protected

<b>A. F. C. I. (ARC-FAULT) OUTLETS</b>	
BEDROOM:	All bedroom/sleeping area outlets must be AFCI protected

<b>BATHROOM CIRCUIT</b>	
AMPERAGE:	Minimum of 1 – 20 amp circuit
DEDICATED:	Circuit supplying more than one bathroom <b>cannot</b> supply any fan, light, or receptacle, other than the bathroom receptacle(s)

<b>WASHING MACHINE CIRCUIT</b>	
SIZE:	<b>20-amp</b> circuit
DEDICATED:	Circuit <b>cannot</b> supply any light, receptacle, etc. other than washing machine receptacle

<b>KITCHEN CIRCUITS</b>	
SIZE:	20-amp rating for all kitchen receptacle circuits.
# OF CIRCUITS:	Minimum of 2 – 20 amp circuits to supply kitchen

<b>WIRE AND BREAKER SIZES</b>				
<b>RECEPTACLES / APPLIANCES</b>				
<b>CIRCUIT TYPE</b>		<b>WIRE SIZE</b>		<b>BREAKER SIZE</b>
General Purpose Outlets		12-2 with ground romex		20-amp 1-pole
		14-2 with ground romex		15-amp 1-pole
Kitchen Outlets		12-2 with ground romex		20-amp 1-pole
Washing Machine		12-2 with ground romex		20-amp 1-pole
Water Heater (4500 Watt)		10-2 with ground romex		30-amp 2-pole
Water Heater (< 4500 Watt)		12-2 with ground romex		20-amp 1-pole
Range		6-3 with ground romex		50-amp 2-pole
Dryer		10-3 with ground romex		30-amp 2 pole
<b>HEAT / AIR CONDITIONING</b>				
<b>TYPE</b>		<b>RATING</b>	<b>WIRE SIZE</b>	<b>BREAKER SIZE</b>
AIR HANDLER		7.5 KW	6-2 with ground romex	50-amp 2-pole
AIR HANDLER		10 KW	6-2 with ground romex	60-amp 2-pole
AIR HANDLER		15 KW	6-2 with ground romex	60-amp 2-pole
			10-2 with ground romex	30-amp 2-pole
AIR COND		3-TON	10-2 with ground romex	30-amp 2-pole
AIR COND		3-1/2 TON	8-2 with ground romex	40-amp 2-pole
AIR COND		4-TON	6-2 with ground romex	40-amp 2 pole
AIR COND		5-TON	6-2 with ground romex	50-amp 2 pole
<b>WATER PUMP (COPPER WIRE)</b>				
<b>H. P.</b>	<b>VOLTS</b>	<b>WIRE LENGTH</b>	<b>WIRE SIZE</b>	<b>BREAKER</b>
1/2 H. P.	120 VOLT	< 100 feet	10-2 with ground UF	20-amp
	120 VOLT	100 to 200 feet	8-2 with ground UF	20-amp
	120 VOLT	200 to 300 feet	6-2 with ground UF	20-amp
	240 VOLT	< 100 feet	12-2 with ground UF	15-amp
	240 VOLT	100 to 200 feet	12-2 with ground UF	15-amp
	240 VOLT	200 to 300 feet	10-2 with ground UF	15-amp
3/4 H. P.	120 VOLT	< 100 feet	10-2 with ground UF	30-amp
	120 VOLT	100 to 200 feet	6-2 with ground UF	30-amp
	120 VOLT	200 to 300 feet	#4 copper	30-amp
	240 VOLT	< 100 feet	12-2 with ground UF	20-amp
	240 VOLT	100 to 200 feet	10-2 with ground UF	20-amp
	240 VOLT	200 to 300 feet	8-2 with ground UF	20-amp
1 H. P.	120 VOLT	< 100 feet	8-2 with ground UF	30-amp
	120 VOLT	100 to 200 feet	6-2 with ground UF	30-amp
	120 VOLT	200 to 300 feet	#4 copper	30-amp
	240 VOLT	< 100 feet	12-2 with ground UF	20-amp
	240 VOLT	100 to 200 feet	10-2 with ground UF	20-amp
	240 VOLT	200 to 300 feet	8-2 with ground UF	20-amp

<b>NAIL PLATES</b>	
HOLES:	Required where edge of hole is less than <b>1-1/4 inch</b> from face of stud.
NOTCHES:	Nail plates required over all notches for wiring.
P. V. C.	Required where PVC piping is less than <b>1-1/4 inch</b> from face of stud.
<b>STAPLES</b>	
<b>ATTICS</b>	
SCUTTLE HOLE:	Wiring stapled to sides of rafters/ joists within <b>6-ft</b> of the attic entrance.
SPACING:	Attic wiring must be stapled not more than <b>4-1/2</b> feet apart.
BOXES:	Wiring must be stapled within <b>12-inches</b> of each box.
<b>WALLS</b>	
PLASTIC BOXES:	Wiring must be stapled within <b>8-inches</b> of plastic wall boxes.
METAL BOXES:	Wiring must be stapled within <b>12-inches</b> of metal wall boxes.
STUDS:	Wiring must be stapled <b>1-1/4 inch</b> from the face of the stud.
SPACING:	Wiring must be stapled not more than <b>4-1/2</b> feet apart along studs.

<b>EXPOSED WIRING</b>	
WALLS:	Exposed wires in wall must be protected with PVC or EMT up to <b>8-ft</b> above floor
ATTIC:	Protection required within <b>6-feet</b> of scuttle hole (unless run on side of joist).
OUTSIDE:	Exterior wiring must be protected up to <b>8-feet</b> above grade.

<b>UNDERGROUND WIRING</b>	
UNDER SLAB:	Must be in conduit (PVC) until outside of building.
BELOW GRADE:	Must be protected by conduit to a depth of <b>18-inches</b> minimum.
ABOVE GRADE:	Must be protected by conduit up to <b>8-feet</b> above grade.
<b>BURIAL DEPTH</b>	
SERVICE CABLE:	<b>24-inches</b> deep to top of cable
U. F. ROMEX	<b>24-inches</b> deep to top of romex
P. V. C.	<b>18-inches</b> deep to top of conduit
RIGID CONDUIT:	<b>6-inches</b> deep to top of conduit
DRIVEWAYS:	All wiring under driveways must be <b>24-inches</b> deep minimum.

<b>ALUMINUM WIRING</b>	
CORROSION:	All aluminum wires must have oxidation inhibitor at terminations.
SPLICES:	Copper & aluminum can only be spliced with split bolt connectors rated for that use.

<b>SMOKE DETECTORS</b>	
WHERE REQUIRED:	<ol style="list-style-type: none"> <li>1. In each sleeping room.</li> <li>2. Outside each sleeping area (in immediate vicinity).</li> <li>3. Each story of the dwelling unit.</li> </ol>
POWER:	Smoke detectors must be hardwired <b>and</b> have battery backup
WIRING:	Smoke detectors must be interconnected to activate all detectors at once

<b>P. V. C.</b>	
COLOR:	All electrical PVC must be gray in color and UL listed for electrical use.

<b>FOOTER GROUND</b>	
REBAR:	#4 ground wire must be connected to 20-foot length of rebar in footer and extended to the outside for connection to the ground rod.

<b>LIGHTING</b>	
<b>CLOTHES CLOSETS</b>	

OPEN BULB:	Open bulb incandescent fixtures are <b>not allowed</b> in clothes closets.
INCANDESCENT:	Enclosed incandescent fixtures must be at least <b>12"</b> from storage areas.
RECESSED:	Recessed fixtures must be at least <b>6"</b> from storage areas.
FLUORESCENT:	Fluorescent fixtures must be at least <b>6"</b> from storage areas (shelves).

<b>ATTICS:</b>	
LIGHTS:	A switched light must be installed in all attics used for storage.
HVAC:	A receptacle and light is required in all attics containing HVAC equipment.

<b>REQUIRED LIGHTING</b>	
BATHROOMS:	Wall switched light fixture required.
KITCHENS:	Wall switched light fixture required.
STAIRWAYS:	Light fixture required switched at top and bottom of stairs.
HALLWAYS:	Wall switched light fixture required.
GARAGES:	Wall switched light fixture required.
DOORWAYS:	Light fixture required at each exterior doorway.
OTHER:	Bedroom, living rooms, etc. may have switched receptacle instead of light.

<b>4-WIRE CIRCUITS</b>	
RANGE:	Ranges require a 4-wire circuit, 4-wire receptacle, and 4-wire cord.
DRYER:	Ranges require a 4-wire circuit, 4-wire receptacle, and 4-wire cord
SUB PANEL:	Sub panels require a 4-wire supply with a separate ground buss at sub panel.

<b>GROUND ROD</b>	
LENGTH:	8-feet long minimum.
GALVANIZED:	Galvanized ground rods must be 5/8" minimum diameter.
COPPER:	Copper ground rods must be 1/2" minimum diameter.
PIPE:	Galvanized pipe ground rods must be 3/4" minimum diameter.
CLAMP:	Ground clamps at, or below grade, must rated for below ground use.
DEPTH:	Ground rods must be driven full depth into earth.

<b>120 VOLT COPPER VOLTAGE DROP TABLE</b>						
<b>Maximum Wire Length (Feet)</b>						
<b>Current Draw</b>	<b>Wire Size</b>					
	<b>14</b>	<b>12</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>4</b>
<b>5-amp</b>	115	182	290	461	732	1165
<b>10-amp</b>	57	91	145	230	366	582
<b>12-amp</b>	48	76	121	192	305	485
<b>15-amp</b>	38	61	97	154	244	388
<b>17-amp</b>	-	54	85	136	215	343
<b>20-amp</b>	-	46	72	115	183	291
<b>25-amp</b>	-	-	58	92	146	233
<b>30-amp</b>	-	-	48	77	122	194
<b>40-amp</b>	-	-	-	58	92	146
<b>50-amp</b>	-	-	-	46	73	116

<b>240 VOLT COPPER VOLTAGE DROP TABLE</b>						
<b>Maximum Wire Length (Feet)</b>						
<b>Current Draw</b>	<b>Wire Size</b>					
	<b>14</b>	<b>12</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>4</b>
<b>5-amp</b>	229	364	579	921	1465	2330
<b>10-amp</b>	115	182	290	461	732	1165
<b>12-amp</b>	96	152	241	384	610	971
<b>15-amp</b>	76	121	193	307	488	777
<b>17-amp</b>	-	107	170	271	431	685
<b>20-amp</b>	-	91	145	230	366	582
<b>25-amp</b>	-	-	116	184	293	466
<b>30-amp</b>	-	-	97	154	244	388
<b>40-amp</b>	-	-	-	115	183	291
<b>50-amp</b>	-	-	-	92	146	233