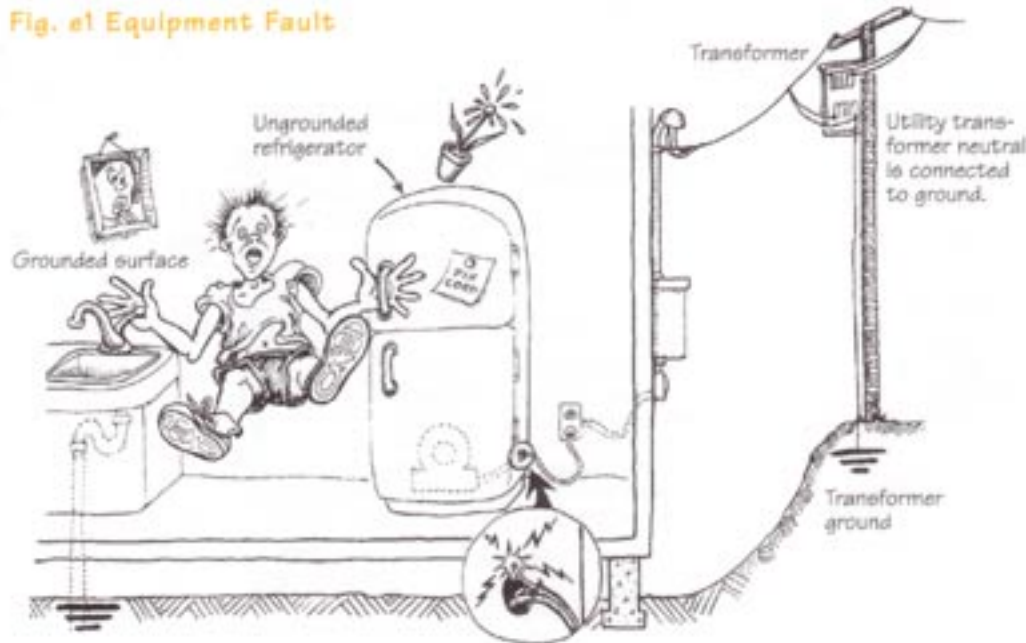


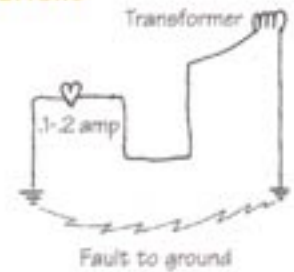
**Fig. e1 Equipment Fault**



Current returns to transformer through ground instead of neutral.

Cond has frayed, and "hot" wire has come in contact with the conductive chassis of refrigerator.

**Fig. e1a • Fatal-Fault Current**



**Electrocution** occurs when a small, specific amount of electrical current flows through the heart for 1 to 3 seconds. 0.1 to 0.2 amperes of current flowing through the heart disrupt the normal coordination of heart muscles. They lose their vital rhythm and begin to fibrillate. Death soon follows.

**e1 • Sizing Conductors**

Fuse or Breaker	Branch Circuits or Feeders Wire Size <sup>a</sup>		Service Conductors Wire Size <sup>b</sup>	
	Copper	Aluminum	Copper	Aluminum
15	14	12		
20	12	10		
25	10	10		
30	10	8		
35	8	6		
40	8	6		
45	6	4		
50	6	4		
60	6	3		
70	4	2		
80	3	1		
90	2	1/0		
100	1	1/0	4	2
110	1	1/0	3	1
125	1/0	2/0	2	1/0
150	1/0	3/0	1	2/0
175	2/0	4/0	1/0	3/0
200	3/0	250kcmil	2/0	4/0
225	4/0	300kcmil	3/0	250kcmil
250	250kcmil	350kcmil	4/0	300kcmil
300	350kcmil	500kcmil	250kcmil	350kcmil
350	500kcmil	700kcmil	350kcmil	500kcmil
400	600kcmil	900kcmil	400kcmil	600kcmil

a. Branch circuit and feeder wire sizes are based on table 310-16 of the NEC. The 60°C column is used for sizes #1 or smaller, and the 75°C column is used for larger sizes.  
 b. Service conductor sizes are based on the wire types in NEC table 310-15(b)(8).

**e2 • Sizing Electric Service**

Gen. lighting & receptacle loads (NEC-220-3b10):		
sq.ft. x 3W		
Small appliance & Laundry loads (NEC 220-16a,b):		
2 small app. circuits	3,000	
Laundry circuit	1,500	
Subtotal gen. light, small appliances & laundry		
1st 3,000W @100%	3,000	3,000
Balance @35%		
Special Appliance Loads:		
Range (NEC 220-19)	*8,000 up to 12kv nameplate	
Dryer (NEC 220-18)	*5,000 or nameplate if >	
Heating or AC @100%		
Appliances fastened in place (NEC 220-17):		
Water heater 4,500*		
Microwave 1,300*		
Dishwasher 1,500*		
Compactor 900*		
Disposer 800*		
Attic Fan 1,600*		
Spa-per manu.		
Other		
Subtotal:		
If <4 appliances enter subtotal @ 100% OR		
If ≥4 appliances enter subtotal x 0.75		
Largest motor x 25%		
Total load:		
Total load ÷ 240V = SERVICE AMPS		

\*Common ratings - use actual nameplate rating of appliances

### Temporary Power

#### Service Conductors

- Identify neutral at both ends .....[3307.1] [200-6b]
- Aluminum properly terminated .....[3306.8] [110-14]
- Wire size—min. #8 Cu or #6 Al .....[3503.2X1&2] [200-6b]
- Support/brace pole to utility specs .....Fig. e3 [3504.5] [230-28]
- Min. 18in. of conductor at weatherhead .....[utility] [utility]
- GFCI-protect all 125V 15-, 20-, & 30-amp receptacles .....[n/a] [305-6a]
- Height requirements .....Fig. e9 [3504.2] [230-24]
- Provide grounding electrode conductor & bonding (see "Grounding Electrode System") .....[3703.2] [300-5b]

#### Service Riser/Lateral

- Underground .....et-4 [3703.1,3] [300-5a,d]
- Clamp conduit within 3ft. of service box .....[T3702.1] [346-12]
- Plumbing pipe or fittings prohibited .....[3303.3] [110-3b]
- 18in. clear OK ≤6ft. of conductor over eave Fig. e2 [3504.2.1X3] [230-24aX3]
- Support/brace pole to utility specs .....Fig. e3 [3504.5] [230-28]
- No unsupported couplings above roof .....[3504.5] [230-28]
- Drip loop below weatherhead .....Figs. e3 & e4 [3505.8.5] [230-54g]

Fig. e2 • Service Conductors over Eave

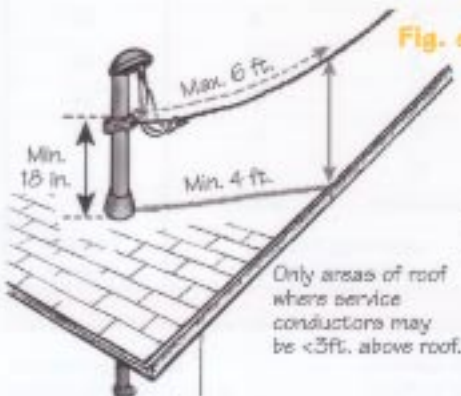
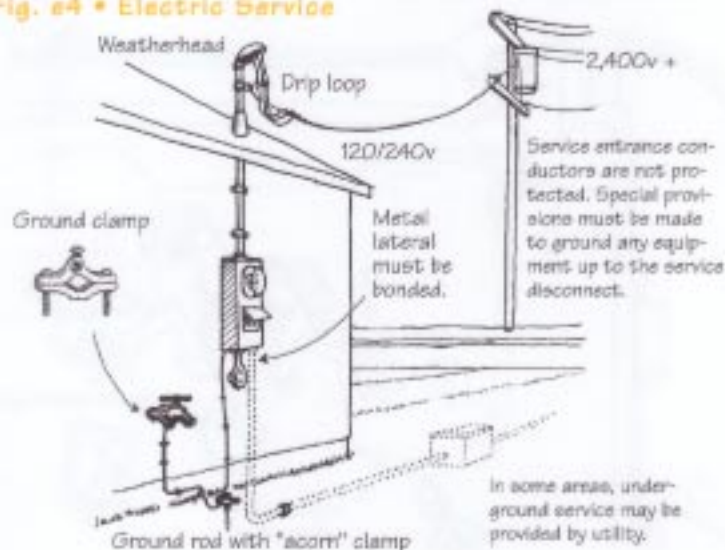


Fig. e3 • Periscope Bracing



Fig. e4 • Electric Service



### Grounding Electrode System

- GEC must connect to neutral at service .....[3507.2] [250-24a]
- #8 GEC must be protected by raceway or armor Fig. e5b [3510.1] [250-64b]
- #6 or > GEC may be run without protection if not subject to physical damage .....Fig. e5a [3510.1] [250-64b]
- #6 bare must adhere to building contour .....[3510.1] [250-64b]
- #6 largest size GEC needed if dead-ends at rod .....[T3503.1] [250-66a]
- #4 largest size GEC needed if dead-ends at Ufer .....[T3503.1] [250-66b]
- Attach to water before 5ft. of piping into building .....[3508.1] [250-50]
- Bond around water meters, filters, etc. ....[3510.1.1] [250-50a1]
- Water pipe must be supplemented (not sole electrode) [3508.1.1] [250-50a2]
- "Ufer" = 20ft.#4 rebar or Cu wire near bottom of footing [3508.1.2] [250-50c]
- 8ft. ground rod must be driven completely .....[3508.2.2] [250-52c3]
- Clamp for ground rod must be rated for direct burial ..[3511.1] [250-70]

et-3 • Grounding Electrode Conductor Sizes

Copper conductors	Aluminum conductors	GEC (copper)
2 or smaller	1/0 or smaller	8*
1 or 1/0	2/0 or 3/0	6
2/0 or 3/0	4/0 or 250kcmil	4
Over 3/0-350kcmil	Over 250kcmil-500kcmil	2
Over 350kcmil-600kcmil	Over 500kcmil-900kcmil	2

a. Must be protected with conduit or armor Based on NEC T 250-66

### Service Conductors

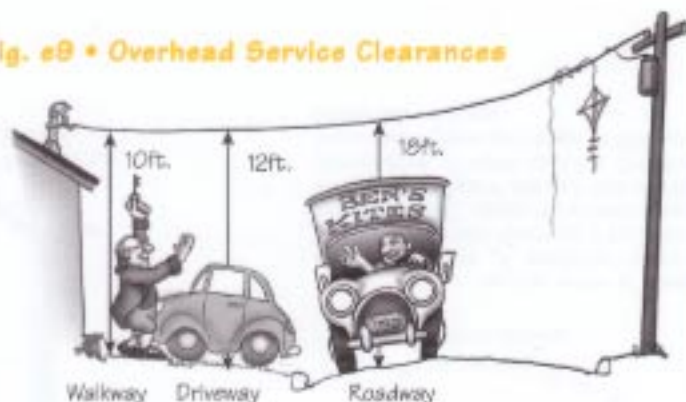
#### General

- Min. 100-amp for 1-family dwelling .....[3502.1] [230-79c]
- Identify insulated neutral at both ends .....[3307.1] [200-6b]
- Aluminum properly terminated .....[3306.8] [110-14]
- Clearance to openable window 3ft. to sides and below OR service conductors in cable or raceway .....[3504.1] [230-9]

#### Overhead Clearances

- 10ft. minimum above walking surface .....Fig. e9 [3504.2.2] [230-24b]
- 12ft. above residential property and driveways ..Fig. e9 [3504.2.2] [230-24b]
- 18ft. above public streets, alleys, or parking areas Fig. e9 [3504.2.2] [230-24b]

Fig. e9 • Overhead Service Clearances

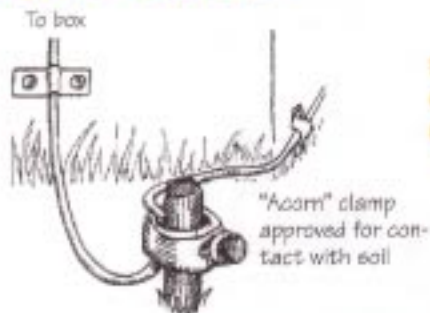


#### Clearances above Roof

- 8ft. min. if slope < 4:12 .....Fig. e10 [3504.2.1] [230-24a]
- 3ft. min. OK if slope ≥4:12 .....Fig. e10 [3504.2.1X2] [230-24bX2]

## GEC Hardware

Fig. e5a • GEC Bare



The grounding electrode conductor (GEC) connects the service to the earth. If subject to physical damage, it must be protected with approved hardware.

Fig. e5b  
GEC Armor Clad



Fig. e5c  
GEC in PVC

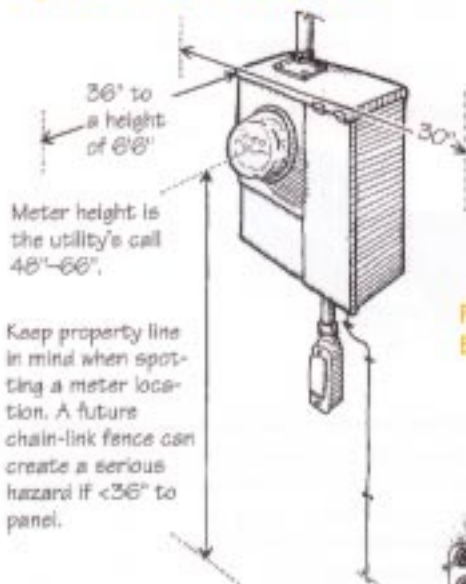


Fig. e5d  
GEC in Metal Raceway



## Meter/Main Hardware

Fig. e6 • Panel Clearances

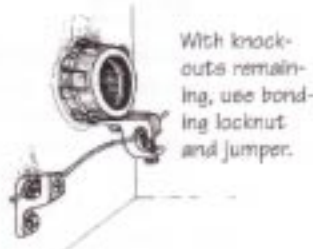


Keep property line in mind when spotting a meter location. A future chain-link fence can create a serious hazard if <36\"/>

Fig. e7  
Grounding Locknut



Fig. e8  
Bonding Bushing



### Bonding

- Bond each end of metal raceway enclosing GEC ..... Figs. e5b & d [3510.2] [250-64e]
- Threaded fittings, bonding bushings, or grounding locknuts (no standard locknuts) on supply side of service ..... Figs. e7 & 8 [3509.4] [250-94]
- Bond all metal piping, hot, cold, and gas ..... [3509.6,7,8] [250-104]

Fig. e10 • Service Conductors over a Roof



et-4 • Minimum Cover Requirements in Trench (NEC 300-5)

Location	UF cable	Rigid metal	PVC	GFCI 20 amp circuit	30v
General	24"	6"	18"	12"	6"
Below 2" of concrete	18"	6"	12"	6"	6"
Under building	n/a	0	0	n/a	n/a
Under min. 4" slab no vehicle	18"	4"	4"	6"	6"
Street	24"	24"	24"	24"	24"
Driveway	18"	18"	18"	12"	18"

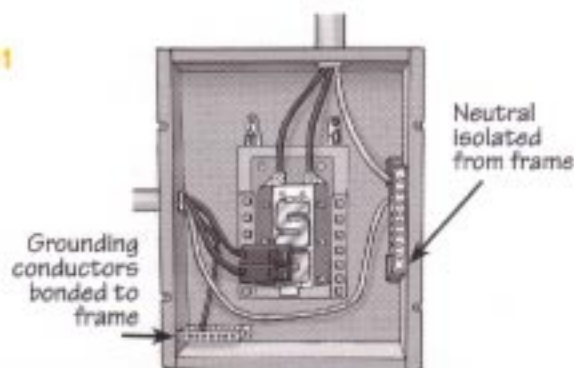
## Meter/Main

- Disconnect 6 handles max. .... [3501.7] [230-71a]
- Clearance in front 30in. wide x 3ft. deep min. ... Fig. e6 [3305.2] [110-26a]
- Max. height of breakers or switches 6ft. 7in. .... [3901.6] [230-71a]
- Verify with utility—location and hookup fees. .... [utility] [utility]
- Labeled "Suitable for Use as Service Equipment" .... [3501.6.1] [230-66]
- Breakers—make and model per panel labeling. .... [3303.3] [110-3b]
- Meter height 48in.–66in. .... Fig. e6 [utility] [utility]
- Illumination for equipment in interior ..... [3305.6] [110-26d]

## Subpanels & Fuse Boxes

- Neutrals isolated from equipment grounds .... Fig. e11 [3507.2] [250-24a5]
- Breakers and fuses must be labeled ..... [3304.11] [110-22]
- Breakers—make and model per panel labeling. .... [3303.3] [110-3b]
- Unused openings effectively closed (no tape). .... [3807.3] [373-4]
- Clearance in front 30in. wide x 3ft. deep min. .... [3305.2] [110-26a]
- Not located in clothes closet or bathroom ..... [3305.4] [240-24d,e]
- Max. height of breakers 6ft. 7in. .... [3901.6] [230-71a]
- Replace overfused plug fuses with "S" type fuses ... Fig. e21 [n/a] [240-51b]

Fig. e11

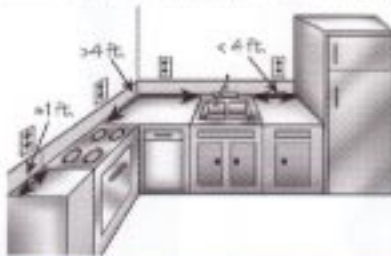


**Rough**

**Kitchen Circuits**

- Two 20-amp small-appliance circuits req'd .....[3603.2] [210-11c1]
- Countertop outlets—min. 2 small-appliance circuits .....[3603.2] [210-52b1]
- No lights (including under-counter) on these circuits .....[3801.3.1] [210-52b1a]
- Counters  $\geq 12$ in. require receptacles. ....[3801.4.1] [210-52c1]
- No point along counter  $> 24$ in. from receptacle **Fig. e12** [3801.4.1] [210-52c1]
- GFCI protection for all countertop receptacles .....[3802.6] [210-8a6]
- GFCI protect wet bar counter receptacle  $\leq 6$ ft. of sink. ...[3802.7] [210-8a7]
- Multiwire (3-wire 2x120V circuit) to top and bottom of duplex receptacle requires handle tie on breaker .....[3601.4] [210-4b]
- Primary light energy efficient (not incandescent) .....[energy] [energy]

**Fig. e12**  
**Kitchen Outlet Spacing**



**Appliances**

- Electric range—min. 40-amp wire (#8Cu #6Al) .....[3602.9.1] [210-19c]
- Garbage disposer cord  $\geq 18$ in. and  $\leq 36$ in. ....[T4001.3] [422-16b1b]
- Dishwasher/compactor cords  $\geq 36$ in. and  $\leq 48$ in. ....[T4001.3] [422-16b2b]
- Garbage disposer/dishwasher sep. circuits sharing split duplex receptacle requires handle tie on breakers .....[3601.4] [210-4b]
- Plugs of fixed appliances accessible, ....[T4001.5] [422-32a]
- Romex® not approved as flexible cord .....[4001.3] [400-4]

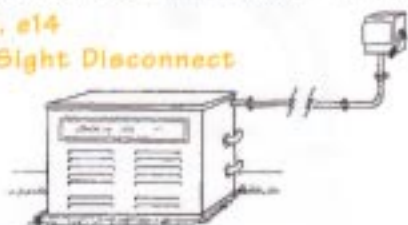
**Disconnecting Means**

- Appliance  $\leq 300$ VA or 1/2hp breaker can be disconnect. ....[T4001.5] [422-31a]
- Accessible cord/plug OK as disconnect .....[T4001.5] [422-32a]
- In-sight or lockable breaker or switch OK **Figs. e13, e14** [T4001.5] [422-31b]
- Unit switch that opens all hot conductors OK .....[T4001.5] [422-33]

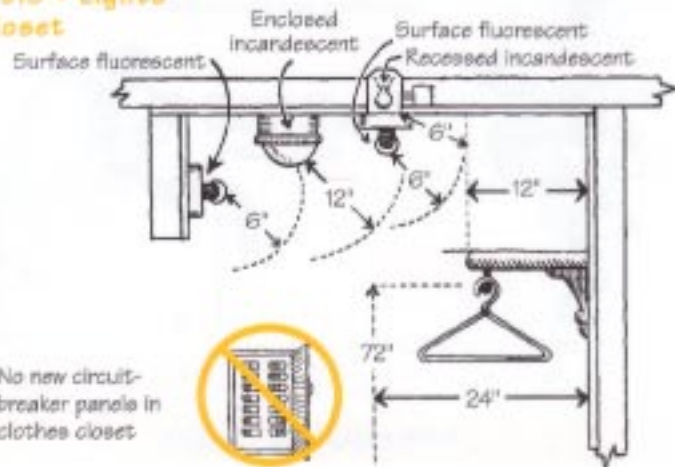
**Fig. e13**  
**Breaker Lockout**



**Fig. e14**  
**In-Sight Disconnect**



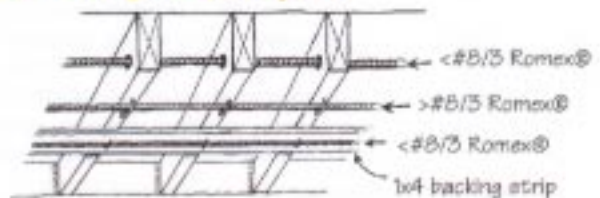
**Fig. e15 • Lights in Closet**



**Romex® (Nonmetallic Sheathed Cable)**

- Not in buildings  $> 3$  floors except one and two-family .....[n/a] [336-5a1]
- Min. 1/4in. sheathing into box (max. 1in.) .....[3805.3.1] [370-17c]
- Protect from physical damage .....[3702.3.2] [336-6b]
- Nail plate req'd if cable  $< 1/4$ in. to stud face .....[T3702.1] [300-4a,d]
- Clamp cable to box with approved clamp, OR .....[3805.3.2] [370-17b,c]
- Cable secured  $\leq 8$ in. of single-gang plastic box .....[3805.3.2X] [370-17cX]
- No sharp bends (min. 5x cable diameter) .....[3702.5] [336-16]
- Secure  $\leq 12$ in. of box and at least every 4 1/2 ft. ....[T3702.1] [336-18]
- Protect within 6ft. of attic access opening .....[3702.2.1] [336-8d]
- Basements, exposed under joists OK if  $\geq \#8/3$  ... **Fig. e16** [3702.4] [336-6c]
- 18cu.in. box too small for 3 x 12/2 Romex® .....[3805.11.2] [370-16b]

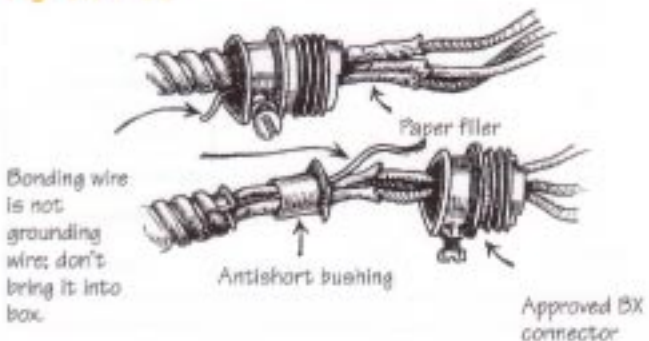
**Fig. e16 • Cabling in Crawlspace**



**BX (Armor-Clad Cable)**

- Secure  $\leq 12$ in. of box and at least every 4 1/2 ft. ....[T3702.1] [333-7]
- Insulated bushing at terminations ..... **Fig. e17** [3303.3] [333-9]
- Nail plate req'd if cable  $< 1 1/4$ in. to stud face .....[T3702.1] [300-4a,d]
- Underside of joists OK if stapled at each joist .....[n/a] [333-11]
- Protect within 6ft. of attic access opening .....[3702.2.1] [333-12a]

**Fig. e17 • BX**



**Conduit Systems**

**General Requirements**

- Openings to conduit systems must remain accessible .....[3805.9] [210-11c2]
- No common plastic boxes with metal raceway or cable .....[3805.3] [370-3]
- Splices in conduit body only if size marked & sufficient[3805.11.3.1][370-16c2]
- Bend—max. 360° between pull points .....[T3702.1] [348-12]
- Kinks in pipe not permitted .....[3702.5] [348-11]

**EMT (Electrical Metallic Tubing)**

- Not approved for burial unless coated .....[T3701.4] [348-4b]
- Rain-tight fittings outdoors ..... **Fig. e18** [n/a] [348-10]
- Supported every 10ft. and within 36in. of boxes .....[T3702.1] [348-13]

## Closet

- No open incandescent bulb fixtures ..... Fig. e15 [3903.11] [410-8c]
- Enclosed surface incandescent—12in. clearance ..... [3903.11] [410-8d1]
- Fluorescent or recessed incandescent—6in. clearance ... [3903.11] [410-8d2,3,4]
- No new breaker panels ..... Fig. e15 [3305.4] [240-24d]

## General-Purpose Circuits

### Receptacles

- Any wall ≥2ft. in habitable room req's receptacle ..... [3801.2.2] [210-52a2]
- 6ft. cord can be plugged in anywhere along wall. .... [3801.2.1] [210-52a1]
- Hallway ≥10ft. requires receptacle ..... [3801.10] [210-52b]

### Lights

- Recessed light (non-IC rated) 3in. from insulation ..... [3904.9] [410-66b]
- Recessed light (non-IC rated) ½in. from combustibles .. [3904.8] [410-66a]
- Switched lighting outlets req'd in all habitable rooms, baths, halls, stairs, garages, outdoor entrances, storage and utility areas, attics, and crawl spaces with equipment. .... [3802,3,4] [210-70a,c]
- Light may be switched receptacle in habitable room except kitchen & bath ..... [3803.2X1] [210-70a1X1]
- 3-way switch for stairs ≥6 steps ..... [3803.3] [210-70a2]

### Paddle Fans

- Not to be supported by standard electrical boxes ..... [3805.8] [370-27c]

## Bathroom

- Receptacle on wall ≤3ft. from basin ..... [3801.6] [210-52d]
- GFCI protection all bath receptacles ..... [3802.1] [210-8a1]
- Bath receptacles req. separate 20-amp circuit. .... [3603.4] [210-11c3]
- Primary light energy efficient (not incandescent) .... [energy] [energy]
- Space heaters—max. watts on general-purpose circuit: 15-amp circuit 900W, 20-amp circuit 1200W ..... [3602.5] [210-23a]

### Hydromassage Bathtub Circuit

- Must be GFCI-protected ..... [4109.1] [680-70]
- Disconnect within sight of motor ..... [T4001.5] [422-31b]
- Disconnect may be cord-and-plug ..... [T4001.5] [422-32]

## Utility

### Laundry

- Separate 20-amp circuit req'd for laundry ..... [3603.3] [210-11c2]
- Electric dryer min. feed 30-amp circuit ..... [T3604.3] [220-18]

### Gas Furnace

- Fused disconnect unless thermally protected ..... [3303.3] [430-32c1]
- Lighting outlet switched at entry to equipment space .. [3803.4] [210-70c]
- Central furnace must be on individual circuit ..... [3603.1] [422-12]
- 120V receptacle within 25ft. on same elevation ..... [3801.11] [210-63]

### Water Heater

- In-sight or lockable breaker or switch OK Fig. e13.14 [T4001.5] [422-31b]
- Bond hot, cold, and gas pipes ..... [3509.6,7] [250-104a,b]

### Heating Units

- Branch circuit 125% load (heat watts + motor FLC) .. [3602.10] [424-3b]
- Max. 48 amps unsubdivided load ..... [n/a] [424-22b]
- In-sight or lockable breaker or switch OK Fig. e13.14 [T4001.5] [424-19]

### Air Conditioning

- Split system wiring per nameplate not tables ..... [3602.11] [440-4b]
- Disconnect in sight of condenser ..... Fig. e14 [T4001.5] [440-14]
- Cord and plug disconnect OK if controls ≤6ft. of floor ... [n/a] [440-63]
- Max. cord length 120V=10ft., 240V=6ft. .... [n/a] [440-64]

## Flexible Metal Conduit (“Greenfield”)

- Dry locations only unless drip loop and “W” conductors [T3701.4] [350-5]
- Support 4½ft. & 12in. from box  
Exception: light whips to 6ft. and motors to 3ft. .... [T3702.1] [350-18]
- OK as ground path up to 6ft. and ≤20 amps ..... [3808.8.1] [250-118.6]
- Angle connections not concealed ..... [3805.9] [350-20]

## Liquidtight Flexible Metal Conduit

- Same as flex except OK for wet or buried ..... [T3701.4] [351-4a]

e1-5 • Calculating EMT Conduit Fill								
AWG	sq.in.		¾"	¾"	1"	1¼"	1½"	2"
	THHN	XHHW	Number of THHN conductors in EMT conduit					
14	0.0111	0.0139	12	22	35	61	84	138
12	0.0133	0.0181	9	16	26	45	61	101
10	0.0211	0.0243	5	10	16	28	38	63
8	0.0366	0.0437	3	6	9	16	22	36
6	0.0507	0.059	2	4	7	12	16	26
4	0.0824	0.0814	1	2	4	7	10	16
3	0.0973	0.0962	1	1	3	6	8	13
2	0.1158	0.1146	1	1	3	5	7	11
1	0.1562	0.1534	1	1	1	4	5	8
1/0	0.1855	0.1825	1	1	1	3	4	7
2/0	0.2223	0.219	0	1	1	2	3	6
3/0	0.2679	0.2642	0	1	1	1	3	5
4/0	0.3237	0.3197	0	1	1	1	2	4
Area of conduit (in sq.in.)								
2 wire fill			0.094	0.165	0.268	0.464	0.631	1.040
>2 wire fill			0.122	0.213	0.346	0.598	0.814	1.342

THHN and THWN are common insulations for copper conductors, XHHW for aluminum. Each wire gauge (AWG) has a cross-sectional area measured in sq.in. and contributes to conduit fill. Formula for determining total area of conductors: (R of wires) x (sq.in. of wire) = total sq.in. Example: To determine conduit size for three #14 AWG THHN and nine #12 AWG XHHW conductors, (3 x 0.0111) + (9 x 0.0181) = 0.1962sq.in. 0.1962sq.in. of conductor will fit in ¾in. EMT conduit, which has an available area of 0.213sq.in.

## Fig. e18 • Electrical Metallic Tubing



Dry location

Rain-tight

## Boxes

- Metal boxes grounded with approved method ..... [3805.2] [370-4]
- Wallboard no side gaps >½in. to outlet box ..... [3806.6] [370-21]
- Outlet box flush with combustible surface ..... [3806.5] [370-20]
- Max. setback ½in. in non-combustible surface (drywall) [3806.5] [370-20]
- Boxes and conduit openings must remain accessible ... [3805.9] [370-29]
- Min. 6in. free conductor in box (min. 3in. past face) . [3306.10.3] [300-14]

### Box Fill

- 3in. (4cu.in.) pancake box too small for 14/2 Romex® [3805.11] [370-16b]
- 4in. (6cu.in.) pancake box end of 14/2 run only Fig. e19 [3805.11] [370-16b]
- 18cu.in. box w/device too small for 3 x 12/2 Romex® . [3805.11] [370-16b]

## Fig. e19 Pancake Boxes



Pancake boxes are not suitable for most applications because they are too small for wiring connections.

## Swimming Pool

### General

- Service drop above or within 10ft. of pool must have clearance of 22ft. in any direction from water .....[T4103.5] [T680-8]
- Clearance in any direction from diving platform 14ft. ...[T4103.5] [T680-8]
- Corded equip. min. #12 ground and max. cord length 3ft. [4102.2] [680-7]
- All underground <5ft. from pool RMC, IMC, or RNC only[4103.6] [680-10]

### Receptacles

- Min. 1 receptacle ≥10ft. and ≤20ft. from pool walls ....[4103.1.2] [680-6a2]
- All receptacles ≤20ft. from pool walls GFCI protected ..[4103.1.3] [680-6a3]
- Pump motor receptacle OK ≥5ft. and ≤10ft. from pool walls if twist-lock and GFCI-protected .....[4103.1.1] [680-6a1]

### Lighting Outlets

- Outdoors no lights <5ft. from pool unless ≥12ft. above [4103.4.1] [680-6b1]
- GFCI for lights >5ft. & <10ft. from pool and <5ft. above [4103.4.5] [680-6b4]
- Existing fixt. OK <5ft. if GFCI protected and >5ft. above [4103.4.3] [680-6b2]
- Indoors 7ft.6in. above water OK if enclosed and GFCI ..[4103.4.2] [680-6b3]

### Grounding & Bonding

- No splicing of grounds to pool light fixtures .....[4105.2] [680-25b4]
- Bond pool shell, metal equip. for pumps, pool covers, underwater light forming shell & all metal ≤5ft. of pool [4104.1] [680-22a]
- Bond wire min. solid #8 copper .....[4104.3] [680-22b]
- Feeders to pool subpanels RMC, IMC, RNC, LFNC (no EMT) .....[n/a] [680-25d]
- Exception: EMT or existing cable within building .....[n/a] [680-25d]
- [Insulated] grounding conductor ≥#12 in feeders .....[4105.6] [680-25d]

### Underwater Lighting

- Listed for pool & GFCI-protected circuit .....[4106.4] [680-20a1]
- Top of fixture min. 18in. below water level ... .Fig. e20 [4106.4.2] [680-20a3]
- RNC to underwater lights req's #8 bonding conductor ...[4105.3] [680-20b1]
- Segregate GFCI-protected from non-GFCI .....[4106.3] [680-5c]
- Junction box ≥8in. above water, 4in. above deck Fig. e20 [4106.8.1] [680-21a5]
- Junction box min. 4ft from pool edge ..... .Fig. e20 [4106.8.1] [680-21a5]
- Wet-niche fixture bonded and secured to shell with locking device and requiring a tool for removal .....[4106.5] [680-20b3]

Fig. e20



## Hot Tub/Spa

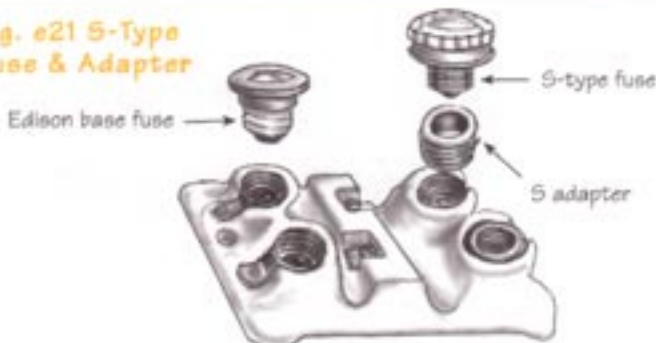
### General

- Outdoors same rules as swimming pools .....[4102.1] [680-40]
- GFCI-protected packaged unit OK for cord ≤15ft. ....[4102.1.3] [680-40a]
- Bond all metal within 5ft. ....[4104.1] [680-22a,41d]

### Indoors

- Min. 1 recep. ≥5ft. and ≤10ft. from spa .....[4103.1.4] [680-41a]
- GFCI-protect all receptacles ≤10ft. from spa. ....[4103.1.5] [680-41a2]
- No receptacles within 5ft. of spa. ....[4103.1.4] [680-41a1]
- No wall switches within 5ft. of spa. ....[4103.2] [680-41c]
- Light fixtures <7ft.6in. above water OK if GFCI-protected, rated for damp locations, and no exposed metal .....[4103.4.2] [680-6b3]

Fig. e21 S-Type Fuse & Adapter



Standard "Edison" based plug-type fuses must be replaced with S-Type fuses and adapters when there is evidence of overfusing (30-amp fuses on branch circuits) or shunting (a penny inserted in the fuse socket).

## Knob and Tube

- No new installations, only OK for repair of existing .....[n/a] [324-3]
- Shall not be enveloped in insulation .....[n/a] [324-4]
- Knob within 6in. of tap or splice .....Fig. e22 [n/a] [324-6]
- 3in. min. between conductors and 1in. to surfaces .....[n/a] [324-8a]
- Use porcelain tube when penetrating wood .....[n/a] [324-9]
- Loom from last knob to individual connector .....[n/a] [370-17b]

Fig. e22 Knob & Tube Extension

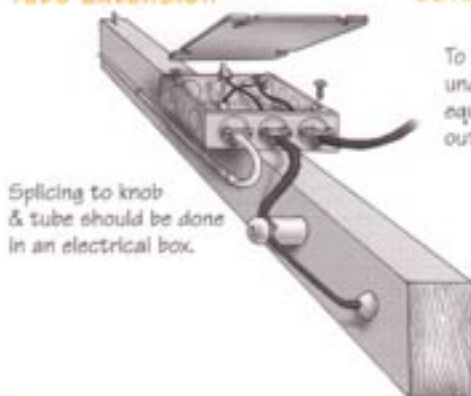


Fig. e23 Rain-Tight Cover

To be used for unattended equipment outdoors



## Outdoors

- Grade-level access receptacles front and rear .....[3801.7] [210-52e]
- GFCI all outdoor receptacles .....[3802.3] [210-8a3]
- Lighting outlet outside all exterior doors at grade .....[3803.3] [210-70a2]
- Equipment suitable for wet or damp location .....[3303.3] [110-3a1]
- Rain-tight cover for unattended cords .....Fig. e23 [3902.9] [410-57b1]

## Garage

- Min. one general-purpose receptacle .....[3801.9] [210-52g]
- GFCI-protection for receptacles unless inaccessible or for dedicated space of fixed appliance .....[3802.2] [210-8a2]
- Subpanels shall not penetrate modified 1hr. wall .....[3302.2] [300-21]
- Lighting outlet required .....[3803.3] [210-70a2]
- Detached garage with >1 circuit req's grounding electrode[3507.3] [250-32a]

## Final

- Wallboard no side gaps >1/8in. to outlet box .....[3806.6] [370-21]
- Outlet box flush with combustible surface .....[3806.5] [370-20]
- Max. setback 1/8in. in non-combustible surface (drywall) [3806.5] [370-20]
- Smoke detectors working and interconnected .....[317.1] [n/a]
- Lighting fixtures must be listed and labeled .....[3303.3] [110-3b]
- Faceplates installed on all outlets .....[3902.5] [410-56e]