



Electrical Code Regulation

St. Clair County has adopted the **2005 National Electrical Code** in its entirety for the unincorporated areas of the county and all communities that have contracted with the county to do their inspections, with the following 10 exceptions:

- A. **Disconnecting Means and Branch-Circuit Protective Equipment.** The minimum size service is 100 Amp. (Article 550-11 NEC 2005)
- B. **Ground Electrode Conductor.** Ground wire shall be in copper wire PVC conduit from meter socket to ground rod. (Article 250-64B NEC 2005)
- C. **Feeder or Service Neutral Load.** Entrance conductors and neutral must be of the same size and rating. (Article 220-61 NEC 2005)
- D. **Maximum Number Of Disconnects.** All dwelling units' service panels shall have a single main disconnect. On new construction, all service panels shall have **three (3) spaces** for future circuit. No **one-half (½) size** circuit breakers permitted on new construction. (Article 230-71 NEC 2005) Note: Also, workspace shall be maintained and top of main breaker no more than 6'6".
- E. **Ground Blocks.** All new services, service upgrade or service panel changes require ground blocks. (Article 250-94 NEC 2008)
- F. **Conductors Material.** Aluminum wire is permitted for dwelling units. Minimum size aluminum will be 100 AMP capacity. (size #1 wire aluminum or copper clad aluminum) (Article 310-2B NEC 2005)
- G. **Conductors – Minimum Ampacity and Size.** All power wire shall be 12 AWG and larger. (Article 210-19 NEC 2005)
- H. **Dwelling Unit Receptacles Outlet.** **Maximum of four (4) receptacles** per circuit in kitchen. Dining room receptacles shall be on a separate circuit from kitchen. All major appliances shall be on a dedicated circuit [dishwasher, disposal, microwave, refrigerator, etc.]. Heating and/or cooling unit blowers shall be on a dedicated circuit. (Article 210-52 NEC 2005) Note: All single outlets shall be installed so cords hang down properly.
- I. **Non Metallic Sheathed "NM" (Romex).** Is permitted only in residential or dwelling not commercial buildings. (Article 210 & 215 NEC 2005)
- J. **Smoke Detectors.** All dwelling shall have smoke detectors and carbon monoxide detectors, they shall be hard wired (110V) with battery backup and



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interconnected. Smoke detectors shall be located in every bedroom and halls outside of bedroom with in 15' of the bedroom door and each level of the home. Carbon monoxide detectors shall be within 15' of every bedroom door. Smoke detectors and carbon monoxide detectors in security systems will not be acceptable.

Before you begin work on a job, you are responsible for contracting the appropriate electric company. Each electric company's guidelines slightly vary and it is best to know what rules need to be followed before beginning a job.

St. Clair County is serviced by the following (7) Electric Utility Companies:

1. Ameren UE(800) 552-7583
2. Clinton County Electric Cooperative.....(618) 526-7282
3. Ameren IP(800) 755-5000
4. Monroe County Electric(618) 939-7171
5. Egyptian Electric(618) 684-2143
6. Southwestern Cooperative Electric(618) 288-6166
7. Tri-County Electric

Application for Appeal. The owner of a building or structure or any other person may appeal from a decision of the Electrical Inspector refusing to grant a modification to the provisions of standards and specifications applicable thereto. The Board of Appeals application for appeal may be made when it is claimed that; the true intent of the standards and specifications applicable thereto do not apply, or any equally good or better form of electrical installation can be used. (See Chapter 6 Article VI Division II – Electrical Board of Appeals)

ROUGH IN AND CIRCUITS

1. All work shall be done in a workman like manner.
2. All wiring shall be #12 AWG or larger excluding phone, sound, security and data etc.
3. Non-metallic sheathed cable (NM) or Romex is allowed only in Residential or Dwellings.
4. All dwellings shall have smoke detectors, they shall be hard wired with battery back-up and shall be interconnected. Locations are to be: each bedroom, halls outside of bedrooms within 15 feet of bedrooms and each level of the home. These are mandatory even if an alarm system is installed.
5. All conduit installed shall use proper electrical fittings, plumbing fittings are not allowed.



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6. All dwelling shall have carbon monoxide detectors with in 15 feet of the outside of all bedroom doors. They shall be interconnected to the smoke detectors and be both 110 volt and battery back up.
7. All rough-in wiring shall be completed and made up, all wiring shall be spliced and tailed out with at least 6 inches of wire extending from the box. All receptacles shall be tailed, feed thru on receptacles is allowed only on GFCI for down line protection.
8. All wiring in a basement 8/3 or smaller shall be installed in a chase or in drilled holes in the joists. Holes shall be drilled as to not damage the integrity of the joists. Wire 6/3 or larger may be run on the bottom of the joists, but not in the center of the room.
9. Dryers, ranges and ovens shall be wired with three conductors and a ground, they shall use a four wire receptacle and the frame may not be tied to the neutral.
10. Sump pumps, washers, refrigerators, freezers and any other appliance which require a dedicated circuit shall have a single outlet. GFCI receptacles are not required if this article is followed.
11. All outlets in garages and accessory buildings that have floors at or below grade level, which are not intended as habitable rooms such as storage areas, work areas, unfinished areas of basements etc. shall be GFCI protected.
12. GFCI are required in crawl spaces, wet bars, all kitchen counter tops, bathrooms, garages, outdoor outlets, above ground pools and receptacles within 6 feet of a sink.
13. All 120 volt, 15 and 20 amp circuits supplying outlets in bedrooms shall be Arc Fault Protected.
14. It is recommended that grounds on receptacles be on top.
15. On final inspection all plates, devices and electrical components shall be installed and operational. All fixtures are to be installed, have lamps and be working, all electric work is to be complete.
16. All closet lights shall be covered (no bare bulbs are allowed) a minimum of 12 inches from stored material to the fixture is required.
17. All panels require circuit identification and a panel directory.

SERVICE

1. Minimum service is 100 amp.
100 amp services require #3 copper or larger or #1 aluminum or copper clad aluminum or larger.
200 amp services require 2/0 copper or larger or # 4/0 aluminum or copper clad aluminum or larger.
Services require a # 6 or larger copper ground wire.
2. Entrance conductors and neutrals must be the same size and rating.



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3. Neutrals shall be identified with white tape or white insulation and unbroken from the weather head thru the meter to the panel.
4. All service entrance conductors shall be installed in conduit from the meter to the panel. When using PVC conduit it shall have a ground wire in it. There shall be no splices in these conductors.
5. The ground wire from the meter to the ground rod shall be in PVC conduit.
6. All PVC conduit shall have the proper size ground wire in it.
7. All service panels must have a single main disconnect. On new construction, panels will have at least three spaces for future circuits.
8. Panel boxes shall be mounted with a maximum height of 6 feet 6 inches to the center of the main breaker.
9. Panel boxes are not permitted to be mounted in closets or bathrooms.
10. Panel boxes require work clearance of 30 inches wide, 3 feet deep and floor to ceiling height unobstructed area. There shall be nothing in this area.
11. Meters shall be 5 feet 6 inches to the center of the meter above final grade.
12. Weather heads shall be a minimum height of 13 feet above ground.
13. Conduit ditches shall remain open until the inspection.



Electrical General Information

General requirements for installation of residential services in the unincorporated areas of St. Clair County and Municipalities that are inspected by St. Clair County Building & Zoning Department. There are seven utilities companies in St. Clair County, all items are not exactly the same this information covers **most** applications.

Services: Utility portion (installed by customer) overhead services shall have rigid heavy wall galvanized threaded conduit. The top of the meter can shall have a rain tight hub (not locknuts, bushings and caulk). Metal conduits require "bonding bushings" or "grounding bushings" with lugs and bond wires. The meter can must be the correct or acceptable can for the utility company servicing the customer. By pass ears or horns where necessary. The meter can shall have the correct "continuous load rating" for the breaker in the service. Dry wall screws are not allowed as fasteners mounting electrical equipment.

Size requirement for services:

100 amp service #3 copper – 100 amp breaker 1 ¼" conduit

125 amp service #2 copper – 125 amp breaker 1 ¼" conduit

200 amp service 2/0 copper – 200 amp breaker 2" conduit

2" conduit is required on all services that the utility connects onto the service mast and on roof penetrating services.

Service conductor insulation requirements RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, XHHN, XHHN-2, USE and USE-2 no other insulation is permitted.

Note: Underground services vary from above information.

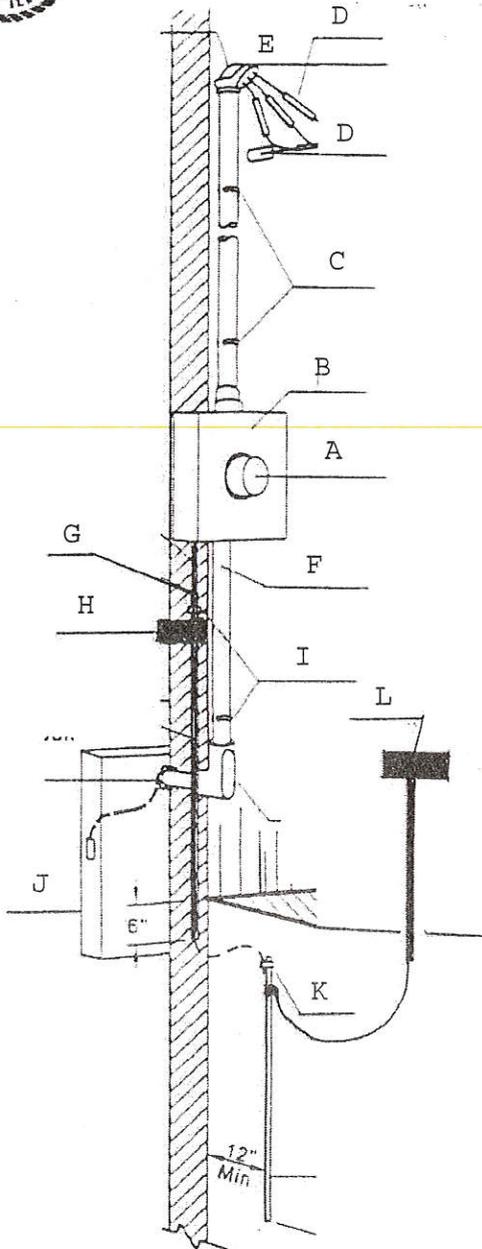
Customer side of service: Conduit is required from meter can to service panel or first disconnecting means. Conduit can be rigid heavy wall galvanized threaded conduit or rigid threaded aluminum conduit or rigid PVC conduit schedule 40 or schedule 80. PVC conduit requires a ground wire of proper size in the conduit. All new services or service up grade require an intersystem ground block UL listed for the purpose.

Ground wires required:

100 amp service #6 copper solid or stranded, insulated or bare marked with green tape if insulated, 200 amp service #4 copper and 320 amp service #2 copper. Two ground rods six feet apart may be required to meet 25 OHMs or less requirement in the NEC. (Article 250.66 NEC 2005)



100 AMP & 200 AMP Overhead Service "Residential"



A. METER 5'6" center (contact electrical inspector for any variance).

B. METER CAN With by pass ears contact utility for style.

C. CONDUIT RISER Heavy wall rigid, threaded conduit with supports and straps.

D. SERVICE CONDUCTORS Lowest point 10'6" above finish grade, neutral identified with white phase tape in meter and within 12" of weatherhead.

E. WEATHERHEAD 12' 6" to 13' above finish grade - For yard wire minimum 10' 6" above grade - Drive ways 12' above grade - Roadways or alleys 18' above grade.

F. CUSTOMER SIDE OF SERVICE Conduit required either rigid threaded heavy wall - rigid threaded aluminum - rigid PVC (electrical).

G. GROUND CONDUIT 1/2" electrical conduit (PVC) attached to meter can and 6" into earth.

H. GROUND BLOCK With 1/2" PVC hubs.

I. STRAPS OR SUPPORTS ON CONDUITS Proper UL listed.

J. CUSTOMERS PANEL OR DISCONNECTING MEANS Located in accessible location either by meter or inside of building nearest point of entrance.

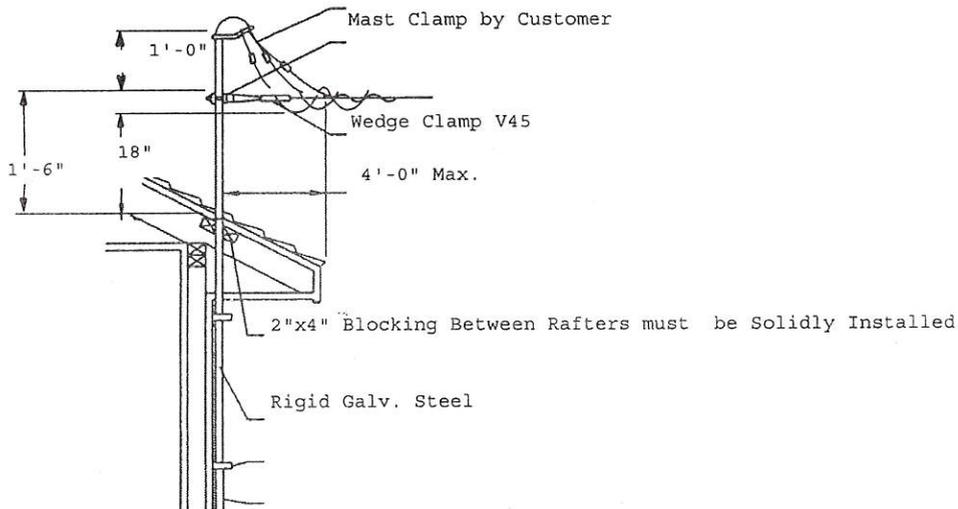
K. GROUND ROD AND CLAMP Rod 5/8" x 8' #6 wire (copper) for 100 amp service #4 for 200 amp service, top of rod 4" to 6" below grade. Where a ground rod does not meet the 25 OHMs or less requirement in NEC a second rod is required with the rods being at least 6' apart.

L. ALTERNATE WAY OF INSTALLING "GROUND BLOCK"



100 AMP & 200 AMP Through Roof Service "Residential"

1. All standard requirements for service apply to "through the roof" services (for height requirements).
2. All material, straps and supports furnished by customer.
3. Lowest point of any conductors are 10'6" over yards, 12' over driveway and 18' over street and alleys.
4. 30" minimum permitted above the roof, the mast is to be no more than 4' from the edge of the roof and terminated at the service mast.
5. Rigid, threaded, galvanized heavy wall conduit required for the riser and may not be coupled if less than 10' long, if over 10' is required the coupling will be closest to the meter can.
6. Utility may require a guy wire if they think the mast will not support the strain.
7. Chart shows acceptable span for N.E.C.

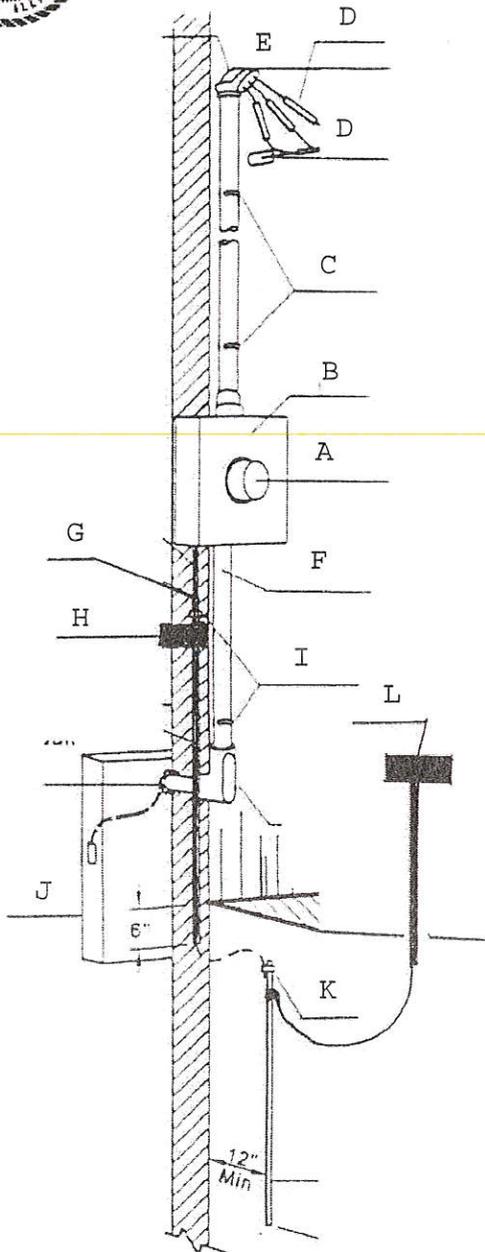


Amperes	Phase	Service Drop Conductor	Span In Feet			
			2" Rigid Steel Conduit	2 1/2" Rigid Steel Conduit	3" Rigid Steel Conduit	3 1/2" Rigid Steel Conduit
100A	1Ø	#4 A1, Triplex	150			
100A	3Ø	#2 A1, Quadruplex	146	150		
200A	1Ø	#2/0 A1, triplex	98	150	150	
200A	3Ø	#2/0 A1, Quadruplex	90	150	150	
320A	1Ø	#4/0 A1 Triplex	136	150	150	

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320 AMP Overhead Service "Residential"



A. METER 5'6" center (contact electrical inspector for any variance).

B. METER CAN With by pass ears contact utility for style.

C. CONDUIT RISER Heavy wall rigid, threaded conduit with supports and straps.

D. SERVICE CONDUCTORS Lowest point 10'6" above finish grade, neutral identified with white phase tape in meter and within 12" of weatherhead.

E. WEATHERHEAD 12' 6" to 13' above finish grade - For yard wire minimum 10' 6" above grade - Drive ways 12' above grade - Roadways or alleys 18' above grade.

F. CUSTOMER SIDE OF SERVICE Conduit required either rigid threaded heavy wall - rigid threaded aluminum - rigid PVC (electrical).

G. GROUND CONDUIT 1/2" electrical conduit (PVC) attached to meter can and 6" into earth.

H. GROUND BLOCK With 1/2" PVC hubs.

I. STRAPS OR SUPPORTS ON CONDUITS Proper UL listed.

J. CUSTOMERS PANEL OR DISCONNECTING MEANS Located in accessible location either by meter or inside of building nearest point of entrance.

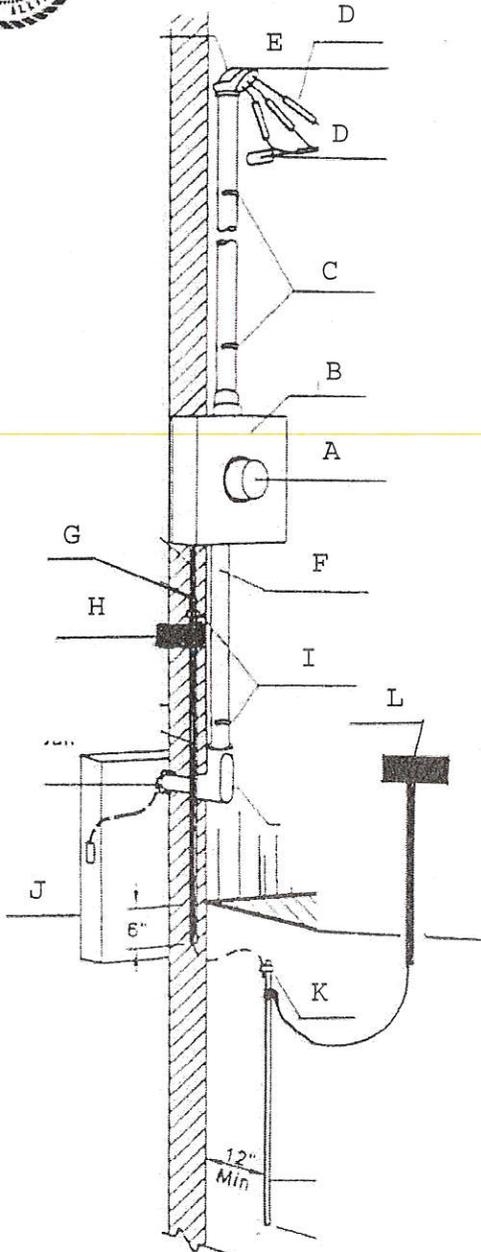
K. GROUND ROD AND CLAMP There shall be two ground rods, they should be 5/8" x 8' rods at least 6' apart. Ground wire shall be #2 copper with top of rod 4" to 6" below grade.

L. ALTERNATE WAY OF INSTALLING "GROUND BLOCK"

Conductors for 320 amp services may be either 350 cir. mil. copper or parallel 2/0 copper (4 hots and 2 neutrals) confirm with utility which they prefer.



400 AMP Overhead Service "Residential"



A. METER 5'6" center (contact electrical inspector for any variance).

B. METER CAN With by pass ears contact utility for style.

C. CONDUIT RISER Heavy wall rigid, threaded conduit with supports and straps.

D. SERVICE CONDUCTORS Lowest point 10'6" above finish grade, neutral identified with white phase tape in meter and within 12" of weatherhead.

E. WEATHERHEAD 12' 6" to 13' above finish grade - For yard wire minimum 10' 6" above grade - Drive ways 12' above grade - Roadways or alleys 18' above grade.

F. CUSTOMER SIDE OF SERVICE Conduit required either rigid threaded heavy wall - rigid threaded aluminum - rigid PVC (electrical).

G. GROUND CONDUIT 1/2" electrical conduit (PVC) attached to meter can and 6" into earth.

H. GROUND BLOCK With 1/2" PVC hubs.

I. STRAPS OR SUPPORTS ON CONDUITS Proper UL listed.

J. CUSTOMERS PANEL OR DISCONNECTING MEANS Located in accessible location either by meter or inside of building nearest point of entrance.

K. GROUND ROD AND CLAMP There shall be two ground rods, they should be 5/8" x 8' rods at least 6' apart. Ground wire shall be 1/0 copper with top of rod 4" to 6" below grade.

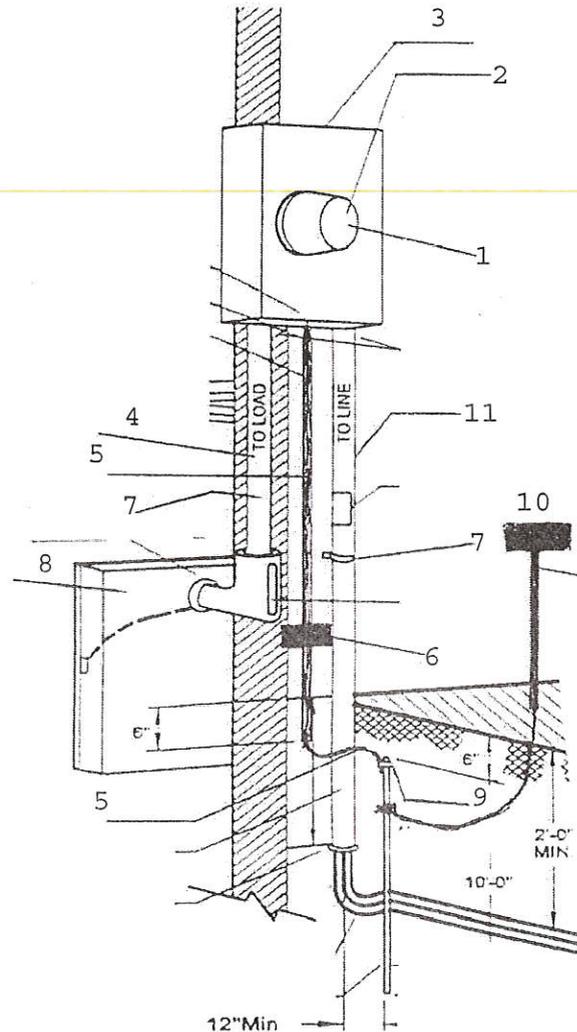
L. ALTERNATE WAY OF INSTALLING "GROUND BLOCK"

Conductors for 400 amp services may be either 400 cir. mil. copper or parallel 3/0 copper (4 hots and 2 neutrals) confirm with utility which they prefer.



100 AMP & 200 AMP UNDERGROUND SERVICE RESIDENTIAL

1. **METER** 5'6" center (contact electrical inspector for any variances).
2. **WORK AREA** There shall be 3' square in from of meter with no obstructions such as air condition, generators, gas meters or water faucets.
3. **METER CAN** Use 200 amp can for underground services, correct can for servicing utility, by pass ears if required.
4. **CUSTOMER SIDE OF SERVICE** Conduit required from meter can to service panel, either rigid galvanized threaded heavy wall, rigid aluminum or rigid PVC schedule 40 or schedule 80.
5. **CONDUIT FOR GROUND WIRE** ½" PVC electrical conduit attached to meter can and 4" to 6" below grade.
6. **GROUND BLOCK** With ½" PVC hubs UL listed for intersystem grounding.
7. **STRAPS OR SUPPORTS ON ALL CONDUITS**
8. **SERVICE PANEL OR CUSTOMER HOUSE PANEL/DISCONNECTING MEANS** In accessible location either by meter or inside of building nearest point of entrance.
9. **GROUND ROD AND CLAMP** 5/8" x 8' rod with #6 copper 100 amp service or #4 copper for 200 amp service. Top of rod 4" to 6" below grade. Where a rod does not meet the 25 OHM standard a second rod is required 6' between rods.
10. **ALTERNATE WAY OF INSTALLING "GROUND BLOCK"**
11. **SLIP FITTING** Most utilities require a "Slip Fitting" or "Expansion" directly below meter can.

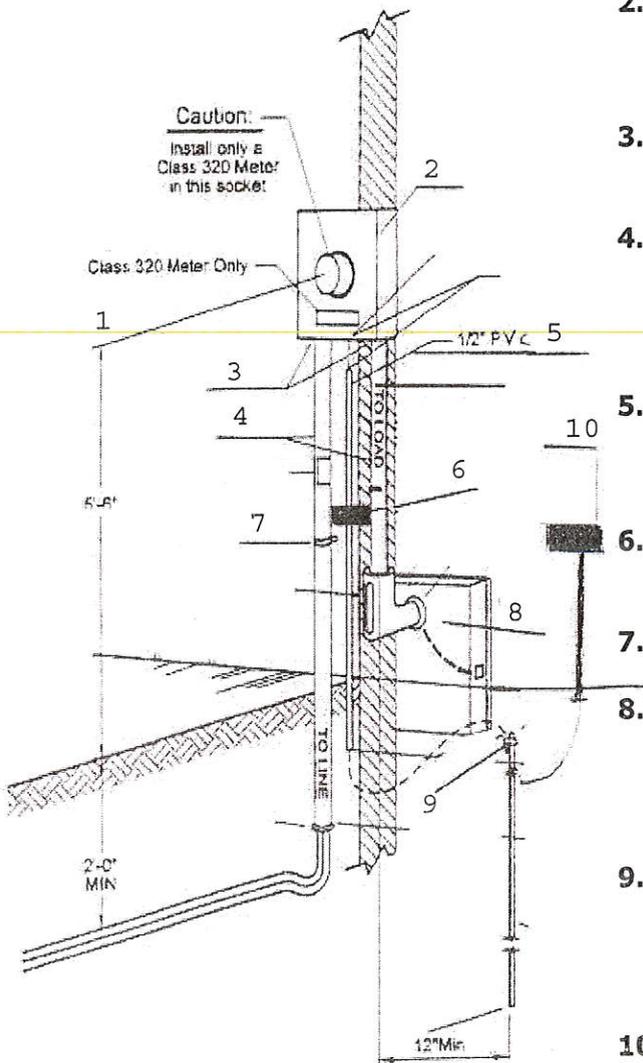


Note: Customers wire attaches to bottom of meter customer may have to supply utility side conduit depending on utility some manufacturers make meter can with 3" knock outs.



320 AMP UNDERGROUND SERVICE RESIDENTIAL

1. **METER** 5'6" center (contact electrical inspector for any variances).
2. **WORK AREA** There shall be 3' square in from of meter with no obstructions such as air condition, generators, gas meters or water faucets.
3. **METER CAN** Do not block work areas or utility access.
4. **CUSTOMER SIDE OF SERVICE** Conduit required from meter can to service panel, either rigid galvanized threaded heavy wall, rigid aluminum or rigid PVC schedule 40 or schedule 80.
5. **CONDUIT FOR GROUND WIRE** 1/2" PVC electrical conduit attached to meter can and 4" to 6" below grade.
6. **GROUND BLOCK** With 1/2" PVC hubs UL listed for intersystem grounding.
7. **STAIRS OR SUPPORTS ON ALL CONDUITS**
8. **SERVICE PANEL OR CUSTOMER HOUSE PANEL/DISCONNECTING MEANS** In accessible location either by meter or inside of building nearest point of entrance.
9. **GROUND ROD AND CLAMP** There shall be two ground rods they should be 5/8" x 8' rods at least 6' a part. Ground wire should be 1/0 copper with top of rod 4" to 6" below grade.
10. **ALTERNATE WAY OF INSTALLING "GROUND BLOCK"**
11. **SLIP FITTING** Most utilities require a "Slip Fitting" or "Expansion" directly below meter can.



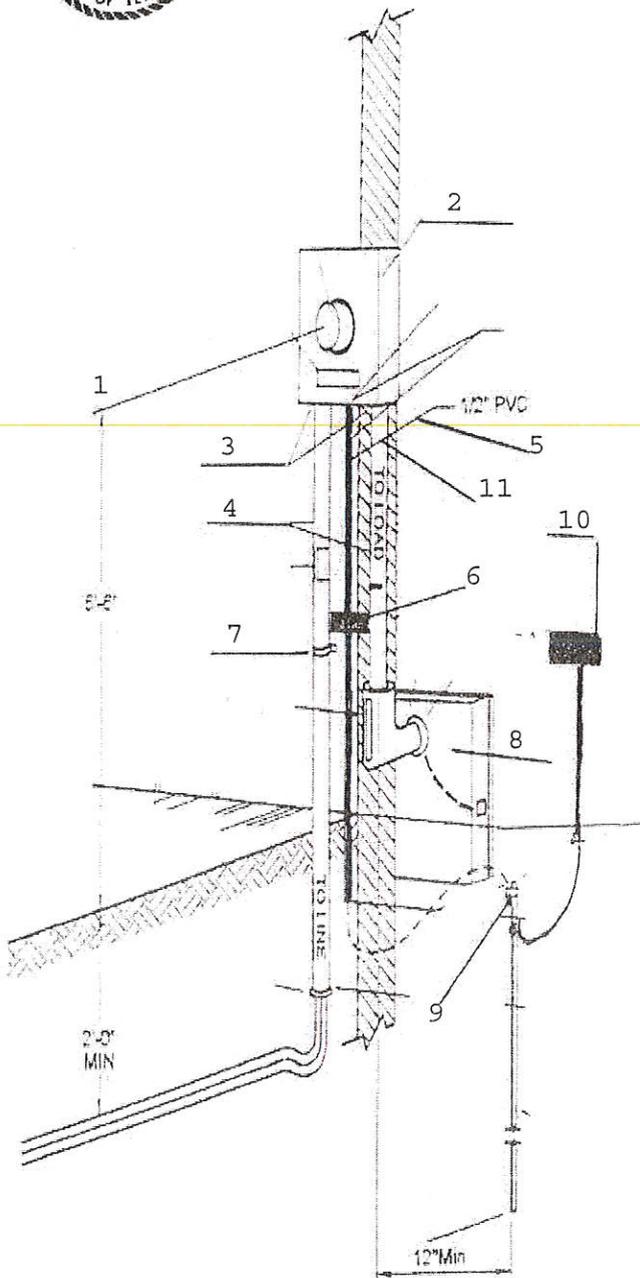
Note: Conductors for a 320 amp service may be either:

- A 200 amp and 100 amp panels 2/0 & #3 copper
- B 2 200 amp panels parallel 2/0 copper (breakers required no fuses allowed)
- C 350 cir mil feed meter can (copper)
- D 500 cir mil feed meter can (alum)

Customer wire attaches to bottom of meter customer may have to supply utility side conduit depending on utility. Some manufactures make a meter can with 3" knock outs.



400 AMP UNDERGROUND SERVICE RESIDENTIAL

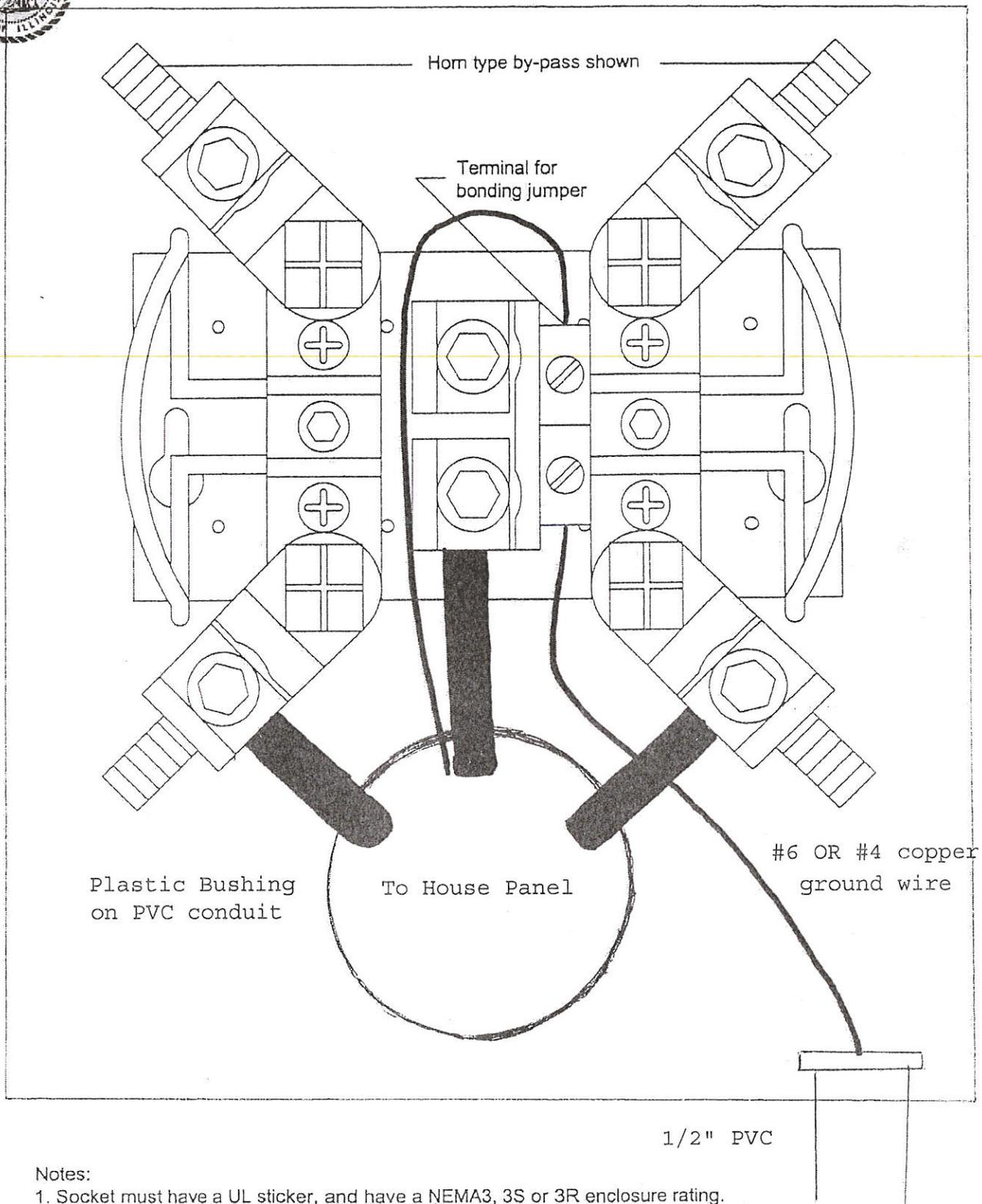


1. **METER** 5'6" center (contact electrical inspector for any variances).
2. **WORK AREA** There shall be 3' square in from of meter with no obstructions such as air condition, generators, gas meters or water faucets.
3. **METER CAN** Do not block work areas or utility access.
4. **CUSTOMER SIDE OF SERVICE** Conduit required from meter can to service panel, either rigid galvanized threaded heavy wall, rigid aluminum or rigid PVC schedule 40 or schedule 80.
5. **CONDUIT FOR GROUND WIRE** 1/2" PVC electrical conduit attached to meter can and 4" to 6" below grade.
6. **GROUND BLOCK** With 1/2" PVC hubs UL listed for intersystem grounding.
7. **STAIRS OR SUPPORTS ON ALL CONDUITS**
8. **SERVICE PANEL OR CUSTOMER HOUSE PANEL/DISCONNECTING MEANS** In accessible location either by meter or inside of building nearest point of entrance.
9. **GROUND ROD AND CLAMP** There shall be two ground rods they should be 5/8" x 8' rods at least 6' a part. Ground wire should be 1/0 copper with top of rod 4" to 6" below grade.
10. **ALTERNATE WAY OF INSTALLING "GROUND BLOCK"**
11. **SLIP FITTING** Most utilities require a "Slip Fitting" or "Expansion" directly below meter can.

Note: Conductors for a 400 amp service shall be either parallel 3/0 copper or 2/0 copper conductors for feed of meter can 400 cir mil copper or 500 cir mil aluminum customer wire attaches to bottom of meter customer may have to supply utility side conduit depending on utility. Some manufactures make a meter can with 3" knock outs.



SELF-CONTAINED 100/200A SOCKET CRITERIA

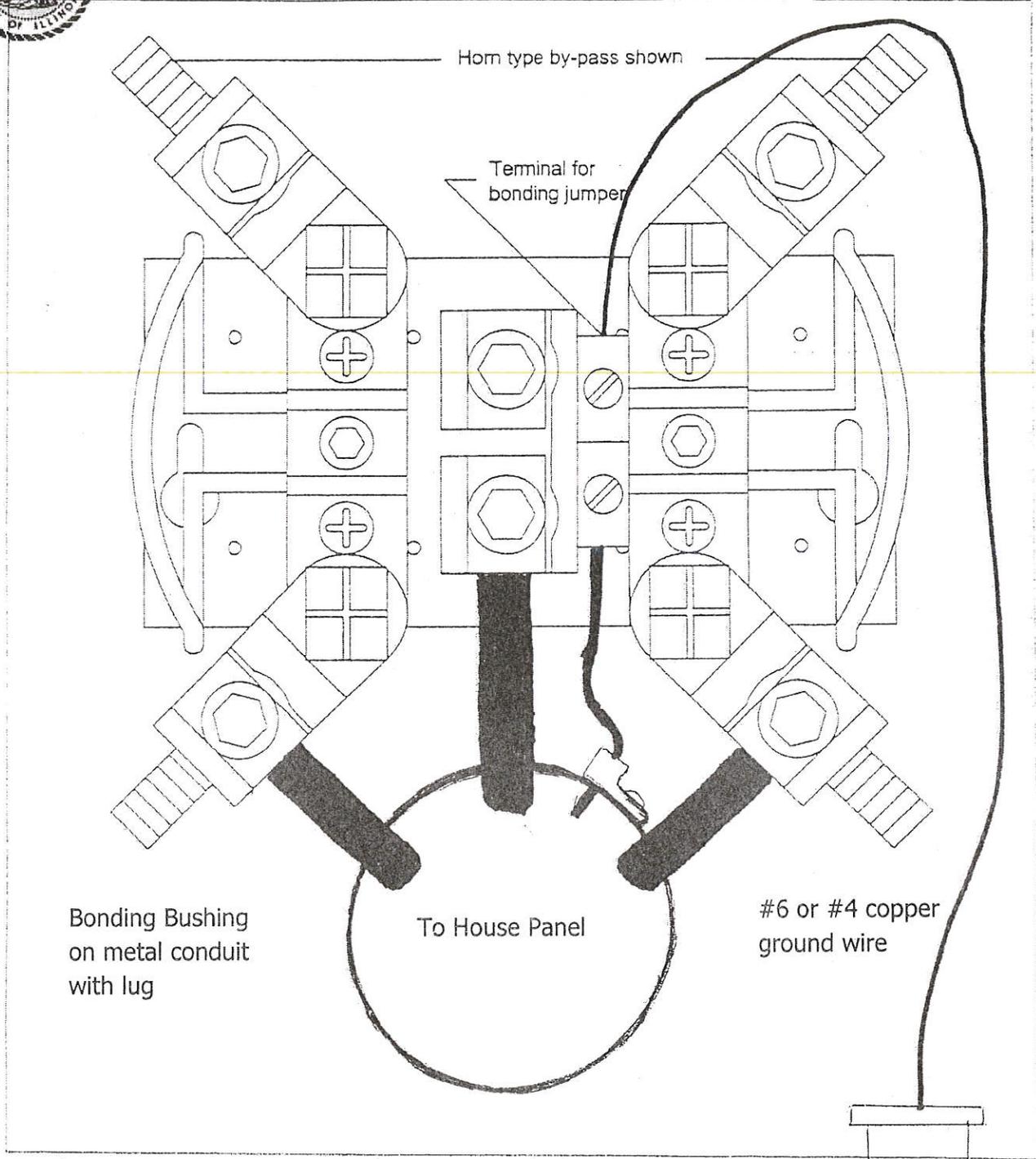


Notes:

1. Socket must have a UL sticker, and have a NEMA3, 3S or 3R enclosure rating.
2. Socket must be rated for continuous duty. (For a 200 amp service the meter socket needs to be marked, usually inside, 200 amp CONTINUOUS as opposed to 200 amp maximum).
3. Either built-in clamp jaw by-pass or horn-pass is required on Class 200 Amp and below.
4. Multiple meter sockets are to comply with the same criteria as above.



SELF-CONTAINED 100/200A SOCKET CRITERIA

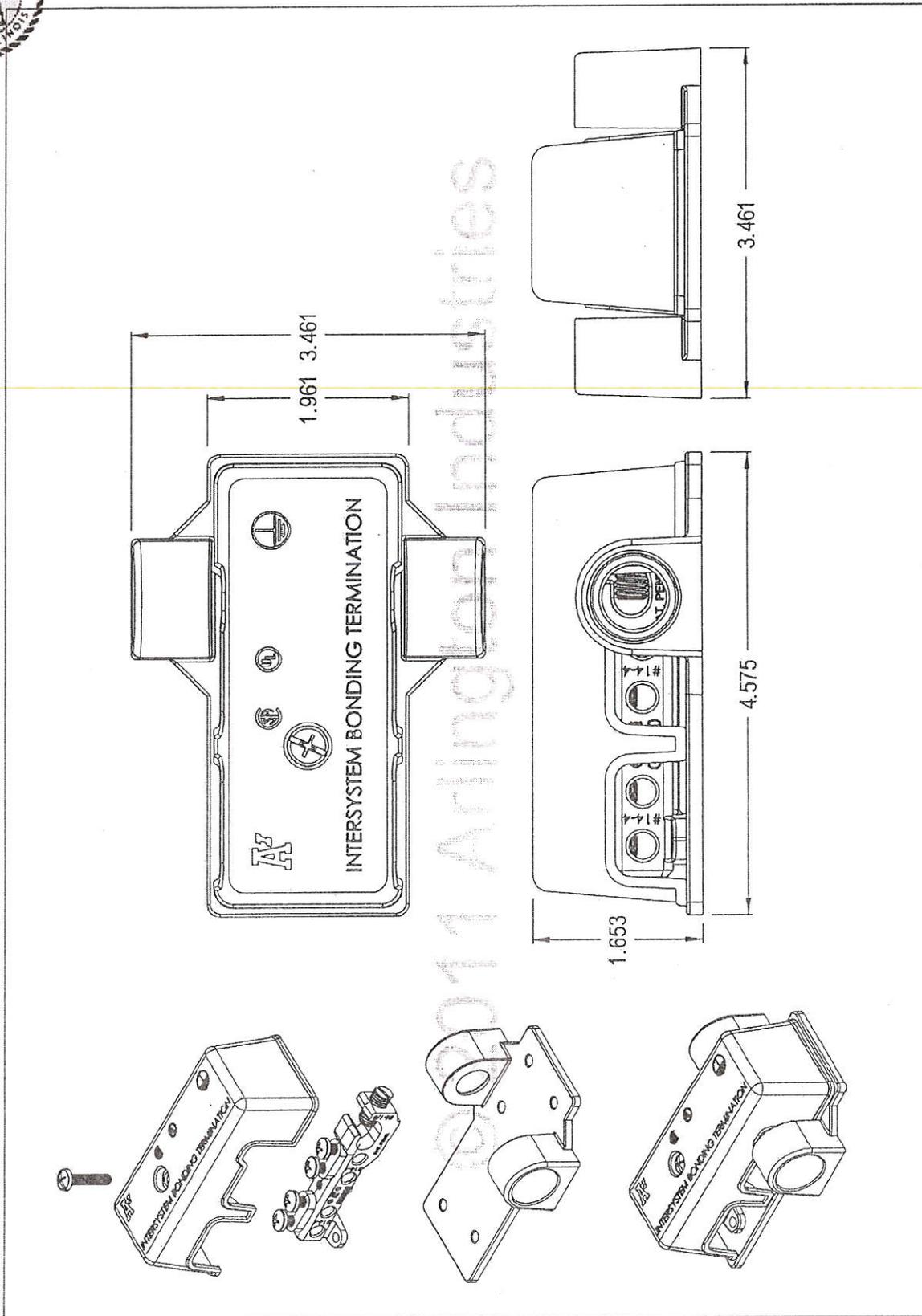


Notes:

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3. Either built-in clamp jaw by-pass or horn-pass is required on Class 200 Amp and below.
4. Multiple meter sockets are to comply with the same criteria as above.



GROUND BLOCK



St. Clair County does not recommend any brand or product this is just an example.



BACK UP GENERATORS

Examples of placement of customer equipment

