City of Scott City

Residential Electrical Rough-in
Inspection Checklist

This inspection checklist reflects the code requirements of the 2015 International Residential Code (IRC) and the 2008 National Electric Code (NEC)

Please verify the following before calling for an Electrical Rough-in Inspection.

Terminology/Definitions

Bonded – Connected to established electrical continuity and conductivity.
Branch Circuit – The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).
Feeder – All circuit conductors between the service equipment, or the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.
Grounded – Connected to ground or to a conductive body that extends the ground connection.
Grounded Conductor – A system or circuit conductor that is intentionally grounded (commonly referred to as the "neutral" conductor).
Grounding Conductor – The conductive path(s) that provide a ground-fault current path and connect normally noncurrent-carrying metal parts of equipment together and, to the system grounded conductor, the grounding electrode conductor or both (commonly referred to as the "ground" conductor).
Grounding Electrode – A conducting object through which a direct connection to earth is established (typically a "ground rod").
Grounding Electrode Conductor – A conductor used to connect the system ground conductor or equipment to a grounding electrode or to a point on the grounding electrode system.
Service – The conductors and equipment for delivering energy from the serving utility to the wiring system of the premises served.
Service Conductors – The conductors from the service point to the service disconnecting means.
Service Equipment – The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s), and their accessories, connected to the load end of the service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply.
Service Drop – The overhead service conductors between the utility supply system and the service point.
Service Lateral – The underground service conductors between the utility supply system and the service point.
Service Point – The point of connection between the facilities of the serving utility and the premises wiring.
Ungrounded Conductor – Commonly referred to as the "hot" conductor.

Permits and Plans

- ☐ Job address is posted in a visible location. (IRC R319.1)
- ☐ Permit and approved plans are on site and accessible to the inspector (IRC R106.3.1 and R105.7)

Service & Service Entry

- ☐ One- and two-family dwellings are supplied by only one service. (IRC E3601.2 & NEC 230.2)
- ☐ Service load is calculated per IRC Table E3602.2 or NEC 220.82(B) & (C).
- ☐ Service conductors supplying another building or structure do not pass through the interior of another building or structure. (IRC E3601.3 & NEC 230.3)
- ☐ Where service raceway enters from underground it is properly sealed. (IRC E3601.5 & NEC 230.8)
- ☐ If direct burial cable is used, raceway with a bushed opening is sealed where moisture could enter. (IRC E3803.6,7 & NEC 300.5(G),(H))
- ☐ Service disconnect is provided to disconnect all conductors in a building or other structure from the service entrance conductors. Service disconnect is permanently marked as a service disconnect and is located in an accessible location outside the building or inside nearest the point of entrance of the service conductors. (IRC E3601.6, NEC 230.70)
- ☐ Service disconnecting means consists of not more than six switches or six circuit breakers mounted in a single enclosure (i.e. must be able to disconnect power to the structure in six hand movements or less). (IRC E3601.7, NEC 230.71(A))
- ☐ Service load is determined per IRC Table E3602.2 or NEC 220.80-220.84.
- ☐ Service and feeder conductors are sized per IRC Table 3705.1 or NEC Table 310.15(B)(6).
- ☐ Grounding electrode conductor is sized per IRC Table 3603.4 or NEC Table 250.66.
- ☐ Overhead service installations have the following vertical clearances (IRC E3604, NEC 230.24):
    - Where the slope of the roof is less than 4/12, clearance of not less than 8'.
    - Where the slope of the roof is 4/12 or greater, clearance of not less than 36".
    - Where the service mast is located in the overhanging portion of the roof, clearance of not less than 18".
    - From grade to the lowest point of the drip loop above sidewalks, clearance of not less than 10'.
    - From grade to the lowest point of the drip loop above driveways, clearance of not less than 12'.
    - Above public streets, alleys, roads or parking areas subject to truck traffic, clearance of not less than 18'.
- ☐ Direct buried cable or raceways are installed in accordance with the minimum cover requirements of IRC Table E3803.1 or NEC Table 300.5(A). (IRC E3803.1)
- ☐ Underground service conductors, not encased in concrete and that are buried at least 18" have a warning ribbon that is placed in the trench not less than 12" above the underground installation. (IRC E3803.2 & NEC 300.5(D)(3))

- ☐ Direct buried cables are protected from damage by raceway when rising out of the ground. Protection is required from no more than 18" below grade up to 8' above finished grade. Conductors entering a building are protected to the point of entrance. (IRC E3803.3 & NEC 300.5(D)(1))
- ☐ Backfill does not contain large rocks, paving materials, cinders or sharply angular substances that could damage the cable or raceway. (IRC E3803.5 & NEC 300.5(F))
- ☐ The interior of raceway installed underground is considered a wet location. Insulated conductors and cables installed in raceway are listed for use in wet locations. (IRC E3803.10 & NEC 300.5(B))
- ☐ Underground cables and conductors installed under buildings are installed in raceway. (IRC E3803.11 & NEC 300.5(C))

Grounding & Bonding

- ☐ The grounding electrode conductor is connected to the grounded service conductor at any accessible point from the load end of the overhead service conductor, service drop, underground service conductors, or service lateral to and including the terminal or bus to which the grounded service conductor is connected to the service disconnecting means. A grounding connection is NOT made to any grounded circuit conductor on the load side of the service disconnecting means (see exceptions). (IRC E3607.2 & NEC 250.24(A)(1) and (A)(5))
- ☐ Grounding electrode conductor is sized per IRC Table 3603.4 or NEC Table 250.66.
- ☐ The following may be used as grounding electrodes:
    - Metal underground water pipe which is in direct contact with the earth for at least 10'. (IRC E3608.1.1 & NEC 250.52(A)(1))
    - Concrete encased bare or zinc galvanized steel reinforcement bars of at least ½" diameter and 20' length. Bare copper conductor of at least 4 AWG may also be encased in concrete. The concrete where the conductor is encased must be in direct contact with the earth. (IRC E3608.1.2 & NEC 250.52(A)(3))
    - Ground ring where a bare copper conductor buried at least 30" deep completely encircles building or structure. Copper conductor must be at least 2 AWG. (IRC E3608.1.3 & NEC 250.52(A)(4))
    - Rod and pipe electrodes at least 8' in length where pipe or conduit is at least ¾" trade size and if iron or steel are galvanized for corrosion protection. Stainless steel, copper or zinc-coated steel are at least 5/8" diameter unless listed and not less than ½" diameter. (IRC E3608.1.4 & NEC 250.52(A)(5))
    - Plate electrode that exposes not less than 2 square feet of surface to the exterior soil. The electrode is constructed of bare or conductively coated iron or steel and is at least ¼" thick. Nonferrous metal plates shall be at least 1.5 mm (0.06") thick. Plate electrodes are buried at least 30" below the surface of the earth. (IRC E3608.1.5 & NEC 250.52(A)(6))
- ☐ If a metal underground water pipe is used as the primary grounding electrode, a supplemental electrode must also be installed and bonded to the grounding electrode conductor, the

grounded service-entrance conductor, nonflexible grounded service raceway, grounded service enclosure. (NEC 250.53(D)(2))

- Note: While not required as a portion of the 2008 NEC, the 2015 IRC (which uses the 2014 NEC) requires a supplemental electrode when a rod, pipe or plate electrode is used as the primary grounding electrode. (IRC E3608.4)

- ☐ Noncurrent-carrying metal parts including raceways, conduits, armored cable sheaths, service enclosures, meter fittings and boxes are bonded together. (IRC E3609.2 & NEC 250.92(A))
- ☐ If a metal water piping system is installed in the building or structure, the system is bonded to the service equipment enclosure, the grounded conductor at the service entrance, the grounding electrode conductor (where of sufficient size) or to one or more of the grounding electrodes used. Bonding jumper is appropriately sized. (IRC E3609.6 & NEC 250.104(A)(1))
- ☐ Grounding conductor connection to grounding electrode is by either exothermic welding or by a listed means such as listed lugs, listed pressure connectors, listed clamps, etc. If the connection is buried, then the connector must also be listed for direct burial or concrete encasement. (IRC E3611.1 & NEC 250.70)
- ☐ Only one grounding conductor is bonded to a grounding electrode by a single clamp (no double lugging). (IRC E3611.1 & NEC 250.70)
- ☐ A grounded conductor (neutral) shall not be connected to normally noncurrent-carrying metal parts of equipment, to equipment grounding conductor(s), or be reconnected to ground on the load side of the service disconnecting means. (IRC E3908.6 & NEC 250.24(A)(5))

Equipment Location & Clearances

- ☐ The following working clearances are required for energized equipment and panelboards: (IRC E3405.2 & Figure E3405.1 & NEC 110.26)
  - Not less than 36” horizontally in the direction of access to the equipment (measured from the energized parts).
  - A minimum of 30” wide in front of the electrical equipment or the width of the equipment, whichever is greater. (Hinged doors must be able to open at least 90-degrees)
  - Clear workspace extending from the floor or platform up to a height of at least 6.5 feet or the top of the equipment, whichever is greater.
- ☐ There is a dedicated installation space for indoor and outdoor panels that is the width of the panel board and extends from the floor or grade up to 6’ above the panelboard or to the structural ceiling, whichever is lower. This space is for electrical installation only. No other piping, ducts, leak protection apparatus or other equipment foreign to the electrical installation is permitted in this space. (IRC E3405.3 & NEC 110.26(F))
- ☐ Manually controlled work lighting is provided for all service equipment and panelboards located indoors. (IRC E3405.7 & NEC 110.26(D))
- ☐ Location of panelboards and overcurrent devices meets the following requirements: (IRC E3405.5 & E3705.7)

- Be readily accessible (NEC 240.24(A))
- Not be located where they will be exposed to physical damage (NEC 240.24(C))
- Not be located in the vicinity of easily ignitable materials such as clothes closets (NEC 240.24(D))
- Not be in bathrooms (NEC 240.24(E))
- Not be located over steps of a stairway (NEC 240.24(F))
- Be installed so that the center of grip of operating hand of the switch or circuit breaker, when in its highest position, is not more than 6'-7" above the floor or platform. (NEC 240.24(A))
- Not installed in a location designed for storage (NEC 110.26(B))

Panelboards

- ☐ All panelboards have a rating not less than that of the minimum service or feeder capacity required for the calculated load. (IRC E3706.1 & NEC 408.30)
- ☐ Panelboard is protected by an overcurrent device that is not rated greater than the rating of the box. (IRC E3706.3 & NEC 408.36)

General Branch Circuit and Feeder Requirements

- ☐ Branch circuits have appropriate wire size and overcurrent protection. (IRC E3702.14 & NEC 210.24)
  - 15-Amp circuit rating: minimum 14 AWG conductor size, maximum 15 Amp overcurrent protection device rating, any type 15 maximum lampholder or outlet devices.
  - 20-Amp circuit rating: minimum 12 AWG conductor size, maximum 20 Amp overcurrent protection device rating, any type 15 or 20 lampholder or outlet devices.
  - 30-Amp circuit rating: minimum 10 AWG conductor size, maximum 30 Amp overcurrent protection device rating, no lampholder devices permitted, type 30 outlet devices.
- ☐ The following branch circuits and outlets are provided: (IRC E3703)
  - Central heating equipment – individual branch circuit (auxiliary equipment such as a pump, valve, humidifier, electrostatic air cleaner, etc. are allowed on same circuit) (NEC 422.12)
  - Kitchen & Dining Area – minimum of (2) 20-Amp branch circuits serving wall and floor receptacles in kitchen, pantry, breakfast area, dining room or similar area of dwelling. Kitchen countertop is served by a minimum of (2) 20-Amp branch circuits which may be the same two circuits serving the other kitchen, pantry, etc. circuits. (NEC 210.52(B), 210.52(C)). Note: refer to NEC 210.52(C) for specific outlet location requirements.
  - Laundry – minimum of (1) 20-Amp dedicated circuit serving only laundry area. (NEC 210.11(C)(2))
  - Bathrooms – each bathroom has a minimum of (1) 20-Amp dedicated circuit serving only that bathroom. (NEC 210.11(C)(3))

- Outdoor locations – minimum of (1) 20-Amp circuit with accessible GFCI protected outlets located at front and back of house. Balconies, decks and porches greater than 20 square feet also have an outlet. (NEC 210.52(E))
- Unfinished basement – minimum of (1) 20-Amp GFCI protected outlet installed. (NEC 210.52(G))
- Attached garage – minimum of (1) 20-Amp GFCI protected outlet installed. (NEC 210.52(G))
- Hallways longer than 10 feet – minimum of (1) receptacle outlet. (NEC 210.52(H))

- ☐ In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room of dwelling units, receptacles are installed per the following:
  - Receptacles spaced such that no point measured horizontally along the floor line in any wall space is more than 6 feet from a receptacle outlet. (NEC 210.52(A)(1))
  - "Wall space" is defined as any space 2 feet or more in width (including space measured around corners) and unbroken along floor line by doorways, fireplaces, and similar openings. It is also defined by the space occupied by fixed panels in exterior walls excluding sliding panels. Also the space afforded by fixed room dividers such as freestanding bar-type counters and railings. (NEC 210.52(A)(2))
- ☐ Feeder conductors are sized per IRC Table E3704.2(1) or NEC 310.15(B).
- ☐ Where feeder supplies branch circuits in which grounding conductors are required, the feeder includes an equipment grounding conductor. (IRC E3704.6 & NEC 215.6)
- ☐ All ungrounded branch circuit and feeder conductors ("hot conductors") are protected against overcurrent by an overcurrent device installed at the point where the conductors receive their supply.

Ground-Fault Protection

- ☐ The following locations are required to be protected by Ground-Fault Circuit-Interrupters: (IRC E3902)
  - Bathroom receptacles – all locations, no exceptions (NEC 210.8(A)(1))
  - Garages and accessory building receptacles (NEC 210.8(A)(2))
  - Outdoor receptacles(NEC 210.8(A)(3))
  - Kitchen receptacles – locations that serve countertop surfaces (NEC 210.8(A)(4))
  - Laundry, utility and wet bar sink receptacles – where located within 6 ft to the outside edge of the sink (NEC 210.8(A)(7))
  - Kitchen dishwasher branch circuit or outlets that supply the dishwasher (IRC E3902.10)
  - Electrically heated floors – in bathrooms, kitchens and in hydromassage bathtub, spa and hot tub locations. (IRC E3902.13)

Arc-Fault Protection

- ☐ Branch circuits that supply 120-volt, single-phase, 15- and 20-Amp outlets in the following locations are required to be protected by Arc-Fault Circuit-Interrupters: (IRC E3902.16 & NEC 210.12)
    - o Kitchens (where not ground-fault protected)
    - o Family rooms
    - o Dining rooms
    - o Living rooms
    - o Parlors
    - o Libraries
    - o Dens
    - o Bedrooms
    - o Sunrooms
    - o Recreation rooms
    - o Closets
    - o Hallways
    - o Laundry area (where not ground-fault protected)
    - o Similar rooms or areas
- ☐ Methods of providing Arc-fault protect meet the requirements listed in IRC 3902.16 and NEC 210.12.

Lighting

- ☐ At least one wall switch-controlled lighting outlet is installed in every habitable room and bathroom (IRC E3903.2 & NEC 210.70(A)(1)) (see exceptions)
- ☐ At least one wall switch-controlled lighting outlet is installed in hallways, stairways, attached garages, detached garages with power, to exterior side of egress doors having grade level access. At stairways, a switch is installed at the top and bottom of the stairs. (IRC E3903.3 & NEC 210.70(A)(2))
- ☐ In attics, under-floor spaces, utility rooms and basements, at least one lighting outlet is installed where these spaces are used for storage or contain equipment requiring servicing. (IRC E3903.4 & NEC 210.70(A)(3))
- ☐ Lighting in a clothes closet meets the requirements of IRC E4003.12 or NEC 410.16.
- ☐ A recessed luminaire that is not identified for contact with insulation has all recessed parts spaced at least ½" from combustible materials. Type IC luminaires are permitted to be in contacted with combustible materials at recessed locations. (IRC E4004.8 & NEC 410.116(A)(1) and (A)(2))

Wiring Methods

- ☐ The maximum number of conductors installed in conduit or tubing is in accordance with the following tables: (IRC E3904.6)

- Table E3904.6(1) Electrical Metallic Tubing (EMT)
- Table E3904.6(2) Electrical Nonmetallic Tubing (ENT)
- Table E3904.6(3) Flexible Metallic Conduit (FMC)
- Table E3904.6(4) Intermediate Metallic Conduit (IMC)
- Table E3904.6(5) Liquid-Tight Flexible Nonmetallic Conduit (FNMC-B)
- Table E3904.6(6) Liquid-Tight Flexible Nonmetallic Conduit (FNMC-A)
- Table E3904.6(7) Liquid-Tight Flexible Metal Conduit (LFMC)
- Table E3904.6(8) Rigid Metal Conduit (RMC)
- Table 3904.6(9) Rigid PVC Conduit, Schedule 80 (PVC-80)
- Table 3904.6(10) Rigid PVC Conduit, Schedule 40 (PVC-40)

- ☐ Where wiring methods having a nonmetallic covering pass through stud cavities and joist spaces used for air handling, such wiring passes through spaces perpendicular to the long dimension of the spaces (IRC E3904.7 & NEC 300.22(C) exception)
- ☐ Metal boxes are grounded. (IRC E3905.2 & NEC 314.4)
- ☐ Nonmetallic boxes are only used with cabled wire methods with entirely nonmetallic sheaths, flexible cords and nonmetallic raceways. (IRC E3905.3 & NEC 314.3 see exceptions)
- ☐ Nonmetallic-sheathed cables have the cable assembly including the sheath extend at least ¼" through the nonmetallic sheathed cable knockout opening. (IRC E3905.3.1 & NEC 314.7(C))
- ☐ Boxes for ceiling fan outlets are marked by the manufacturer as suitable for the purpose and do not support fans weighing more than 70 lbs. (IRC E2905.8 & NEC 314.27(C))
- ☐ Junction boxes, pull boxes, and outlet boxes are accessible without having to remove any part of the building or structure. (IRC E3905.10 & NEC 314.29)
- ☐ Max number of conductors in a metal box does not exceed the numbers calculated in IRC Table E3905.12.1 or NEC Table 314.16(A).
- ☐ Unused openings in boxes are plugged. (IRC E3906.4 & NEC 110.12(A))
- ☐ Boxes and enclosures are properly supported. (IRC E3906.8 & NEC 314.23)
- ☐ Flexible cords such as extension cords are not used as a substitute for NM cabling. Flexible cords are not run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings or floors. Flexible cords are not concealed behind walls, ceilings or located above suspended ceilings or dropped ceilings. (IRC E3909.1 & NEC 400.7 & 400.8)
- ☐ In areas specified under IRC E3901.1, 125-volt, 15- and 20-ampere receptacles are listed to be tamper resistant. (IRC E4002.14 see exceptions & NEC 406.11)
- ☐ Nonmetallic-sheathed cable is supported and secured by staples, cable ties, straps, hangers, or similar fittings at intervals not exceeding 4.5 feet and within 12" of every outlet box, junction box, cabinet or fitting. Flat cables are not stapled on edge. (NEC 334.30)
- ☐ Conductors extend at least 6" from the point emerges from raceway or cable sheath in each outlet, junction or switch point and be long enough to extend at least 3" outside the opening of the box. (NEC 300.14)
- ☐ Cables and raceways shall be protected from damage and where 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 1-1/4 inch from the nearest edge of the wood member, or shall be

protected by a steel plate at least 1/16 inch thick and of appropriate length and width. (NEC 300.4)

Equipment Listing & Labeling

- ☐ Electrical materials, components, devices, fixtures and equipment shall be listed for the application, shall bear the label of an approved agency and shall be installed, and used, or both in accordance with the manufacturer's installation instructions. (IRC E3403.3 & NEC 110.3(B))