

RULE XIII - ELECTRICAL AND MECHANICAL REGULATIONS

SECTION 1301. Electrical Regulations

All electrical systems, equipment and installations mentioned in the Code shall conform to the provisions of the Philippine Electrical Code Part 1 (PEC-1) and Part 2 (PEC-2), as adopted by the Board of Electrical Engineering pursuant to Republic Act 7920, otherwise known as the Philippine Electrical Engineering Law.

1. Overhead Service Entrance

In **Subdivisions, Housing Projects**, Commercial and Industrial Buildings, overhead transmission and distribution voltages are required to supply power source including transformers, poles and supporting structures.

2. Attachments on and Clearances from Buildings

- a. An Attachment Plan approved by professional electrical engineer shall cover power lines and cables, transformers and other electrical equipment installed on or in buildings and shall be submitted to the local Building Official.
- b. Where building/s exceed 15.00 meters in height, overhead lines shall be arranged where practicable so that clear space or zone at least 1.80 meters (horizontal) will be left adjacent to the building or beginning not over 2.45 meters (horizontal) from the building, to facilitate the raising of ladders where necessary for fire fighting.

EXCEPTION: This requirement does not apply where it is the rule of the local fire department to exclude the use of ladders in alleys or other restricted places, which are generally occupied by supply lines.

3. Open Supply Conductors Attached to Buildings

Where the permanent attachment of open supply conductors to any class of buildings is necessary for service entrance, such conductors shall meet the following requirements:

- a. Conductors of more than 300 volts to ground shall not be carried along or near the surface of the building unless they are guarded or made inaccessible.
- b. To promote safety to the general public and to employees not authorized to approach conductors and other current-carrying parts of electric supply lines, such parts shall be arranged so as to provide adequate clearance from the ground or other space generally accessible, or shall be provided with guards so as to isolate persons effectively from accidental contact.

- c. Ungrounded service conduits, metal fixtures and similar noncurrent-carrying parts, if located in urban districts and where liable to become charged to more than 300 volts to ground, shall be isolated or guarded so as not to be exposed to accidental contact by unauthorized persons. As an alternative to isolation or guarding noncurrent-carrying parts shall be solidly or effectively grounded.
- d. Service drops passing over a roof shall be securely supported by substantial structures. Where practicable, such supports shall be independent of the building.

4. Conductors Passing By or Over Buildings

- a. Unguarded or accessible supply conductors carrying voltages in excess of 300 volts may be either beside or over buildings. The vertical or horizontal clearance to any buildings or its attachments (balconies, platforms, etc.) shall be as listed in Table XIII.1. The horizontal clearance governs above the roof level to the point where the diagonal equals the vertical clearance requirements. This Rule should not be interpreted as restricting the installation of a trolley contact conductor over the approximate centerline of the track it serves. (Figure XIII.1.)
- b. Supply conductors of 300 volts or more, when placed near enough to windows, verandas, fire escapes, or other ordinarily accessible places, shall be properly guarded by grounded conduit and barriers.
- c. Where the required clearances cannot be obtained, supply conductors shall be grouped or bundled and supported by grounded messenger wires.

5. Clearance of Service Drops

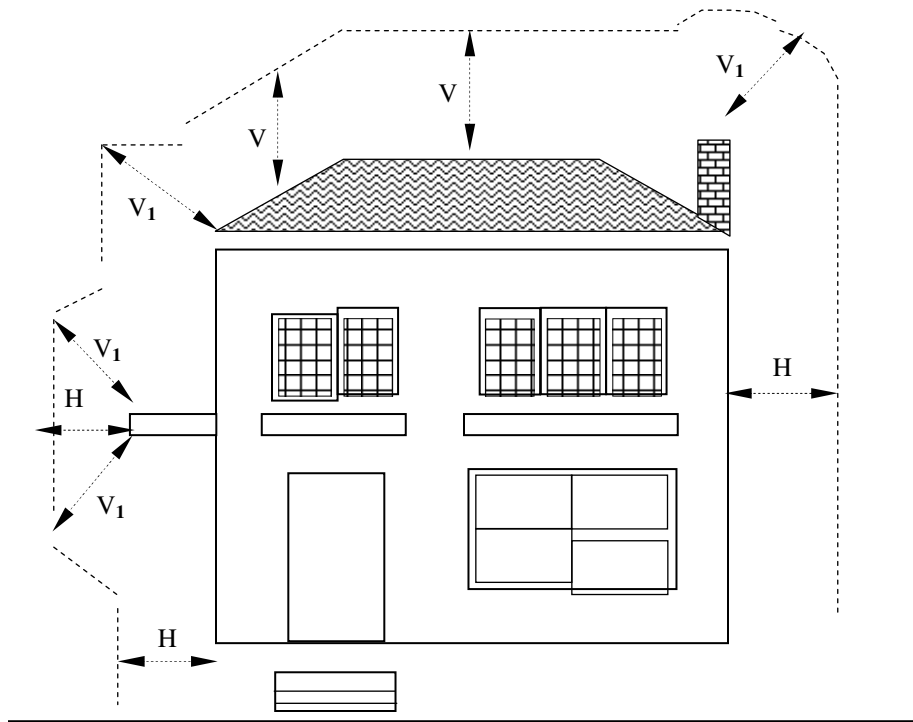
- a. Service drop conductors shall not be readily accessible and when not in excess of 600 volts, shall conform to the following:
 - i. Conductors shall have a clearance of not less than 2.50 meters from the highest point of roofs over which they pass with the following exceptions:
 - (a) Where the voltage between conductors does not exceed 300 volts and the roof has a slope of **not** less than 100 millimeters in 300 millimeters, the clearance may not be less than 1.00 meter.
 - (b) Service drop conductors of 300 volts or less which do **not** pass over other than a maximum of 1.20 meters of the overhang portion of the roof for the purpose of terminating at a through-the-roof service raceway or approved support may be maintained at a minimum of 500 millimeters from any portion of the roof over which they pass.
 - b. Conductors shall have a clearance of **not** less than 3.00 meters from the ground or from any platform or projection from which they might be reached.
 - c. Conductors shall have a horizontal clearance of not less than 1.00 meter from windows, doors, porches, fire escapes, or similar locations and shall be run less than 1.00 meter above the top level of a window or opening.

- d. Service drop of conductors, when crossing a street, shall have a clearance of not less than 5.50 meters from the crown of the street or sidewalk over which it passes; and shall have a minimum clearance of 3.00 meters above ground at its point of attachment to the building or pedestal.
- e. No parts of swimming and wading pools shall be placed under existing service drop conductors or any other overhead wiring; nor shall such wiring be installed above the following:
 - i. Swimming and wading pools and the area extending 3.00 meters outward horizontally from the inside of the walls of the pool;
 - ii. Diving structures;
 - iii. Observation stands, towers or platforms.

TABLE XIII.1. Clearance of Wires, Conductors, Cables and Unguarded Rigid Energized Parts Adjacent but not Attached to Buildings and Other Installations Except Bridges

Clearance of	Insulated Communication conductors and cables; messengers; surge protection wires; grounded guys; neutral conductors	Supply cables of 0 to 750 V (mm)	Unguarded rigid energized parts, 0 to 750 V; non-insulated communication conductors (mm)	Supply cables over 750 V; open supply conductors, 0 to 750 V (mm)	Open supply conductors, over 750 V to 22 kV (mm)	Unguarded rigid energized parts, over 750 V to 22 kV (mm)
1. Buildings						
a. <i>Horizontal</i>						
(1) To walls, projection and guarded windows	1400	1500	1500	1700	2300	2000
(2) To unguarded windows	1400	1500	1500	1700	2300	2000
(3) To balconies and areas readily accessible	1400	1500	1500	1700	2300	2000
b. <i>Vertical</i>						
(1) Over or under roofs or projections not readily accessible to pedestrians	900	1070	3000	3200	3800	3600
(2) Over or under balconies and roofs readily accessible to pedestrians	3200	3400	3400	3500	4100	4000
(3) Over roofs accessible to vehicles but not subject to truck traffic	3200	3400	3400	3500	4100	4000
(4) Over roofs accessible to truck traffic	4700	4900	4900	5000	5600	5500

2. Signs, chimneys, billboards, radio and television antennas, and other installations not classified as buildings or bridges						
a. Horizontal	900	1070	1500	1700	2300	2000
b. Vertical over or under	900	1070	1700	1800	2450	2300



V - Minimum vertical clearance, measured either diagonally or vertically

V₁ - Transition

Where:

$$V_1 = V$$

Figure XIII.1.

CLEARANCE DIAGRAM FOR BUILDING

Anotation. The appropriate protective devices for high tension wires shall be provided.

6. Wiring Methods

Service entrance conductors extending along the exterior or entering buildings or other structures shall be installed in rigid steel conduit or concrete encased plastic conduit from point of service drop to meter base and from meter base to the disconnecting equipment. However, where the service entrance conductors are protected by approved fuses or breakers at their terminals (immediately after the service drop or lateral) they may be installed in any of the recognized wiring methods as provided by PEC-1.

- a. Abandoned lines and/or portions of lines no longer required to provide service shall be removed.
- b. Power pole, lines, service drop and other line equipment shall be free from any attachment for antennas, signs, streamers and the like.

7. Transformers

- a. Oil-insulated transformers rated more than 15 kV between conductors shall be installed inside a transformer vault.
- b. Dry-type and other transformers with non-flammable insulation shall be installed in a transformer room.
- c. Transformers shall be guarded as follows:
 - i. Appropriate provisions shall be made to minimize the possibility of damage to transformers from external causes where the transformers are located exposed to physical damage.
 - ii. Dry-type transformers shall be provided with a non-combustible moisture resistant case or enclosure which will provide reasonable protection against accidental insertion of foreign objects.
 - iii. The transformer installation shall conform to the provisions for guarding of live parts in PEC-1.
 - iv. The operating voltage of exposed live parts of transformer installations shall be indicated by signs or visible markings on the equipment or structures.

8. Provisions for Transformer Vault

- a. A transformer vault when required, shall be constructed in accordance with PEC-1 latest edition.

- b. Transformers and transformer vaults shall be accessible only to qualified personnel for inspection and maintenance.
- c. Adequate ventilation shall be provided for the transformer vault.

9. Capacitor

- a. This applies to installation of capacitors on electric circuits in buildings.

EXCEPTION: 1. Capacitors that are component of other apparatus shall conform to the requirements for such apparatus.

2. Capacitors in hazardous locations shall comply with additional requirements as prescribed in PEC-1.

- b. Installation of capacitors in which any single unit contains more than 11 liters of flammable liquid shall be in a vault or outdoor fence enclosures complying with PEC-1.
- c. Capacitors shall be protected from physical damage by location or by suitable fences, barriers or other enclosures.
- d. Capacitors shall be provided with non-combustible cases and supports.

10. Emergency Power Systems

- a. Shall provide electric power for the safety to life and property when normal electric power supply is interrupted.
- b. Shall have adequate capacity for the operation of the emergency load.
- c. For hospitals, the transition time to transfer power supply from the instant of interruption of normal power supply to the emergency supply shall not exceed 10 seconds.

11. Electrical Room

- a. An adequate space or area shall be provided at load centers where panel boards, breakers, switchgears and other electrical equipment are installed.

12. Service Equipment

- a. An adequate space or area shall be provided for the service equipment that shall be located in a readily accessible area, either inside or the outside walls of the building.

13. Metering Facilities

- a. Metering Vault, when required for primary service, shall be provided with natural or artificial ventilation.
- b. Metering space shall be provided for single metering or multi-metering centers for secondary service.

SECTION 1302. Mechanical Regulations

1. All mechanical systems, equipment and installations mentioned in the Code shall conform to the provisions of the Philippine Mechanical Code, as adopted by the Board of Mechanical Engineering pursuant to **RA 8495** as amended, otherwise known as the Philippine Mechanical Engineering Law.

2. Guarding of Moving and Dangerous Parts

All prime movers, machines and machine parts, power transmission equipment shall be so guarded, shielded, fenced or enclosed to protect any person against exposure to or accidental contact with dangerous moving parts.

3. Cranes

- a. Adequate means like ladders, stairs or platforms shall be provided for cranes having revolving cabs or machine houses, to permit the operator to enter or leave the crane cab and reach the ground safely, irrespective of its position. If a step-over is provided, the gap must not exceed 300 millimeters.
- b. A gong or other effective warning device shall be mounted on each cage or cab.
- c. Temporary crane operation without warning device may be allowed provided there is a flagman whose sole duty is to warn those in the path of the crane or its load.
- d. The maximum rated load of all cranes shall be plainly marked on each side of the crane. If the crane has more than one hoisting unit, each hoist shall have marked on it or its load block, its rated capacity clearly legible from the ground or floor.

4. Hoists

- a. Operating control shall be plainly marked to indicate the direction of travel and provided with an effective warning device.
- b. Each hoist designed to lift its load vertically shall have its rated load legibly marked on the hoist or load block or at some easily visible space.

- c. A stop, which shall operate automatically, shall be provided at each switch, dead end rail or turntable to prevent the trolley running off when the switch is open.
- d. Each electric hoist motor shall be provided with electrically or mechanically operated brake so arranged that the brake will be applied automatically when the power is cut off from the hoist.

5. Elevators

Elevators shall be installed in all private and public buildings for public use accessible to disabled persons, pursuant to the objectives of *Batas Pambansa Bilang 344 (Accessibility Law)*.

- a. Hoistway for elevators shall be substantially enclosed throughout their height, with no openings allowed except for necessary doors, windows or skylights.
- b. Ropes, wires or pipes shall not be installed in hoistways, except when necessary for the operation of the elevators.
- c. Hoistway pits shall be of such depth that when the car rests on the fully compressed buffers, a clearance of not less than 600 millimeters remains between the underside of the car and the bottom of the pit.
- d. When four (4) or more elevators serve all or the same portion of a building, they shall be located in not less than two (2) hoistways and in no case shall more than four (4) elevators be located in any one hoistway.
- e. Where a machine room or penthouse is provided at the top of a hoistway, it shall be constructed with sufficient room for repair and inspection. Access shall be by means of an iron ladder or stairs when the room is more than 600 millimeters above the adjacent floor or roof surface. The angle of inclination of such ladder or stairs shall not exceed 60° from the horizontal. This room shall not be used as living quarters or depository of other materials and shall be provided with adequate ventilation.
- f. Minimum number of hoisting ropes shall be three (3) for traction elevators and two (2) for drum type elevators.
- g. The minimum diameter of hoisting and counterweight ropes shall be 30 millimeters.
- h. Elevators shall be provided with Fall-Free Safety Device, over-load switch and reverse polarity relay.
- i. In apartments or residential condominiums of five (5) storeys or more, at least one (1) passenger elevator shall be kept on twenty-four (24) hour constant service.

6. Escalators

- a. The angle of inclination of an escalator shall not exceed 30° from the horizontal.
- b. The width between balustrades shall not be less than 560 millimeters nor more than 1.20 meters. This width shall not exceed the width of the steps by more than 330 millimeters.
- c. Solid balustrades of incombustible material shall be provided on each side of the moving steps. If made of glass, it shall be of tempered type glass.
- d. The rated speed, measured along the angle of inclination, shall be not more than 38 meters per minute.

7. Boilers and Pressure Vessels

a. Location of Boilers

- i. Boilers may be located inside buildings provided that the boiler room is of reinforced concrete or masonry and that the boiler room shall not be used for any other purpose. No part of the boiler shall be closer than 1.00 meter from any wall and shall have at least two (2) separate exits.
 - ii. In case the main building is not made up of fire resistive materials, boilers shall be located outside the building at a distance of not less than 3.00 meters from the outside wall of the main building and the building housing the boiler shall be made up of fire-resistive materials.
- b. Smokestacks, whether self-supporting or guyed, shall be of sufficient capacity to handle fuel gases, shall be able to withstand a wind load of 175 kilometers per hour and shall rise at least 5.00 meters above the eaves of any building within a radius of 50.00 meters.
 - c. Manufacturers/assemblers of boilers/pressure vessels/pressurized water heaters shall stamp each vessel on the front head or on any other suitable location with the name of the manufacturer, serial number, year of manufacture maximum allowable working pressure, heating surface in sq. meters, and thickness of shell.
 - d. Boilers of more than 46.00 sq. meters heating surface shall each be provided with two (2) means of feeding water, one (1) steam driven and one (1) electrically driven, or one (1) pump and one (1) injector.
 - e. Two (2) check valves shall be provided between any feed pump and the boiler in addition to the regular shut-off valve.
 - f. Where two (2) or more boilers are connected in parallel, each steam outlet shall be provided with a non-return valve and a shut-off valve.

- g. In no case shall the maximum pressure of an existing boiler be increased to a greater pressure than would be allowed for a new boiler of same construction.
 - h. Each boiler shall have at least one (1) safety valve. For boilers having more than 46.00 sq. meters of water heating surface or a generating capacity exceeding 910 kilograms per hour, two (2) or more safety valves shall be required.
 - i. Each boiler shall have a steam gauge, with a dial range of not less than one and one-half times and not more than twice the maximum allowable working pressure. It may be connected to the steam space or to the steam connection to the water column.
 - j. Repairs/replacements on any parts shall comply with the applicable section on New Installation of Boilers/Pressure Vessels of the Philippine Mechanical Code.
 - k. Upon the completion of the installation, the Building Official shall conduct an inspection and test, and if found complying with requirements, a certificate of operation for a period not exceeding one (1) year shall be issued after payment of the required inspection fees.
 - l. After a permit has been granted to install a boiler/pressure vessel/pressurized water heater upon payment of the installation fees therefore, it shall be the duty of the Building Official to make periodic inspection of the installation to determine compliance with the approved plans and specifications.
 - m. The **Building Official** shall notify the owner in writing of the intended date of the annual inspection at least fifteen (15) days in advance but not to exceed thirty (30) days from the intended date of inspection.
 - n. The owner/user shall prepare the boiler(s) for inspection and provide all labor and equipment required during said inspection.
8. Refrigeration and Air Conditioning
- a. The effective temperature and relative humidity of the air to be used for comfortable cooling shall be maintained at 20°Celsius to 24°Celsius and 50% to 60%, respectively, with 4.60 to 7.60 meters per minute air movement within the living zone.
 - b. Water from evaporators, condensers and other machinery shall be properly collected into a suitable water or drainage system.
 - c. Ducts shall be constructed entirely of non-combustible materials such as steel, iron, aluminum or other approved materials. Only fire retardant lining shall be used on the inside of ducts.
 - d. Access doors shall be provided at all automatic dampers, fire dampers, thermostats and other apparatus requiring service and inspection in the duct system.

- e. Where ducts pass thru walls, floors or partitions, the space around the duct shall be sealed with fire resistant material equivalent to that of the wall, floor or partition, to prevent the passage of flame or smoke.
 - f. When ducts or their outlets or inlets pass through firewalls, they shall be provided with automatic fire dampers that automatically close on both sides of the firewall through which they pass.
 - g. Fire doors and fire dampers shall be arranged to close automatically and remain tightly closed, upon the operation of a fusible link or other approved heat actuated device, located where readily affected by an abnormal rise of temperature in the duct.
 - h. Each refrigerating system shall be provided with a legible metal sign permanently attached and easily noticeable, indicating thereon the name of manufacturer or installer, kind and total number of kilograms of refrigerant contained in the system and applied field test pressure applied.
 - i. In refrigerating plants of more than 45 kilograms, refrigerant, masks and helmets shall be used. These shall be kept in a suitable cabinet outside the machine room when not in use.
 - j. Not more than 140 kilograms of refrigerant in approved containers shall be stored in a machine room at any given time.
 - k. Where ammonia is used, the discharge may be into tank of water, which shall be used for no other purpose except ammonia absorption. At least 1 liter of water shall be provided for every 120 gallons of ammonia in the system.
 - l. In a refrigerating system containing more than 9 kilograms, stop valves shall be installed in inlets and outlets of compressors, outlets of liquid receivers, and in liquid and suction branch headers.
 - m. Window type air conditioners shall be provided with drainpipe or plastic tubing for discharging condensate water into a suitable container or discharge line.
 - n. Window type air conditioners shall be provided with exhaust ducts if the exhaust is discharged into corridors/hallways/arcades/sidewalks, etc., and shall be installed at not less than 2.10 meters above the floor level.
9. Water Pumping for Buildings/Structures
- a. Installation of pumping equipment to supply buildings/structures directly from existing water supply system shall not be allowed. An underground water tank or cistern must be filled by gravity flow from the water supply system, from where pumps can be installed.

- b. To maintain water pressure in all floors of a building/structure, the following systems may be used:
 - i. Overhead tank supply - may be installed above the roof supported by the building/structure or on a separate tower.
 - (a) Water tanks shall be provided with a vent and an overflow pipe leading to a storm drain and shall be fully covered.
 - ii. Pneumatic tank - an unfired pressure vessel, initially full of air, into which water from mains is pumped.
 - (a) A suitable pressure switch shall stop the pump when pressure required is attained.
 - (b) Tanks shall be designed for twice the maximum total dynamic pressure required.
 - (c) An air volume control device shall be installed to maintain correct air volume inside the tank.

10. Pippings for Fuel, Gas and Steam

- a. Piping shall, as much as possible, run parallel to building walls.
- b. Grouped piping shall be supported on racks, on either horizontal or vertical planes.
- c. Piping on racks shall have sufficient space for pipe or chain wrenches so that any single line can be altered/repaiored/replaced without disturbing the rest.
- d. Piping 100 millimeters in diameter and above shall be flanged. Smaller sized pipes may be screwed.
- e. Piping subjected to varying temperatures shall be provided with expansion joints.
- f. Galvanized piping shall not be used for steam.
- g. Piping carrying steam, hot water or hot liquids shall not be embedded in concrete walls or floors and shall be properly insulated.
- h. Piping carrying propane, butane and other gas which are heavier than air, shall be provided with automatic shut-off devices. The automatic shut-off device is most effective if provided to each burner before the flexible connection.

11. Identification of piping by color and tag shall be as follows:

Material Piped	Pipe Color	Pipe Identification
Acetylene	Orange	Acetylene
Acid	Yellow	Acid
Air-High pressure	Yellow	H.P. Air
Air-Low Pressure	Green	L.P. Air
Ammonia	Yellow	Ammonia
Argon-Low Pressure	Green	L.P. Argon
Blast Furnace Gas	Orange	B.F. Gas
Carbon Dioxide	Red	Carbon Dioxide
Gasoline	Orange	Gasoline
Grease	Orange	Grease
Helium-Low Pressure	Green	L.P. Helium
Hydrogen	Orange	Hydrogen
Nitrogen-Low Pressure	Green	L.P.-Nitrogen
Oxygen	Orange	Oxygen
Oil	Orange	Oil
Steam-High Pressure	Yellow	H.P. Steam
Steam-Low Pressure	Yellow	L.P. Steam
Tar	Orange	Tar
Producer Gas	Orange	Producer Gas
Liquid Petroleum Gas	Orange	L. P. Gas
Vacuum-High	Orange	High Vacuum
Water-Boiler Feed	Yellow	Boiler Feed Water
Water-Cold	Green	Cold Water

Water-Distilled	Green	Distilled Water
Water (Fire Service)	Red	Fire Service Water
Water-Hot	Yellow	Hot Water
Water-Low-Pressure (Excl. Of fire Service)	Green	L.P. Water
Water-High Pressure (Excl. of Fire service)	Yellow	H.P. Water
Water-Treated	Green	Treated Water
Oil and Water (For hydraulic system)	Green	Oil and Water
Oil and Water (For hydraulic system)	Orange	Oil and Water

(emphases and underscoring supplied)

Rule XIV follows