

2023 NEC Study Guide For “Commercial Garages”

(This Study Guide was prepared by Gaylord Poe)

Auto repair shops, servicing areas of car dealerships, muffler & brake shops, quick lube shops, vehicle accessory installation shops (cell phones, stereos, etc.) and similar locations (including most motorcycle shops) all share something in common – Article 511 of the NEC. This study guide will address the more common code issues that frequently arise concerning these locations.

What conditions must be present for Art. 511 to be applicable? Art. 511.1 provides us the basics. Art. 511 applies to all locations that provide service and repair for self-propelled vehicles that are fueled by volatile flammable liquids (gasoline) or flammable gases (ie: LPG-Liquefied Petroleum Gas-“Propane”, LNG-Liquefied Natural Gas, CNG-Compressed Natural Gas).

What if the business only services diesel-fueled vehicles? Art. 511 does not apply but caution should be used in specifying and certifying such locations because of the obvious: Will only diesel-powered vehicles be worked on here?

What about parking garages? What about car dealership showrooms? Art. 511.3 (A) provides that where no repair work is done (parking and storage only) these locations shall be permitted to be unclassified. A common problem with car dealership showrooms is that although they are usually unclassified because of this rule, they can become classified by another rule. An example would be a showroom that meets all of the above criteria but has an opening (a door or walk-through) directly into a classified service area. In many cases this opening causes the showroom to become part of the service area for classification purposes, thus becoming classified not because it's a showroom but because it's an adjacent area. In some cases the service area is on a higher level than the showroom making the showroom a Class 1 Division 1 location!

What we are working towards is keeping ignition sources away from areas that may have accumulations of explosive fumes or vapors.

Major Repair Garages/Minor Repair Garages – The Tables of Art 511.3 go into significant detail in classifying repair areas. Generally speaking, determining if most of the shops you encounter are “Major” or “Minor” Repair Garages depends on if gasoline is going to be transferred during repair operations. Except for unventilated pits and belowgrade work areas, repair shops whose services do not include transferring volatile flammable liquids (gasoline) or flammable gases are generally considered to Minor Repair Garages. However, much caution should be used when determining if the vehicle repair facility is a Minor Repair Garage. Electrical inspectors, electrical contractors, and designers should be aware that in most vehicle repair garages the transfer of fuel to some degree is commonplace. In most shops the servicing of fuel delivery

systems (fuel injectors, carburetors, fuel lines, fuel pumps) is performed on a daily basis. Most newer vehicles have modular fuel pumps located in the fuel tanks, which must be made free of the vehicle for service. I believe the safest approach is to assume that a vehicle repair garage is going to work on “everything” including fuel systems. Those that claim otherwise should certify so. For example, if a repair shop certifies that it will never remove or drain a gas tank (as is typically required for fuel pump repairs) the shop can be classified as a Minor Repair garage. It should be noted that purposely-designed lubritoriums usually qualify as Minor Repair Garages.

1. Some Examples of Unclassified Repair Areas –

- a. Servicing areas that store, handle, or dispense (into vehicles) alcohol-based windshield washer fluid are not considered to be classified unless other hazardous conditions are present too.
- b. Areas adjacent to classified areas are not considered to be classified if these adjacent areas are properly ventilated or separated by an unpierced wall, roof, or other solid partition (no doors, etc.) from the classified areas.
- c. Areas that are ventilated in accordance with the provisions for floor areas, pit areas, belowgrade work areas, and lubritoriums found in 511.3 are not considered to be classified areas. (Note: Most “quick lube” places have a pit where technicians work below the vehicles. In reviewing the Tables of Art. 511.3 you’ll see that with proper ventilation these pit areas can be considered as unclassified.)
- d. Repair or storage areas for vehicles using lighter-than-air fuels are not considered to be classified areas when properly ventilated.

2. Wiring & Equipment In Classified Areas:

- a. **Wiring Methods** – In general, everything up to 18” above the floor (or within 18” of the ceiling for “lighter than air” gaseous fuels) is Class 1 Division 2. Pits and depressions below the floor are Class 1 Division 1. Don’t want the hassles of special wiring methods? Then stay out of those areas. If you install above the classified areas, any of the wiring methods in Art. 511.7(A) are OK. If you install below the classified areas, use one of the wiring methods in Art. 511.8. You may also want to avoid installing conduit under the slab because as the conduit emerges above the floor, it passes through classified areas, which require seals at the boundaries. Because of this and other rules applicable to wiring in hazardous locations,

“slab work” in repair and service areas may not be worth the effort or expense.

- b. Fixed Lighting (or other arcing equipment)** – Art. 511.7 (B)(1) and (2) covers this pretty well for reasons already discussed. Note that fixed lighting located over areas where vehicles are driven has to be either totally enclosed or located 12’ above the floor.
 - c. “Pull-down” or Cord-equipped Retractable Lights** – Art. 511.4 (B) (2) provides no restrictions on the general use of these types of fixtures but make note that if you can pull the fixture body into a classified area, it must be listed and labeled for use in the classified area. If you’re using fixtures that do not meet these criteria, sometimes you can adjust the stops so that the fixture cannot be pulled into the classified area.
 - d. Fuel Dispensing Equipment** – Art. 511.3(B) – Fuel dispensing equipment is seldom provided in commercial garages. If fuel-dispensing equipment is provided, Article 514 applies.
- 3. GFCI Receptacles:** Art. 511.12 provides that ground-fault circuit-interrupter protection for personnel shall be provided as required in Art. 210.8(B). Note that this rule applies whether or not there are classified areas. Even if the entire service area has become unclassified due to mechanical ventilation, this rule still applies.