ARTICLE

511

Commercial Garages, Repair, and Storage

INTRODUCTION TO ARTICLE 511—COMMERCIAL GARAGES, REPAIR, AND STORAGE

Article 511 covers locations used for the service and repair of vehicles which use volatible flammable liquids or flammable gases for fuel. If there is any fuel dispensing done in the building, then the requirements of Article 514 also apply. As long as there is no fuel dispensing taking place, the requirements are fairly straightforward

First of all, it is essential to understand if the facility is a major repair or minor repair garage. Pay careful attention to these definitions as you study this unit. The next factor that makes a difference in the classification of a location is the presence or absence of a below-floor pit. Finally, mechanical ventilation is critical and can change the classification of a location. Read this unit carefully and review the illustrations and you will find the Article 511 requirements are not that difficult.

511.1 Scope. Article 511 applies to areas used for service and repair operations of self-propelled vehicles including passenger automobiles, buses, trucks, tractors, and so on, in which volatile combustible liquid-produced vapors or gases are used for fuel or power.

Author's Comments:

- Installations within the scope of Article 511 include automobile service/repair centers, service/repair garages for commercial vehicles such as trucks and tractors, service/repair garages for fleet vehicles such as cars, buses, and trucks, and shops that service motorcycles and all-terrain vehicles (ATVs).
- This article doesn't apply to garages for diesel fueled or electric vehicle service garages.

511.2 Definitions.

Major Repair Garage. A building or portions of a building where engine overhauls, painting, body and fender work, and repairs that require draining of the motor vehicle fuel tank are performed, including floor space used for offices, parking, or showrooms.

Minor Repair Garage. A building or portions of a building used for lubrication, inspection, engine tune-ups, replacement of parts, fluid changes (for example, oil, antifreeze, transmission fluid, brake fluid, air-conditioning refrigerants, and so forth), brake system repairs, tire rotation, and similar routine maintenance work, including floor space used for offices, parking, or showrooms.

511.3 Classification of Hazardous Areas.

(A) Parking Garages. Parking or storage garages aren't classified.

> **Author's Comment:** A commercial garage is a place where people store or repair vehicles that burn volatile liquids, such as gasoline, liquid propane, and alcohol. The requirement is a bit more detailed, but this is the general idea. Article 511 also draws a distinction between a parking garage and a commercial garage used for repair or storage.

(B) Repair Garages, With Dispensing. Major and minor repair garages that dispense motor fuels must have the dispensing functions classified in accordance with Table 514.3(B)(1).

(C) Major Repair Garages. If gasoline, or gaseous fuels, such as natural gas, hydrogen, or LPG, won't be dispensed, the classification rules in (1), (2), and (3) apply.

(1) Floor Areas. Figure 511–1

(a) Ventilation Provided. The floor area can be unclassified if there's a minimum of four air changes per hour for each square foot of floor area.

(b) Ventilation Not Provided. The entire floor area is classified as Class I, Division 2 up to 18 in. above the floor.

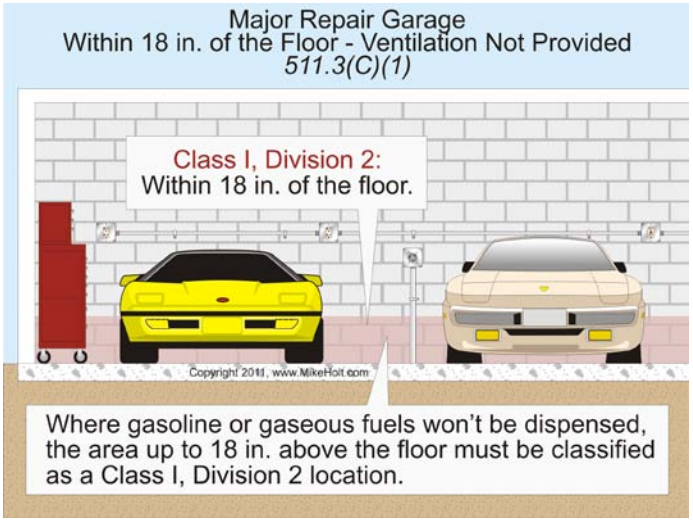

Figure 511–1

(2) Ceiling Areas. If vehicles fueled with natural gas or hydrogen are repaired or stored, the area within 18 in. of the ceiling is classified in accordance with (a) and (b). Figure 511–2

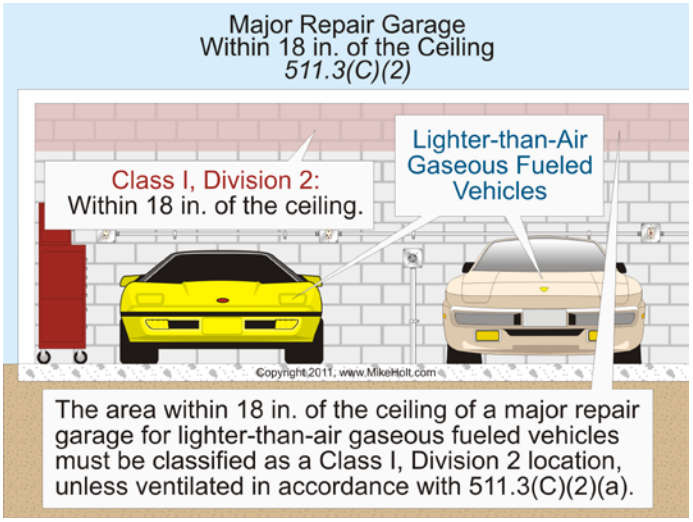

Figure 511–2

(a) Ventilation Provided. The ceiling area is unclassified if ventilation is provided from not more than 18 in. from the highest point in the ceiling to exhaust the ceiling area at a rate of at least 1 cfm/sq ft at all times that the building is occupied, or when vehicles using lighter-than-air gaseous fuels are parked below this area.

(b) Ventilation Not Provided. The ceiling area is classified as Class I, Division 2.

(3) Pit Areas in Lubrication or Service Room. The pit area is classified as provided in (a) or (b). Figure 511–3

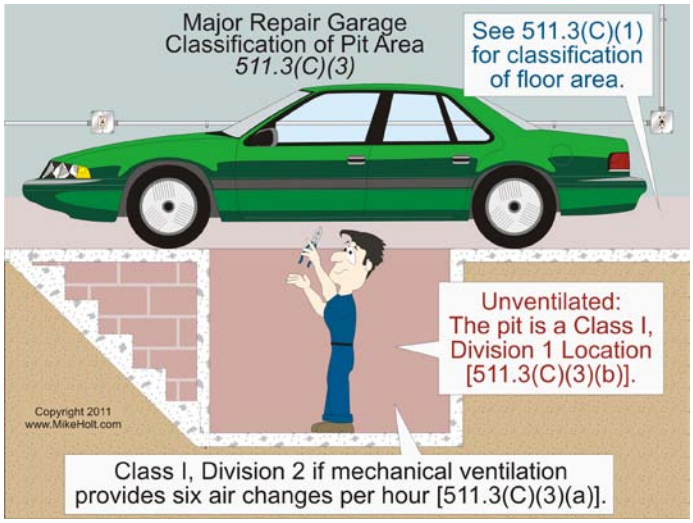

Figure 511–3

(a) Ventilation Provided. The pit area is classified as Class I, Division 2 if there's a minimum of six air changes per hour.

(b) Ventilation Not Provided. The pit area is classified as Class I, Division 1 up to the floor level.

(D) Minor Repair Garages. If flammable liquids won't be dispensed or transferred, the classification of (D)(1), (D)(2), and (D)(3) apply.

(1) Floor Areas. Floor areas are unclassified, except pit areas are classified according to (a) or (b). Figure 511–4

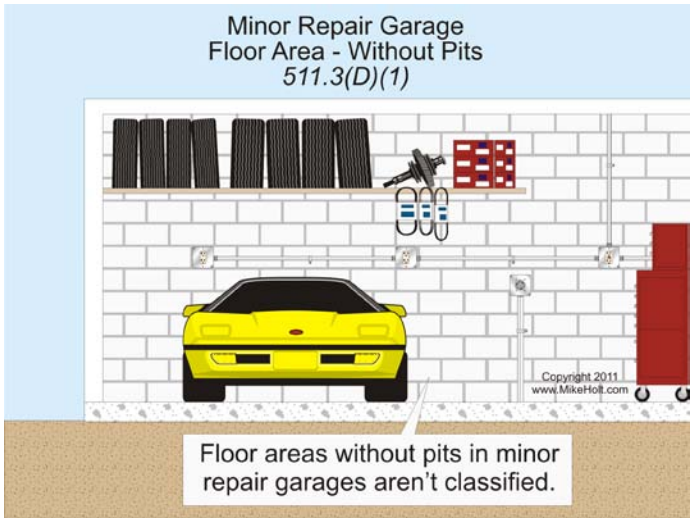

Figure 511–4

(a) Ventilation Provided. The pit area can be unclassified if there's a minimum of four air changes per hour.

(b) Ventilation Not Provided. The pit area is classified as Class I, Division 2 up to the floor level.

(2) Ceiling Areas. The ceiling area is unclassified if natural gas or hydrogen won't be transferred. Figure 511–5

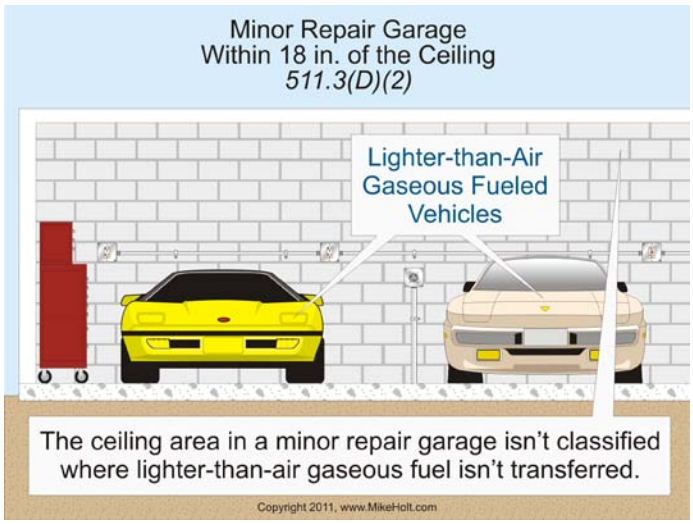

Figure 511–5

(3) Pit Areas in Lubrication or Service Room. Pit areas must be classified according to (a) or (b).

(a) Ventilation Provided. The pit area is unclassified if there's a minimum of 1 cfm/sq ft of the floor area at all times that the building is occupied or when vehicles are parked in or over this area. Figure 511–6

(b) Ventilation Not Provided. The pit area is classified as Class I, Division 2 up to 18 in. above floor level and extending out 3 ft. Figure 511–7

(E) Modifications to Classification.

(1) Classification of Adjacent Areas. Areas adjacent to classified locations aren't classified if mechanically ventilated at a rate of four or more air changes per hour, or when walls or partitions effectively cut off the adjacent area. Figure 511–8

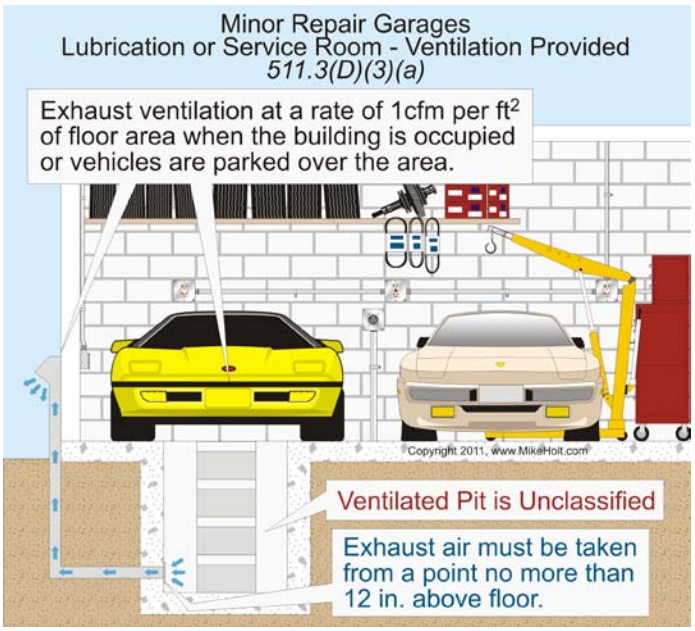

Figure 511–6

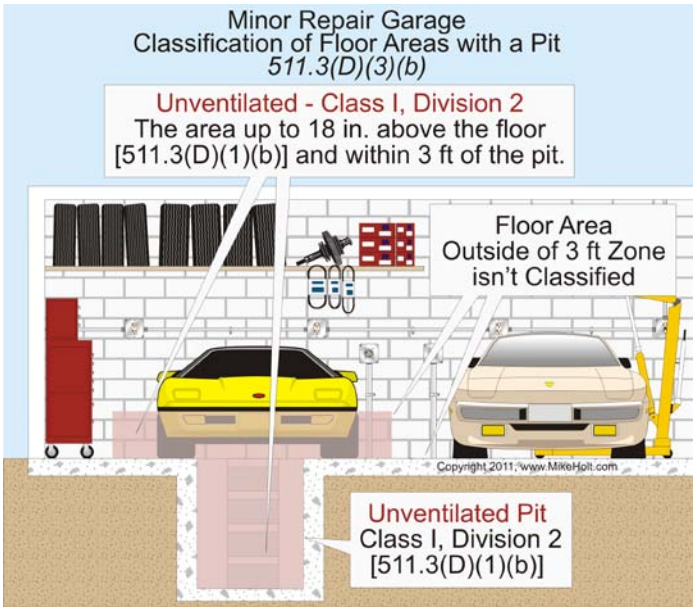

Figure 511–7

(2) Alcohol-Based Windshield Washer Fluid. The storage, handling, or dispensing into motor vehicles of alcohol-based windshield washer fluid in areas used for the service and repair operations of the vehicles doesn't cause such areas to be classified as hazardous (classified) locations.

Author's Comment: Windshield washer fluid isn't flammable.

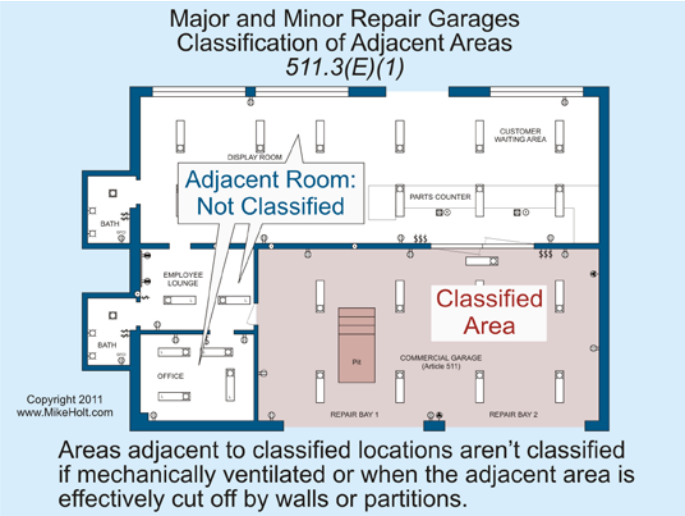

Figure 511–8

511.4 Wiring and Equipment in Hazardous (Classified) Locations.

(A) Located in Class I Locations. Wiring and equipment within a Class I location must be installed in accordance with Article 501. Figure 511–9

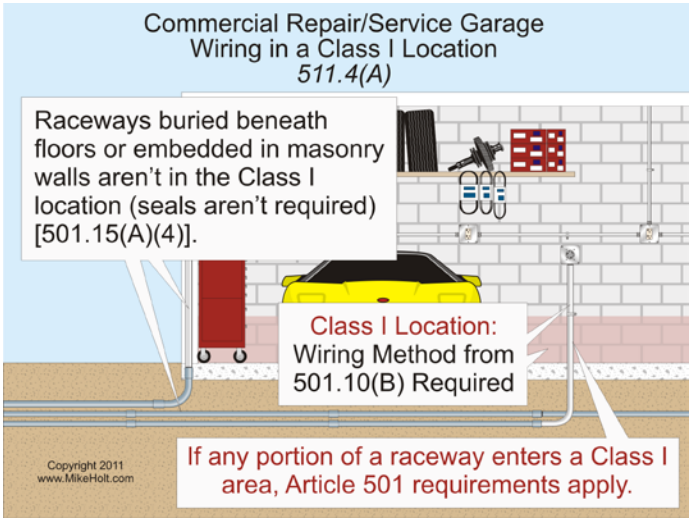

Figure 511–9

(B) Equipment Located in Class I Locations.

(1) Fuel-Dispensing Units. The wiring of fuel-dispensing units must comply with Article 514.

(2) Portable Lighting Equipment. The lamp and cord of portable lighting equipment must be supported or arranged in such a manner that it can't be used in a hazardous (classified) location [511.3(B)], or it must be identified for a Class I, Division 1 location [501.130(B)].

511.7 Wiring and Equipment Above Hazardous (Classified) Locations.

(A) Wiring in Spaces Above Class I Locations.

(1) Fixed Wiring Methods. Wiring above a Class I hazardous (classified) location must be in raceways, Types AC or MC cable, manufactured wiring systems, PLTC cable in accordance with Article 725, or TC cable in accordance with Article 336. Figure 511–10

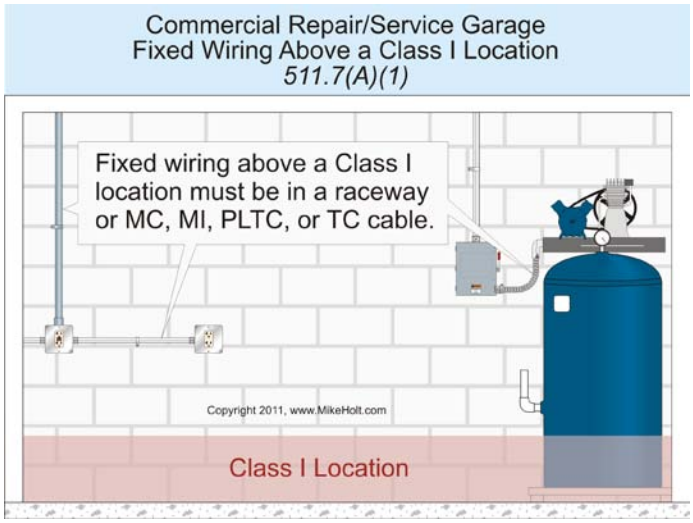

Figure 511–10

(2) Pendant Cords. Pendant cords above a Class I hazardous (classified) location must be listed for hard usage as per Table 400.4.

(B) Equipment Above Class I Locations.

(1) Fixed Electrical Equipment.

(a) Arcing Equipment. Equipment with make-and-break contacts installed less than 12 ft above the floor level (excluding receptacles, lamps, and lampholders) must be of the totally enclosed type or be of the type constructed to prevent sparks or hot metal particles from escaping.

(b) Fixed Lighting. Lampholders and lamps for fixed lighting over travel lanes or where exposed to physical damage must be located not less than 12 ft above floor level, unless the luminaires are of the totally enclosed type or constructed to prevent sparks or hot metal particles from escaping. Figure 511–11

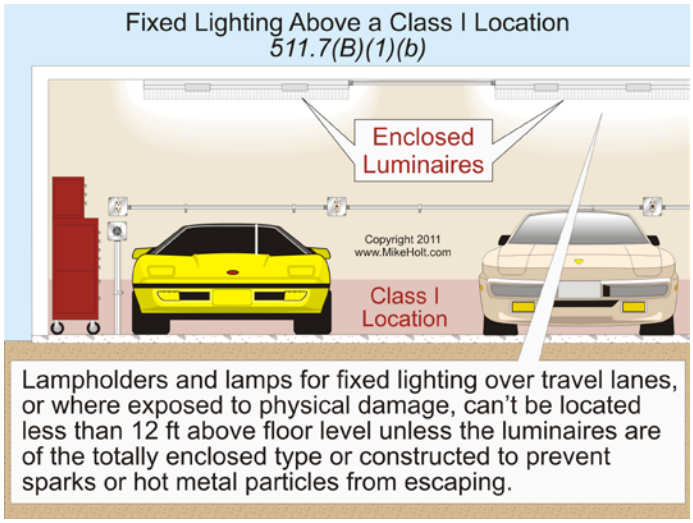

Figure 511–11

511.9 Seals. Raceway, cable, and boundary seals must be installed in accordance with 501.15.

Author's Comment: If the Class I, Division 1 boundary is beneath the ground, the sealing fitting can be installed after the raceway leaves the ground. However, there must not be any unions, couplings, boxes, or fittings (except explosion-proof reducing bushings) between the seal fitting and the point where the raceway leaves the earth [501.15(A)(4) Ex 2]. Figure 511–12

511.10 Special Equipment.

(A) Battery Charging Equipment. Battery chargers and batteries being charged must not be located within an area classified in accordance with 511.3(B).

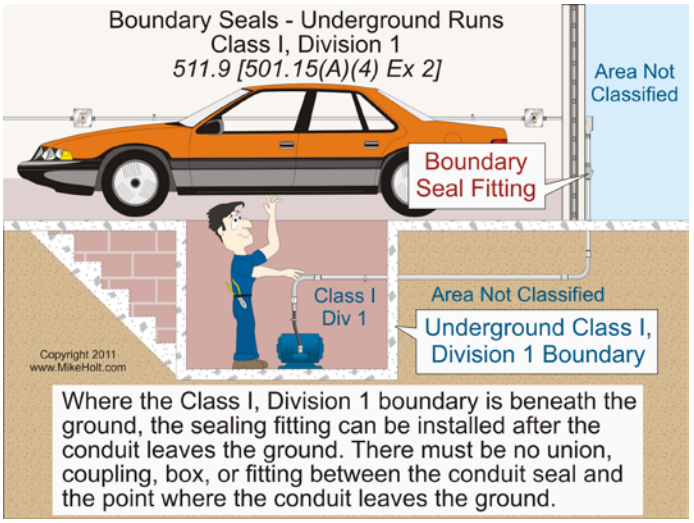

Figure 511–12

511.12 GFCI-Protected Receptacles. GFCI protection is required for 15A and 20A, 125V receptacles used for service and repair operations, such as electrical automotive diagnostic equipment, electric hand tools, portable lighting devices, and so on. Figure 511–13

Author's Comment: See the definition of "Ground-Fault Circuit Interrupter" in Article 100.

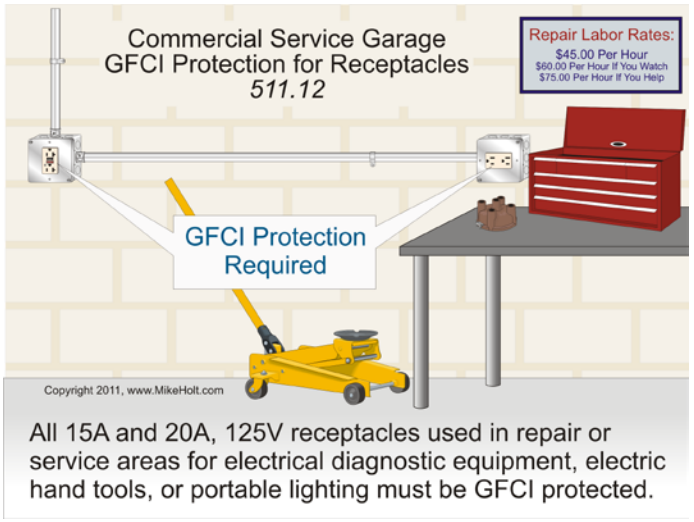

Figure 511–13