

Aircraft Hangars

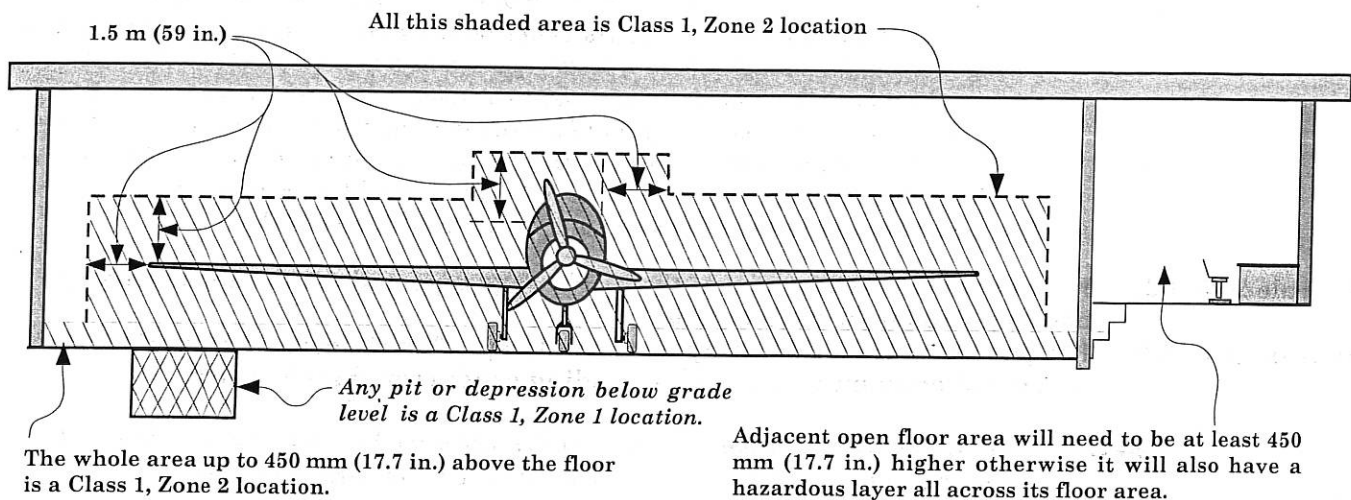
Rule 20-500 Scope - Rules 20-502 to 20-522 apply to locations used for storage or servicing of aircraft in which gasoline, jet fuels, or other volatile flammable liquids, or flammable gases, are used but shall not include those locations used exclusively for aircraft which have never contained such liquids or gases, or which have been drained and properly purged.

Rule 20-502 Hazardous Areas

- (1) Any pit or depression below the level of the hangar floor shall be considered to be a Class I, Zone 1 location which shall extend up to the floor level.
- (2) The entire area of the hangar including any adjacent and communicating areas not suitably cut off from the hangar shall be considered to be a Class I, Zone 2 location up to a level 450 mm above the floor.
- (3) The area within 1.5 m horizontally from aircraft power plants, aircraft fuel tanks, or aircraft structure containing fuel shall be considered to be a Class I, Zone 2 location which shall extend upward from the floor to a level 1.5 m above the upper surface of wings and of engine enclosures.
- (4) Adjacent areas in which hazardous vapours are not likely to be released such as stock rooms, electrical control rooms, and other similar locations shall be permitted to be classed as non-hazardous when adequately ventilated and when effectively cut off from the hangar itself in accordance with Rule 18-060.



The illustration below shows the hazardous areas.



Section 20

Rule 20-504 Wiring and Equipment in Hazardous Areas

Subrule 20-504(1) All fixed and portable wiring and equipment which is or may be installed or operated within any of the hazardous locations defined in Rule 20-502 shall conform to the requirements of Section 18.



The requirements of Section 18 and their clarifying comments are included in Section 18

Subrule 20-504(2) All wiring installed in or under the hangar floor shall conform to the requirements for Class I, Zone 1 locations.



Fuels used in aircraft engines are liquid not a gas so that any spillage can seep into the ground and so convert the underground area to a hazardous location. Conduits and cables either in the concrete floor slab or under it are considered to be in a Class 1, Zone 1 location.

Subrule 20-504(3) Wiring systems installed in pits, or other spaces in or under the hangar floor shall be provided with adequate drainage and shall not be placed in the same compartment with any other service except piped compressed air.



This is shown in the illustration above.

Subrule 20-504(4) Attachment plugs and receptacles in hazardous locations shall be explosion-proof, or shall be so designed that they cannot be energized while the connections are being made or broken.



This requirement is only for receptacles actually located in the hazardous location. Receptacles above the hazardous level may be standard type. See also Rule 20-510(2)(b).

Rule 20-506 Wiring Not Within Hazardous Areas

Subrule 20-506(1) All fixed wiring in a hangar not within a hazardous area as defined in Rule 20-502 shall be installed in metal raceways or shall be armoured cable, Type MI cable, or aluminum sheathed cable, except that wiring in a non-hazardous location as set out in Rule 20-502(4) shall be permitted to be of any type recognized in Section 12 as suitable for the type of building and the occupancy.



There is a distinction here, with a difference. The room adjacent to a hangar which is illustrated above and referred to in Rule 20-502(4) is a room in which there is little or, no possibility, of any hazardous vapours being released could therefore be wired with any wiring method, including loomex, if local regulations will permitted it.. The rule gives the reason; there is nothing in that room that can release hazardous vapours. Other areas, inside the hangar, but outside of any hazardous locations in the hangar, must be wired with metal raceways, armoured cable, MI cable, or aluminum sheathed cable. The electrical wiring in these locations, while above or outside of all hazardous locations is, never the less, in a room where hazardous vapours are, or can be, released.

Subrule 20-506(2) For pendants, flexible cord of the hard usage type and containing a separate bonding conductor shall be used.

Subrule 20-506(3) For portable utilization equipment and lamps, flexible cord approved for hard usage and containing a separate bonding conductor shall be used.



Requiring a bonding conductor in a cord certified for hard usage dates these subrules. It would likely require a special order for unbonded hard usage electrical cord.

Subrule 20-506(4) Suitable means shall be provided for maintaining continuity and adequacy of the bonding between the fixed wiring system and the non-current-carrying metal portions of pendant fixtures, portable lamps, and other portable utilization equipment.



Bonding for pendant light fixtures must be made secure in the outlet box supplying the fixture. This is a normal requirement for pendant fixtures everywhere. The difference here is that these fixtures operate above a hazardous Zone 2 location at floor level and therefore additional care is needed when making these connections.

The receptacle and the attachment cap is the connection between fixed wiring and portable lamps and other utilization equipment. This part of the subrule seems to be asking for

high quality receptacles and attachment caps to insure this connection, and in particular the bonding connection, will be assured.

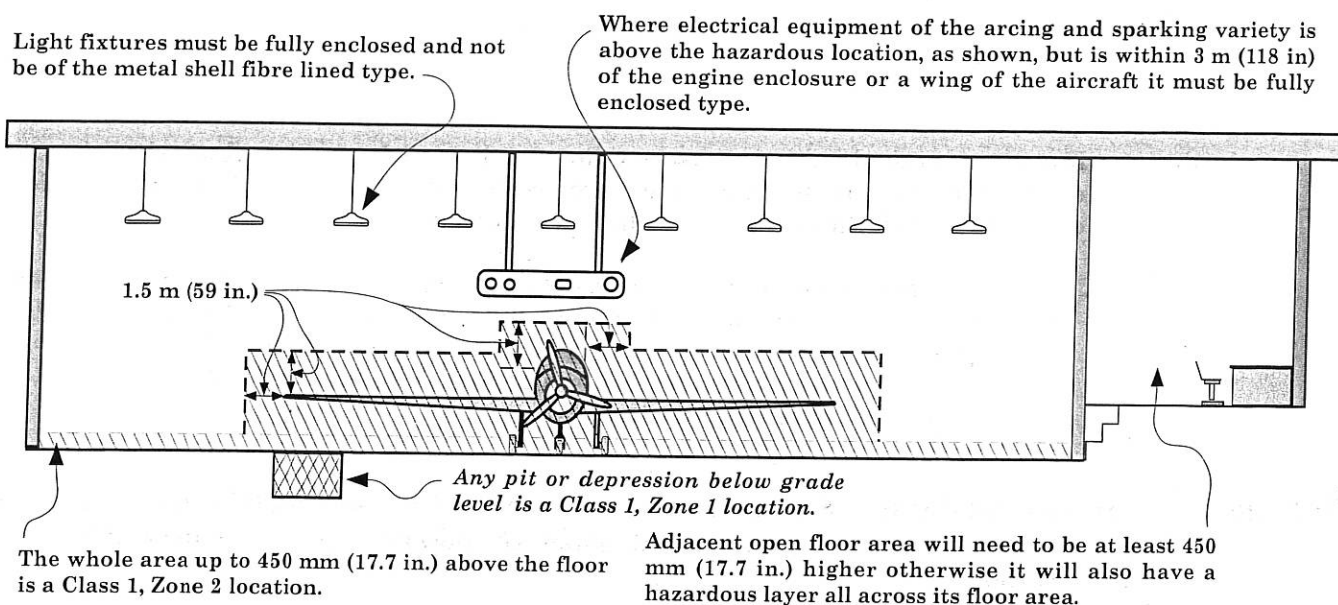
Portable equipment if located in any hazardous location must be certified for that location.

Rule 20-508 Equipment Not Within Hazardous Areas

Subrule 20-508(1) In locations other than those described in Rule 20-502, equipment which is less than 3 m above wings and engine enclosures of aircraft and which shall be permitted to produce arcs, sparks, or particles of hot metal, such as lamps and lampholders for fixed lighting, cutouts, switches, receptacles, charging panels, generators, motors, or other equipment having make-and-break or sliding contacts, shall be of totally enclosed type or so constructed as to prevent escape of Sparks or hot metal particles, except that equipment in areas described in Rule 20-502(4) may be of general purpose type.

Subrule 20-508(2) Lampholders of metal shell, fibre lined types shall not be used for fixed lighting.

➤ The requirements are illustrated below.



Section 20

Subrule 20-508(3) Portable lamps that are used within a hangar shall comply with Rule 18-118.

Subrule 20-508(4) Portable utilization equipment which is, or may be, used within a hangar shall be of a type suitable for use in Class I, Zone 2 locations.

➤ *Portable lighting must comply with Rule 18-118 which says that portable lamps must be approved in "in accordance with the requirements of Rule 18-100. The sticky point here is that Rule 18-100 refers only to Class 1, Zone 1 locations. A portable lamp can be used anywhere in that room, including the pit, which is a Zone 1 location.*

Other portable electrical equipment need only be certified for use in a Zone 2 location. Presumably other electrical equipment is not as likely to be used in the pit.

A sump pump in the pit would need to be certified for use in a Class 1, Zone 1 location, but then, it would also not be classed as portable equipment.

Rule 20-510 Stanchions, Rostrums, and Docks

(1) Electric wiring, outlets, and equipment including lamps on, or attached to, stanchions, rostrums, or docks which are located, or likely to be located, in a hazardous

area as defined in Rule 20-502(3) shall conform to the requirements for Class I, Zone 2 locations.

- (2) Where stanchions, rostrums, and docks are not located, or are not likely to be located, in a hazardous area as defined in Rule 20-502(3), wiring and equipment shall conform to Rules 20-506 and 20-508, except that:
 - (a) Receptacles and attachment plugs shall be of the locking type which will not break apart readily; and
 - (b) Wiring and equipment, not more than 450 mm above the floor in any position, shall conform to Subrule (1).
- (3) Mobile stanchions with electrical equipment conforming to Subrule (2) shall carry at least one permanently affixed warning sign, to the effect that the stanchions be kept 1.5 m clear of aircraft engines and fuel tank areas.



Rule 20-512 Sealing

Subrule (1) Seals shall be installed in accordance with Section 18 and shall apply to horizontal as well as to vertical boundaries of the defined hazardous areas.



The location of seals is covered in Section 18

Subrule (2) Raceways embedded in a masonry floor or buried beneath a floor shall be considered to be within the hazardous area above the floor when any connections or extensions lead into or through the hazardous area.



Very few hangars have masonry (brick) floors. This rule says, in effect, that raceways in a masonry floor, or raceways buried under any kind of floor, must be regarded as being in the hazardous area above the floor. This subrule is similar to Rule 20-108 which deals with raceways under an automobile garage floor. This subrule needs clarification. Check with your local Electrical Inspector.

Section 20

Rule 20-514 Aircraft Electrical Systems - Aircraft electrical systems shall be de-energized when the aircraft is stored in a hangar and, whenever possible, while the aircraft is undergoing maintenance.



Compliance with this rule could be difficult to monitor.

Rule 20-516 Aircraft Battery-Charging and Equipment

- (1) Aircraft batteries shall not be charged when installed in an aircraft located inside, or partially inside a hangar.
- (2) Battery chargers and their control equipment shall not be located or operated within any of the hazardous areas defined in Rule 20-502 but shall be permitted to be located or operated in a separate building or in an area complying with Rule 20-502(4).
- (3) Mobile chargers shall carry at least one permanently affixed warning sign, to the effect that the chargers be kept 1.5 m clear of aircraft engines and fuel tank areas.
- (4) Tables, racks, trays, and wiring shall not be located within a hazardous area, and shall conform to the provisions of Section 26 pertaining to Storage Batteries.



Chargers on the hangar floor would be in the 450 mm Zone 2 hazardous layer on the floor. This would be acceptable only if the charger is certified for operation in such an environment. The terminal connections to the battery would also likely need to be made within the