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Ind 59.48 General sanitation and service areas. (1) SCOPE. This classification shall include toilet rooms, locker rooms, natatoriums, shower rooms and janitor closets.

Note #1: A janitor closet is a service closet with one or more plumbing fixtures.

Note #2: For exhaust ventilation requirements in hospital service areas, see Wis. Adm. Code section Ind 59.56 (2).

Note #3: For exhaust ventilation requirements in places of employment, see Wis. Adm. Code section Ind 59.53.

(2) VENTILATION REQUIRED. (a) Exhaust ventilation shall be provided for all areas of this class unless otherwise exempted. The volume of air exhausted shall not be less than 2 cubic feet per minute per square foot of floor area.

(b) The effectiveness of the exhaust shall be greater than the supply.

(c) Exhaust ventilation shall be installed in toilet rooms having more than one fixture (water-closets and urinals).

Note: Exhaust ventilation is not required from toilet rooms having one water-closet or one urinal when the window area is greater than 4 square feet and more than 2 square feet is openable.

(d) The air movement in the natatorium shall be not less than 6 air changes per hour and the volume of tempered outside air supplied and exhausted shall be not less than 2 cubic feet per minute per square foot of pool surface.

(e) Locker rooms used with natatoriums, baths and toilet rooms, shall be supplied with tempered air.

Note: The air supplied may be exhausted through baths or toilet rooms.

(f) *Exemptions.* Exhaust ventilation is not required from toilet rooms having one water closet or one urinal, or from janitor closets having one service sink or receptor, providing the room has an outside window of at least 4 square feet with at least 2 square feet that is openable.

(3) EXHAUST VENTILATING SYSTEMS. Exhaust ventilating systems serving this class of occupancy shall not be used for any other service.

History: Cr. Register, January, 1965, No. 109, eff. 2–1–65; am. (1), cr. (2) (f), Register, September, 1973, No. 213, eff. 10–1–73.

Ind 59.49 Kitchens. (1) SCOPE. This classification includes all areas where food is prepared, except in domestic science educational facilities from grades kindergarten thru 12, and single unit apartments in hotels, motels and apartment buildings.

(2) VENTILATION REQUIRED. (a) *Exhaust.* The exhaust ventilation shall be not less than 4 cubic feet per minute per square foot of floor area for every occupied area within the scope of this section.

1. Exception: The exhaust ventilation shall be not less than 2 cubic feet per minute per square foot of floor area for kitchens used in the preparation of only one meal a day. The exception may apply to churches, auditoriums and lodge halls.

(b) *Exhaust ventilating system.* Exhaust ventilating systems serving this class of occupancy shall not be used for any other services.

(3) EXHAUST HOODS. (a) *Where required.* Exhaust hoods are required under the following conditions:

1. Where frying and/or broiling is done.

Note: The above includes deep-fat frying and surface frying.

2. Where cooking is a regular commercial operation.

Note: The above includes ranges, griddles, fryers, broilers and similar grease-producing equipment.

(b) *Size of hood.* The horizontal inside dimensions of the hood shall be sized to effectively capture grease vapors, but in no case shall these dimensions be less than the overall horizontal dimensions of the grease-producing equipment.

(c) The volume of exhaust air from the hood shall be not less than 100 cubic feet per minute per square foot of the overall horizontal dimensions of the grease-producing equipment.

(d) When hoods are connected to ducts supplying outside air, performance data shall be submitted as required by subsection Ind 59.20 (4) (g).

(e) Hood surfaces and exposed exhaust ducts within 18 inches of combustible material shall be protected by 2-hour fire-resistive construction.

(f) Hood surfaces that are concealed by or recessed into adjoining construction shall be protected by 2-hour fire-resistive construction.

(g) Recirculation of air as described under subsection Ind 59.24 (8) (b) is prohibited.

(4) DUCTS. (a) Exhaust ducts or vents connected to required hoods that pass through any other area of the building, including suspended ceilings, shall be protected with not less than 2-hour fire-resistive construction. Where 2-hour fire-resistive construction cannot be provided, a manufactured or masonry chimney shall be used. The manufactured chimney shall be tested and approved for use at a flue gas temperature of not less than 1000° F.

Note #1: See Wis. Adm. Code section Ind 51.04 for various building materials having a 2-hour rating.

Note #2: See Ind 59.69 (13) (a) 5. for fire dampers.

(b) Accessible clean-out openings shall be installed in the area of the duct not requiring a 2-hour fire-resistive construction.

(c) The air discharge shall be directed away from combustible materials.

(d) Sheet metal ducts shall be constructed of not less than 20 U.S. gauge sheet steel.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. (1) and (4) (a), r. and recr. (2) (a) and (3), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.50 Offices. (1) SCOPE. This classification shall include areas where clerical and administrative work is the chief usage.

(2) VENTILATION REQUIRED. The air movement supply and distribution for this classification shall conform to the requirements of Wis. Adm. Code section Ind 59.41 unless each of the following requirements has been satisfied:

(a) The total area of outdoor openings is not less than 3% of the floor area served.

(b) The available floor space for each occupant is not less than 75 square feet per person.

(c) Heat or odors are not present in sufficient quantities to be injurious to the health, safety or welfare of the occupants.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.51 Retail establishment. (1) SCOPE. This classification shall include barber shops, beauty parlors, brokerage board rooms, taverns, bowling alleys, retail establishments where goods and commodities are bought and sold and places where not more than 100 persons assemble for recreation, entertainment or dining purposes.

(2) VENTILATION REQUIRED. The air movement, supply and distribution for all occupancies of this class shall conform to the requirement of section Ind 59.41 unless the total area of "outdoor openings" is more than 3% of the floor area served. Window openings below grade will not be accepted unless there is a "clear space" outside of the window having a width of not less than 1½ times the distance below grade at the bottom of the window.

Note: Width of "clear space" means the horizontal distance measured at right angles to the plane of the window.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.52 Garages and service stations. (1) SCOPE. Ventilation shall be provided for all repair garages, service stations, body shops, repair service shops and live storage garages where vehicles or equipment having internal combustion engines are operated for repair or other purposes.

Note: A live storage area does not include vehicles or equipment stored for a seasonal period or where such vehicles or equipment, when new, are displayed in a showroom area.

(2) VENTILATION REQUIRED. The supply and exhaust ventilation shall be provided for areas of this class, whenever open to the public or to employes.

(3) STORAGE AREAS. (a) *Heated live storage area.* Areas used for the storage of 6 or more motor-driven vehicles shall be provided with a tempered outside air supply of not less than ½ cubic foot per minute per square foot of floor area. Exhaust ventilation shall equal the volume of air supplied.

Note: A live storage area is any area within a building used for the storage of fire trucks, tractors, automobiles, trucks and other self-propelled vehicles driven in and out under their own power. For exception, see note under (1).

(b) *Unheated live storage area.* Areas used for the storage of 6 or more motor-driven vehicles and where heat is not required, shall be provided with exhaust ventilation equal to ½ cubic foot of air per minute per square foot of floor area unless the following requirements have been satisfied:

1. The floor is at or above grade level.

2. A permanent open wall of the included area is not less than 30% of the total wall area and arranged to cause air circulation throughout the respective area.

(4) REPAIR AREAS. (a) All areas in which motor-driven vehicles are repaired shall be supplied with a volume of tempered outside air not

less than ¾ cubic foot per minute per square foot of floor area. An equal volume of exhaust ventilation shall be provided and maintained. Exhaust air shall be drawn from a line not more than 18 inches above the floor.

(b) Provide a mechanical exhaust system in the repair area to remove the exhaust fumes from internal combustion engines. The duct system shall be designed with sufficient outlets to accommodate the total number of vehicles in the repair area. Provide flexible hose equipped with a device for connecting it to the exhaust pipe of the vehicle and to the exhaust system. Each outlet shall be provided with a shut-off valve that can be closed when not in use. The blower capacity shall be sufficient to exhaust a volume of air not less than 100 cubic feet per minute for each opening.

Note: In a repair area of a garage where the repair area can accommodate not more than 2 vehicles, an incombustible flexible tube or hose not more than 10 feet long connected to the engine exhaust (tail pipe) and terminating outside of the building may be used in lieu of a mechanical exhaust system.

(c) A noncombustible flexible tube or hose not more than 10 feet long, connected to the engine exhaust (tail pipe) and terminating outside the building, may be used in lieu of requirements stated in (b) above.

Note: The requirements stated in (4) (a) need not be increased when satisfying requirements of either (b) or (c). Also see Wis. Adm. Code Chapter Ind 20-N Dusts, Fumes, Vapors and Gases, for additional requirements.

(d) Areas involved in the servicing of small internal combustion engines such as lawnmowers, snowmobiles, chainsaws, cycles, boat engines, etc. shall be provided with at least ¾ cubic foot of tempered outside air per square foot of enclosed service floor area and an equivalent exhaust.

(5) SERVICE STATIONS. Buildings of this classification shall include liquid fuel dispensing stations and/or where vehicles can be driven into the building for washing, greasing, oil change, motor tune-up or repair, tire replacement, battery charging or replacement, and similar operations.

(a) All service and/or workroom areas, other than where engine tune-up or repair is made, shall be supplied with a volume of tempered outside air not less than ½ cubic foot per minute per square foot of floor area.

1. An exhaust ventilation system shall be provided to satisfy the minimum required air movement.

2. The exhaust air shall be drawn from not more than 18 inches above the floor.

(b) All service and/or workroom areas involving engine tune-up or repair requiring the operation of internal combustion engines shall be provided with ventilation to satisfy requirements of (4) above.

(c) Buildings or portions of buildings having a capacity of and used exclusively for washing 2 or more vehicles simultaneously shall be supplied and exhausted with a volume of air equal to ½ cubic foot per minute per square foot of floor area.

1. The minimum floor area calculated for wash areas provided with vehicle conveyor systems shall be based on that portion of floor

TABLE 4

	Maximum Allowable Velocities	
	Mechanical System	Gravity System
Intake openings using propellor fans	600 F.P.M.	
Vertical vent ducts		300 F.P.M.
Roof siphon ventilators	600 F.P.M.	300 F.P.M.

Note: The allowable velocity may be increased to 600 feet per minute for gravity vent ducts equipped with siphon ventilators and the tempered outside air is supplied by mechanical means.

Note: For supply and return air duct velocities, reference may be made to the standards of the American Society of Heating, Refrigerating and Air Conditioning Engineers Guide and Data Book, which are acceptable.

(3) USE. No duct designed for the transmission of air shall be used for any other purpose.

Note: See Wis. Adm. Code section Ind 59.69 (4) (g) for exception.

(4) UNDERGROUND DUCT CONSTRUCTION AND INSTALLATION. (a) All underground duct systems using cement tile, glazed clay tile and other tile having a composition of cement and minerals shall be waterproof and shall have sufficient strength to prevent failure of duct at time of installation and while in service. All fittings shall be designed with bell and spigot or slip joint connections. All joints shall be waterproof.

(b) Metal and other approved materials not specified in (a) may be used for underground systems if encased in not less than 2 inches of concrete. The ducts shall be round, water-proof, incombustible, smooth, and of sufficient strength to prevent collapse.

(c) Supply air ducts installed parallel and adjacent to an outside wall shall be insulated with a moisture proof material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) placed between the duct and outside wall. The insulation shall extend from bottom of floor to 2 feet below finished grade.

(d) Underground ducts shall be provided with drainage to a lower room of the building or to a sump. No duct shall be connected to a sewer.

(e) All room inlets and outlets for underground ducts shall comply with Wis. Adm. Code, subsection Ind 59.71 (4). A water-tight connection shall be provided where the inlet and outlet risers are connected to underground ducts.

(f) In addition to the requirements of subsections (4) (a), (b), (c), (d), and (e), the trunk duct shall not be less than 12 inches high and 12 inches wide and branch ducts not more than 16 feet long may be 8 inches high and 8 inches wide. All ducts shall be provided with inspection and clean-out openings equipped with tight fitting incombustible covers.

(g) In addition to the requirements in subsections (4) (a), (b), (c), (d) and (e) warm air supply ducts shall be designed in compliance with allowable air velocities in Table 4. Where supply air ducts are installed parallel and adjacent to an outside wall, a moisture-proof insulating material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) shall be placed

between the duct and outside wall. The insulation shall extend from bottom of floor to 2 feet below finished grade.

(h) Non-hazardous piping may be installed in underground ducts if it does not restrict the air flow and the inside dimensions of the duct are greater than 4 feet wide and 4 feet high.

(5) CONSTRUCTION. (a) All sheet metal ducts and fittings shall be constructed in compliance with standards approved by the department of industry, labor and human relations. All ducts or airways of wood or other combustible material shall be lined on the inside with sheet metal or other approved incombustible material.

Note: For acceptable standards, see ASHRAE Guide and Data Book, published by the American Society of Heating, Refrigeration and Air-Conditioning Engineers or as illustrated in the Duct Manual published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(b) Ducts constructed of other than metal need not conform to subsection (5) (a), provided:

1. They are approved for such use and the method for fabricating, installing and supporting is approved by the department of industry, labor and human relations.

Note: The department of industry, labor and human relations accepts Class 1 air ducts tested (Standards for Safety U.L. 181) and listed by Underwriters' Laboratories, Inc.

2. They resist puncture, deformation or collapse.

3. They are not used where the air temperature exceeds 250 degrees Fahrenheit.

4. They do not pass through required fire-resistive construction.

5. They are not connected to a furnace, duct heater or similar heat-producing appliance unless a connecting duct of steel, having a length of not less than 6 feet is used to separate them from the appliance.

(c) Flexible duct connectors between duct systems and air outlets or air outlet units need not conform to subsections (5) (a) and (b), provided:

1. The duct material is approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in Building Materials List published by Underwriters' Laboratories, Inc. are acceptable.

2. The construction is approved by the department of industry, labor and human relations.

3. The connector is not subject to deterioration from mildew or moisture.

4. The connector does not pass through required fire-resistive construction.

(d) The vibration isolation connectors at the joint between the duct and fan or heat-producing equipment shall conform to the following:

1. The connector shall be a type approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in Building Materials List published by Underwriters' Laboratories, Inc. are acceptable.

2. The connector shall be not more than 10 inches wide.

3. The connector shall not be used where the air temperature is in excess of 250 degrees Fahrenheit.

(e) Spirally wound metal ducts shall be constructed to provide structural strength equal to rectangular ducts. The metal may be one standard gauge lighter than required for round ducts.

(6) SUSPENDED CEILING PLENUM. The plenum above suspended ceilings shall be of incombustible construction. The installation of hazardous piping is prohibited. Openings into the plenum that would affect the fire-resistive rating of the roof and ceiling are prohibited.

(7) INSULATION. Heating supply ducts shall be covered with not less than ½ inch of insulation unless an allowance is made for temperature drop in the system.

(8) GRAVITY VENT DUCTS. (a) Separate vent ducts from each area of similar occupancy shall extend to a plenum at the base of a siphon ventilator.

(b) The use of open pipe space for a gravity vent duct is prohibited.

(9) TERMINATION OF VENT DUCTS. Vent ducts used with mechanical ventilation supply systems shall not terminate in attic space, unless the space is air tight, of incombustible construction and the attic floor is smooth. All such gathering chambers shall be connected to an approved siphon type roof ventilator or to an exhaust fan discharging outside the building.

(10) VENT DUCTS, HORIZONTAL RUN. (a) Horizontal runs in vent ducts connected to siphon type roof ventilators shall be avoided wherever possible and the maximum practicable inclination shall be provided in all cases. In no case shall the horizontal run exceed 30% of the vertical run unless the room has a direct mechanical supply or the vent duct is connected to an exhaust fan.

(b) Dampers are prohibited in gravity vent ducts, unless automatic back draft dampers are installed.

(11) VENT DUCTS ABOVE ROOF. Final delivery of all vent circuits shall be protected from weather, and shall be so located and constructed as to prevent contamination of air supply for or in any occupied area. Gravity vent ducts shall extend not less than 2 feet above the high portion of the roof or parapet wall, and shall be surmounted with an approved type of siphon roof ventilator.

(12) RELIEF VENTS. (a) The use of barometric relief vents is prohibited where exhaust ventilation is required for occupancies classified as (c) and (d) in Table 3.

(b) Barometric relief vents may be used to exhaust an air volume equal to the mechanical ventilation supplied for occupancies classified as (a) and (b) in Table 3.

(c) Where barometric relief vents are installed on the roof, the discharge opening shall not be less than 2 feet above the roof.

(13) FIRE DAMPERS AND FIRE DOOR ASSEMBLIES. (a) Where heating and ventilating ducts pass through required fire-resistive walls or floor systems, such ducts shall have approved fire dampers or fire door assemblies installed in the approved tested position and located at the point where the ducts pierce the walls or floor systems. Ducts shall be protected according to the following conditions:

1. For construction requiring a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

a. If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. For construction requiring a fire-resistive rating of not less than 1½ hours up to ratings not more than 2 hours, the damper or door shall be rated not less than 1½ hours.

3. For construction requiring a fire-resistive rating of 3 or 4 hours, the door assembly shall be rated not less than 3 hours.

4. Access panels shall be provided next to damper or door assembly to permit viewing and servicing.

Note #1: Special attention should be given to design and installation of equipment where highly corrosive conditions exist.

Note #2: See Wis. Adm. Code Chapters 50 through 57 for fire-resistive rated construction.

5. No openings will be permitted in fire-resistive rated doors unless such door assemblies satisfy the requirements of Ind 51.047.

6. Fire dampers are prohibited in kitchen exhaust ducts where combustion-supporting grease deposits can accumulate unless approved kitchen hood assemblies including fire dampers and extinguishing systems are used.

Note #1: The department will accept those hoods and systems approved by Underwriters' Laboratories.

Note #2: The above includes those exhaust ducts serving ranges, broilers, fryers and griddles, for example, but does not include such equipment as dishwashers and steam kettles.

(b) Where heating and ventilating ducts terminate after penetration of required fire-resistive walls or floor systems, such duct openings shall be protected by approved fire dampers or fire door assemblies installed in the approved tested position and rated to satisfy one of the following conditions:

Note: The above includes transfer grilles, combustion air intakes, and supply and return air ducts.

1. Where construction of enclosure must satisfy a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

a. Exception: If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. Where construction of enclosure must satisfy a fire-resistive rating of one and one-half (1½) hours or two (2) hours, the damper or fire door assembly shall be rated not less than one and one-half (1½) hours.

3. Where construction of enclosure must satisfy a fire-resistive rating of three (3) or four (4) hours, the fire door assembly shall be rated not less than three (3) hours.

Note: The department will accept listed fire damper and fire door assemblies tested by a nationally recognized testing laboratory and the systems recommended in publications of Sheet Metal, Air Conditioning Contractors National Association, Inc. and National Fire Protection Association Bulletin No. 90A.

(c) Exceptions: Fire damper or fire door assemblies are not required in (a) where

1. Maximum duct area does not exceed 20 square inches.
2. Duct serves as an exhaust for kitchen range hood.

History: Cr. Register, January, 1965, No. 109, eff. 2–1–65; r. and recr. Register, September, 1973, No. 213, eff. 10–1–73.

Ind 59.70 Volume dampers and deflectors. Necessary volume dampers, splitters and deflectors shall be provided in all ducts to permit accurate balancing of the system. The dampers, splitters and deflectors shall be adjusted to satisfy the heating and ventilating requirements of the conditioned space and locked in place.

History: Cr. Register, January, 1965, No. 109, eff. 2–1–65.

Ind 59.71 History: Cr. Register, January, 1965, No. 109, eff. 2–1–65; r. Register, September, 1973, No. 213, eff. 10–1–73.

Ind 59.72 Equipment location and protection required. Heating and ventilating equipment in gymnasiums, play rooms and similar occupied areas shall be fully recessed, and protected, or located not less than 7 feet above the floor. Heating and ventilating equipment shall not block any part of the required aisles, passageways and corridors.

History: Cr. Register, January, 1965, No. 109, eff. 2–1–65.

Ind 59.74 Piping. (1) PIPE SIZES AND ARRANGEMENT. All steam and hot water supply and return piping, air-line piping and auxiliary equipment shall be of appropriate sizes, elevations and arrangements in accordance with standard engineering practice to accomplish the calculated services in practical operation, without undue noise, stress or other detriment.

(2) EXPANSION AND CONTRACTION. The piping for heating system shall be equipped with anchors, expansion swings or joints, supports and similar devices to relieve stress and strains caused by temperature change of the pipe material.

(3) PIPE INSULATION. Steam, hot water supply and return piping in occupied areas shall be covered with not less than ½ inch insulating material, where the heat emission is objectionable or where piping is subject to freezing.

Note: For additional requirements see Wis. Adm. Code section Ind 52.13.

History: Cr. Register, January, 1965, No. 109, eff. 2–1–65.

Ind 59.75 Refrigerants. The rules covering the use of refrigerants as a function of air conditioning systems shall conform with Wis. Adm. Code chapter Ind 45 (Mechanical Refrigeration).

APPENDIX A

The following notes, bearing the same number as the text of the building and heating, ventilating and air conditioning code to which they apply, contain useful explanatory material to clarify the referenced definitions and rules.

A-51.01 (12) BUILDING. The intent was to consider permanent awnings as part of a building.

A-51.01 (42) FAMILY. The intent of this definition is to clarify the use of the word "family" in reference to subsection Ind 57.001 (2) (a); it is not intended as a variance to requirements stated under Ind 57.001 (2) (b).

A-51.01 (67a) HABITABLE ROOM. It is the intent that rooms designated as recreation, study, den, family room, office, etc. and providing the only space for living and/or sleeping are considered habitable rooms.

A-51.01 (115) SETBACK. The intent was to not include gutters, downspouts, outdoor lighting fixtures, signs and similar attachments as parts of a building.

A-51.01 (121) STORIES, NUMBER OF. For further clarification, refer to A-51.02 (14).

A-51.01 (144) WALL (DIVISION).

(a) *Building division wall* is intended to denote a wall constructed in a manner sufficient to meet requirements for a party wall [see "Wall (Party)"] and is acceptable as a dividing wall or enclosing wall when determining the volume of a building as referred to in sections Ind 50.10, 52.001 and 59.20. Also see Chapter A-E 2 of Wis. Adm. Code—Examining Board of Architects, Professional Engineers, Designers and Land Surveyors.

(b) *Fire division wall* is intended to relate to construction that provides separation between portions of a building to satisfy allowable floor area limitations, separation between 2 classes of construction, or separation of hazardous occupancies. For other separations, see "occupancy separations" and isolation of hazards sections of this code.

A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of Ind 51.01 (121) Stories, Number of.

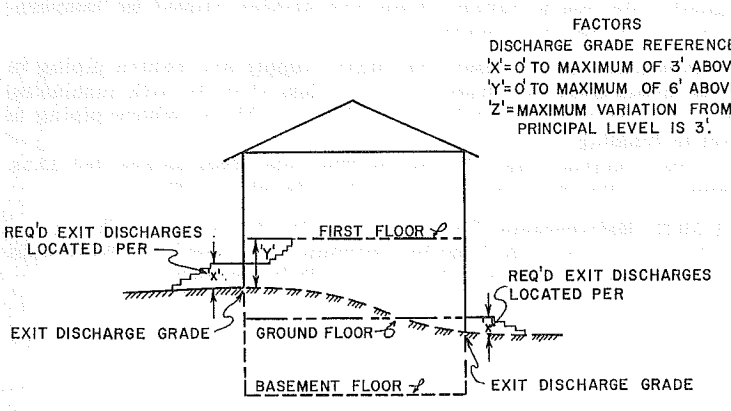

ILLUSTRATION SHOWING EXTREME ALLOWABLE CONDITION FOR FIRST FLOOR AND GROUND FLOOR
ILLUSTRATION A-1