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Guide on Sources of Ignition Where Dangerous Goods are Present

Contains Information on Hazardous Zoning
for Flammable Vapour Atmospheres



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FOREWORD

This information has been prepared to give dangerous goods inspectors some fundamental information on the regulatory requirements regarding the prohibition of sources of ignition in areas where flammable vapours may be present. The guide explains the role of an inspector in connection with the delineation of hazardous areas and broadly outlines factors which affect their final classification. Persons who have not had any experience in handling situations where classifications are required should not get involved without first having received training or assistance.

Information contained in this publication certainly is not going to make anybody an expert or fully competent in handling all situations. The material is fairly basic and so, therefore, not every situation may be easily answered just by reading the contents alone. It will be necessary for any reader to have some of the standards or codes listed in section 3. As well as understanding the dangerous goods legislation, a basic understanding of the properties of dangerous goods is also necessary.

Our aim as dangerous goods inspectors should be to prevent, as far as practical and humanly possible, any accidents occurring with dangerous goods. However, we know that it does not matter what legislation is in force, or how good enforcement is, there will always be incidents simply because of two main factors:

1. Human error, and
2. Mechanical failure.

We can have a myriad of safety requirements to try and eliminate mistakes, all the mechanical checks and certification possible to stop machinery failing, yet we still have explosion or fires where people are hurt or killed. All the rules under the sun are no substitute for simple common sense.

New Zealand's regulations were made with the benefit of local and overseas experience, and reflect most international standards. Given the current state of knowledge and technology, they go as far as possible to protect life and property while still making it economically viable to produce, manufacture, use, store and convey dangerous goods.

In arriving at decisions regarding the classification of areas, thought should be given to both safety and economics. Remember that there is a relationship between the two.



1. USE OF ELECTRICAL EQUIPMENT IN AREAS WHERE DANGEROUS GOODS ARE STORED OR USED (EXCLUDING MINING APPLICATIONS AND PETROCHEMICAL PIPELINES)

1.1 The Dangerous Goods Act 1974 charges the Chief Inspector of Dangerous Goods with the duty of carrying the Act into effect. The purpose of the Act is principally to protect the public against fire or explosion risk from those dangerous goods found in the schedule to the Act. The Act allows Government to make regulations in the interest of public safety where dangerous goods are stored, used, handled or exposed and conveyed. In order to eliminate risk of fire, threat of explosion or hazard which threatens the public safety, safety of any person or any property, there are many prescribed safety measures contained in both the Dangerous Goods (Class 2 - Gases) Regulations 1980 and the Dangerous Goods (Class 3 - Flammable Liquids) Regulations 1985. One very important feature to eliminate the possibility of an ignition of dangerous goods is to preclude any sources of ignition from within specified distances where dangerous goods or flammable vapours might be stored or used, depending on the class of dangerous goods present and the circumstances under which they are used.

1.2 Throughout both sets of regulations minimum distance for “sources of ignition” are prescribed.

Under the interpretations contained in respective sets of regulations, a source of ignition is defined as follows: means any agency capable of igniting a flammable gas, vapour, or other combustible substance, and includes a fire flame, spark, fuel lamp, and any electrical equipment of a type not approved for use in the particular location where flammable gas or vapour or combustible substance is or may be present.

2. ELECTRICAL INSTALLATIONS WITHIN HAZARDOUS AREAS

2.1 Role of Dangerous Goods Inspector and Electrical Supply Authority

Because the regulations lay down requirements limiting the presence of sources of ignition, the ultimate responsibility therefore lies with a dangerous goods inspector, before approving a proposal for a dangerous goods installation, to be satisfied that the regulations have been fully met. The inspector is obliged to ensure that where any electrical equipment is installed within the “precluded” area that the responsible electrical supply authority has approved the electrical equipment and circuits as being acceptable for use in a flammable area or atmosphere. Their responsibility then is for defining or prescribing distances where the presence of sources of ignition are prohibited and the electrical authority jurisdiction is normally limited to the approval or making sure the electrical apparatus installed within the hazardous area is suitable or correct for the type of location or assessment prescribed in terms of the provisions of the Electrical Wiring Regulations 1976.

2.2 Having clearly established what the respective roles are for the dangerous goods inspector and the responsible electrical supply authority, it is appropriate to explain that the Chief Inspector may approve standards or codes which recognise the principle of zoning into regions of differing degrees of hazard where there is any requirement limiting the presence of sources of ignition. This then allows suitably approved modified electrical installations and equipment to be installed in hazardous areas. The appropriate regulations which recognise electrical installations within hazardous areas are regulations 138 and 199 in the two previously mentioned sets of legislation.

2.3 Both regulations are worded as follows:

Where in these regulations there is any requirement limiting the presence of sources of ignition, that requirement may be modified in respect of electrical installations by applying the principle of zoning into regions of differing degrees of hazard in accordance with such standard specification or code as may be approved by the Chief Inspector, and installing within any such zone electrical equipment or circuits of such type and in such manner as may be approved by the responsible electrical supply authority as acceptable for that zone in terms of the provisions of the Electrical Wiring Regulations 1976.

2.4 We would expect a suitably registered electrical installer of the equipment to be conversant with the zoning principle and for the electrical supply authority to ensure that the zoning principle is adhered to. However, where there was any doubt or if advice was sought we would expect the dangerous goods inspector to give assistance in giving zonal classifications so to consequently limit presence of sources of ignition in defined hazardous areas. Having said this, it would not be necessary or indeed essential in all cases, for an inspector of dangerous goods to define every common situation when the zoning principle was applied. We will explain what codes the Chief Inspector has approved shortly but, before doing so, stress that specifications and codes are for



guidance and not every situation is clearly defined, appropriate, or reflect precise regulatory requirements. Therefore, in some instances there is indeed a need for flexibility having regard to all the circumstances. However, flexibility should not go as far that uniformity throughout the country is compromised or safety is prejudiced. Where there is any doubt on enforcement of a code, guidance should be sought from a departmental inspector.

3. APPROVED CODES

3.1 The following codes and standards are currently acceptable to the Chief Inspector:

1. AS 2430: Part 1
2. BS 5345: Part 1 to 12
3. NZS 5425: Part 1: 1980
4. MP 6105:1976 (for hazardous areas)

Note: certain sections are not applicable or appropriate.

(These documents are for hazardous area classification).

3.2 There are other codes which are acceptable and the approval of these are subject to the application and industry they are applied, for instance, the current Institute of Petroleum codes may be applied to large processing and refinery operations or smaller facilities.

4. PROTECTION FROM SOURCES OF IGNITION

4.1 Ideally, all electrical equipment should be installed outside of areas where flammable vapours or liquids are present, however, we know that this is not always practical so, therefore, it must be ensured that all electrical apparatus installed in hazardous vapour areas are suitable and are adequately protected in order to reduce the likelihood of an ignition. Not only should the approved electrical equipment be designed for a particular application but it should be installed and maintained in accordance with the measures recommended in the areas in which the equipment is located and operated. There are several methods of protection for electrical equipment and they are described adequately in the electrical wiring various codes of practice, so we do not need to go into this here.



5. FACTORS EFFECTING CLASSIFICATION OF AREAS

There are a good number of factors affecting the classification of an area where flammable liquids or vapours are present. These are:

5.1 What the regulations stipulate in regard to the minimum distances regarding sources of ignition and the class of goods present in the location, the quantity and method of containment, this leads onto the second point.

5.2 Flash Point of the Goods

The flash point of a substance is the lowest temperature at which a substance, when tested by a prescribed apparatus, liberates vapour at a rate sufficient to produce an explosive mixture with the air that is in immediate contact with the substance.

5.3 Explosive (Flammable) Limits

All combustible gases and vapours are characterised by explosive (flammable) limits between which the gases or vapour mixed with air is capable of sustaining the propagation of flame and therefore explosion.

The limits are called the lower explosive (or flammable) limit (LEL) and the upper explosive (or flammable) limit (UEL) and are usually expressed as percentages of the material mixed with air by volume.

5.4 Ignition Temperature (Auto-Ignition Temperature)

The ignition temperature of a substance is the minimum temperature under prescribed test conditions at which the substance will ignite and sustain combustion when mixed with air at normal pressure, without initiation by a spark or flame. Electrical equipment can be subject to a system of classification by which it is allocated one of six temperature classes according to its maximum surface temperature, see page 197 table 31 in MP 6105:1976.

MAXIMUM SURFACE TEMPERATURE OF ENCLOSURE

1	2
Class	Maximum surface temperature °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85



- 5.5 Rate of release of vapour to the atmosphere — this is self-explanatory.
- 5.6 Ventilation in the area where vapour may be present.
- 5.7 Credibility or possibility of release of vapour whereby the LEL is reached.
- 5.8 The location of the installation and the physical features which surround it, i.e. the construction and location of walls, roofs or canopies.

6. FUNDAMENTAL SAFETY CONSIDERATIONS

Ideally, storage or processing should eliminate as much as possible release of flammable vapours to the atmosphere and where this cannot be achieved ventilation systems should be employed to discharge vapours well away from an approved electrical equipment. Ventilation discharge ducts shall be in a position in the open air and vent openings must not be situated within a position where discharge will be close to any opening within a building. Ventilating systems or natural ventilation are important when giving consideration to the hazard which may exist. Systems installed in any area shall ensure that under normal working conditions the concentration of vapours will not exceed 25 percent of the lower flammable limit of those vapours.

Three basic conditions are necessary for a fire or explosion. These are:

- (a) a flammable gas or vapour must be present;
- (b) it must be mixed with air in the proportions required to produce a flammable or ignitable mixture. Further, there must be a sufficient amount of the mixture around the source of ignition to sustain the ignition; and
- (c) there must be an ignition of the mixture; the electrical equipment must be capable of releasing incendiary energy.

Ideally, storage or processing should eliminate as much as possible release of flammable vapours to the atmosphere and where it is not practical to do so ducts vents or pipes should discharge vapours well away from unapproved electrical equipment.

Fire and explosion cannot occur without a source of ignition, i.e. by excluding sources of ignition around dangerous goods, we eliminate the possibility of fire and/or explosion.

6.1 Restriction on Sources of Ignition for Dangerous Goods Locations as Detailed in the Regulations

6.2 Dangerous Goods (Class 3 - Flammable Liquids) Regulations 1985.

6.3 Regulation 5: Rules relating to conveyance, loading and delivery.

- (a) No person shall smoke and no source of ignition shall be allowed on any vehicle conveying the dangerous goods, nor shall a source of ignition be permitted within 8 m of any place where the dangerous goods are being conveyed or handled.



- 6.4 Regulation 20: Restrictions on taking tank wagon into building.
- Ic (iii) Immediately before delivery the vehicle to the person in charge of the building, the driver or some other representative of the owner has obtained from that person a written undertaking that the load tank will be kept closed and that no source of ignition will be brought or permitted to be present within 8 m of the load tank but for this purpose any electrical fittings or wirings shall not be a source of ignition if the electricity supply to them has been disconnected.
- 6.5 Regulation 22: Restrictions in respect of smoking, sources of ignition and passengers.
- (L) No person shall smoke or allow any source of ignition in the vicinity while attending to any rail tank car or tank wagon or tank trailer (including a towing vehicle), which is or has been carrying dangerous goods of class 3(a), unless the load tank or tanks of the rail tank car or tank wagon or tank trailer has been effectively free of flammable liquid or vapour by an approved method.
- 6.6 Regulation 31: Rules as to storage of dangerous goods of Class 3(a) and Class 3(b) otherwise than in bulk.
- (k) No explosive, or article or substance liable to spontaneous ignition or source of ignition shall be placed, brought, or allowed to remain within 15 m of any depot or dangerous goods in any premises, unless the depot or dangerous goods are separated from the explosive, article or substance or source of ignition by a screen wall but in the case of dangerous goods of Class 3(b) the distance from any source of ignition shall be not less than 6 m.
- 6.7 Regulation 33. Requirements for certain storage depots for Dangerous Goods of class 3.
- (g) No artificial light or other fittings or equipment which could be a source of ignition shall be installed inside the depot.
- 6.8 Regulation 41: Inspector may approve storage of dangerous goods of Class 3(b) or 3(c) other than in a depot.
- (d) No other dangerous goods or highly combustible material shall be stored or brought within 6 m of the containers and no source of ignition shall be permitted within 6 m of the containers, unless a screen wall intervenes between the containers and the other dangerous goods, highly combustible material or source of ignition.
- 6.9 Regulation 48: Protection of underground tanks.
- (2) Where any premises, or any part thereof, have been fenced in accordance with the provisions of subclause (1) of this regulation, the occupier of those premises shall not permit matches to be taken into the area so fenced, nor allow any smoking within that area, nor permit the introduction of any source of ignition into that area, except in such buildings as may be specially set apart for that purpose; and suitable notices to this effect shall be conspicuously posted on the premises by the occupier.



6.10 Regulation 51: Ventilating pipes.

- (1) Every underground tank for the storage of dangerous goods of Class 3 shall be fitted with a ventilating pipe of not less than half the diameter of the filling pipe and of such size as to prevent unsafe pressures developing.
- (2) The ventilating pipe shall terminate in the open air in such a position that flammable vapours will not accumulate or travel to an unsafe position, but in no case shall it terminate less than 4 m above the ground nor less than 1m from any opening into a building, which opening shall be of such design as to prevent the entry of water and shall be covered with brass wire gauze of 500 microns nominal aperture size, secured in such a manner as to allow removal for inspection and cleaning.
- (3) Notwithstanding subclause (2) of this regulation, the ventilating pipe from an underground tank for the storage of dangerous goods of Class 3(c) need only terminate at such height and in such location as to prevent the entry of foreign matter into the pipe.

6.11 Regulation 52: Filling pipes.

- (1) The filling pipe of any underground tank for storage of dangerous goods of Class 3 shall be carried to an approved position in the open air, and both the filling pipe and the dipping pipe shall be sealed with approved vapour tight caps and shall remain sealed except as may be required during the transfer of product to or from the tank.
- (2) The opening of every filling pipe and the opening of every dipping pipe shall, where necessary, be so protected by suitably supported metal covers or by any other approved methods so that the tank cannot be damaged by traffic or by any other source of mechanical injury, and shall be located so that water cannot overlie the opening except in the event of flooding in the locality.
- (3) Filling pipes shall be identified in the manner prescribed in regulation 14(1) of these regulations so as to indicate the particular class of dangerous goods that is stored in the tank.
- (4) Every filling pipe shall be identified in such a manner that the person filling the tank can easily ascertain to which tank it belongs.

6.12 Regulation 57: Bulk deliveries.

- 2(a) The removal of any such dangerous goods from an underground tank by pumping into a tank wagon to enable the tank to be repaired or examined, if an approved pump is used and due precautions are taken to exclude sources of ignition.

6.13 Regulation 71: Protection of tanks against fire.

- (1) Except as otherwise provided in the regulations, no person shall bring or allow any source of ignition within 6 m of any above ground tank used for the storage of dangerous goods of Class 3(b) or Class 3(c) or within 15 m of any above ground tank used for the storage of any dangerous goods of Class 3(a).



- (4) In any case where, for the purpose of the maintenance or erection of new equipment or for any similar purpose, it is necessary to bring any source of ignition into an above ground tank depot for the storage of dangerous goods of Class 3, or to use tools and equipment that constitute a source of ignition, that source of ignition or those tools and equipment may be brought within such area of the depot as may be necessary if the work is carried out in accordance with procedures and precautions approved by the Chief Inspector.

6.14 Regulation 79: Prohibition on smoking, etc.

No person shall smoke or bring any source of ignition or permit any person to smoke or bring any source of ignition within 3 m of the fuel tank of any motor vehicle while the tank is being filled with dangerous goods of Class 3(a).

6.15 Regulation 131: Use of dangerous goods at temperature equal to or above flashpoint.

Where dangerous goods of Class 3(a) are kept or used at temperature equal to or higher than the flashpoint of the dangerous goods, such goods shall, for the purpose of regulations (other than the licensing provisions), be treated as dangerous goods of Class 3(a) and the requirements of these regulations shall have effect as if such goods were dangerous goods of Class 3(a):

Provided that the isolation distance required to be maintained between dangerous goods of Class 3(a) and sources of ignition may be reduced by the licensing authority in the case of dangerous goods of Class 3(b) to such lesser distance as it considered appropriate by an inspector.

6.16 Regulation 149: Permission for use of dangerous goods of Class 3 otherwise than in dangerous goods workroom.

- (d) Notwithstanding regulation 151 of these regulations, no smoking or source of ignition shall be permitted within 15 m of the area where work involving the exposure to the atmosphere of a quantity of dangerous goods of Class 3(a) in excess of 30 litres is being carried out, unless the working area is protected by a screen wall.

6.17 Regulation 151: General provisions in respect of premises.

- (c) No person shall smoke or bring any source of ignition within 6 m of the machine, dip tank, or process container unless the area in which the dangerous goods are being used is protected by a screen wall.

6.18 Regulation 168: Location of drying machines.

Any approved drying machine or similar apparatus which is fully enclosed and properly ventilated direct to the open air and has no parts of fittings which could be a source of ignition and within which articles and goods which have been coated, wetted or impregnated with dangerous goods of Class 3(a) or Class 3(b) are placed for the purpose of drying out by evaporation may be located:

- (a) inside a dangerous goods workroom; or
- (b) if the machine or other apparatus is of fire-resisting construction to the satisfaction of an inspector, in some approved place other than a dangerous goods workroom.



6.19 Regulation 169: Other drying processes.

3f(1) The articles or materials to be heated shall first be subjected to an adequate “flash off” period to remove flammable vapours in such a manner as to prevent them coming on contact with a source of ignition and the ventilation shall be arranged to ensure that the concentration of vapour in the air will never exceed 25 percent of its lower limit of flammability.

6.20 Regulation 170: Isolation distances and other precautions.

(3) No person shall smoke in any dangerous goods workroom or in any portion of a building in which dangerous goods of Class 3(a) or Class 3(b) are used or within 6 m of the door thereof unless approval has been given for such door to remain open, or within 15 m of any outside container for the use of dangerous goods of Class 3(a) or within 6 m of any such container for the use of dangerous goods of Class 3(b) or bring into or permit to be present in a dangerous goods of Class 3(a) or Class 3(b) are used, any source of ignition for flammable vapour, nor bring or permit any source of ignition within those distance of 15 m or 6 m of any such outside container unless the container is protected by a screen wall.

(5) No person shall bring any source of ignition into any drying room or into the vicinity of any drying cabinet or oven or other place where articles or goods coated with dangerous goods of Class 3(a) or Class jib) are placed to dry, and no person shall permit any such source of ignition to be present in such areas or smoke or permit smoking in such areas.

6.21 Regulation 197: Repairs to used containers.

No person shall repair or cause or permit to be repaired any container which has held dangerous goods of Class 3, nor shall any person bring or permit any source of ignition to be brought into such container or so near thereto as to create a hazard, unless that container has first been cleared of all traces of dangerous goods and flammable vapour by an approved method:

Provided that this regulation shall not prohibit the carrying out of such servicing and repairs as will not create or involve a source of ignition and the work is carried out in accordance with conditions approved by an inspector.

7. DANGEROUS GOODS (CLASS 2 - GASES) REGULATIONS 1980

7.1 Regulation 31: Restriction on smoking and sources of ignition.

No person shall smoke or bring any source of ignition or permit any person to smoke or bring any source of ignition into any room or enclosed space where dangerous goods of Class 2(b) are stored or handled or within 8 m of any vehicle conveying such goods in bulk.



7.2 Regulation 32: Isolation distances.

(41) Isolation Distance for any Quantity:

Storage to be isolated from	For any quantity not exceeding 100m ³	Exceeding 100m ³ but not exceeding 500m ³	Exceeding 500 m ³
source of ignition	5 m	5 m	5 m

(4) Isolation Distance for any Quantity:

Storage to be isolated from	For any quantity not exceeding 100m ³	Exceeding 100m ³ but not exceeding 500m ³	Exceeding 500 m ³
Public places or source of ignition	3 m	3 m	3 m

(6) The isolation distance from any source of ignition to any dispensing point for compressed natural gas shall not be less than 3 m.

7.3 Regulation 33: use of dangerous goods of Class 2(b) for ripening fruit.

(h) No person will smoke in the room or chamber or bring or permit any fire or other source of ignition to be brought into the chamber, unless the chamber or room has been thoroughly ventilated and all flammable gas has been removed.

7.4 Regulation 46: Conveyance of dangerous goods of Class 2(d).

(d) No person shall smoke or allow any source of ignition in the vicinity of any rail tank or tank wagon or tank trailer (including any towing vehicle) which is or has been carrying goods of Class 2(d) unless the load tanks or the tanks of the tank wagon or tank trailer have been effectively rendered free of flammable liquid and vapour by an approved method.

7.5 Regulation 51: Repairs and servicing of vehicles.

(c) In the case of emergency repairs if the driver or other responsible representative of the owner remains with the vehicle until the repair is completed, the vehicle is not located where it can be subject to heating and if no source of ignition is permitted within 8 m of the load tank.

7.6 Regulation 53: Vehicle refuelling stations.

(h) No source of ignition is permitted within am of the dispensing point while refueling operations ace taking place.

7.7 Regulation 59: Restrictions in respect of explosives, sources of ignition, etc.

(i) Except in the case of flame resulting from the combustion of liquefied petroleum gas in approved equipment, no person shall place or bring any explosive or any article or substance liable to spontaneous ignition or combustion or any source of ignition that distance expressed in regulation 56 of these regulations as being minimum distance to be maintained from



a public place, of any place where dangerous goods of Class 2(d) are stored in cylinders or allow any such explosive, article, substance or source of ignition to be placed or brought within that explosive, article or substance or source of ignition by a screen wall:

Provided that nothing in this subclause shall apply to any vehicle picking up or setting down cylinders at a cylinder filling station.

7.8 Regulation 73: Isolation distances from sources of ignition.

A tank for the storage of dangerous goods of Class 2(d), or the valves or filling or discharge connections of any such tank, shall not be located closer to a source of ignition, nor shall any person bring or permit any source of ignition to be brought closer to the tank is required to be isolated from a public place in accordance with regulation 71 of these regulations.

Regulation 71: Isolation distances from protected works and public places.

(1) Except as provided in subclauses (4) and (5) of this regulation, every above ground storage tank for dangerous goods of Class 2 (d) shall be isolated from protected works and public places by not less than the distances specified in the table in subclause (2) of this regulation.

Provided that for tanks of capacities intermediate between the capacities specified the distances shall be adjusted proportionately.

(2) The table referred to in subclause (1) of this regulation is as follows:

Water capacity of tank	Isolation from protected works - not less than	Isolation from public places - not less than
Litres	Metres	Metres
Up to 500	2	2
1,000	3	3
5,000	8	5
10,000	11	7
20,000	15	9
50,000	17	10
100,000	21	12
200,000	28	14
over 200,000	AB required by the Chief Inspector	

7.9 Regulation 76: Restriction on use of vaporisers.

(2) Except as may be approved by the Chief Inspector, no vaporiser that is directly fired or could be a source of ignition for flammable gas shall be located closer than:

(a) 15 m from any tank used for the storage of dangerous goods of class 2(d) or any filling connection for that tank or from any protected work or public place where the capacity of the vaporiser is greater than 500 litres per hour; or



(b) 8 m where the vaporiser is of lesser capacity.

7.10 Regulation 136: Repairs to used containers.

No person shall repair or cause or permit to be repaired any container that has held dangerous goods of Class 2, nor shall any person bring or permit any source of ignition to be brought into any such container or so near as to create a hazard, unless that container has first been cleared of all traces of dangerous goods and flammable vapour or gas by an approved method:

Provided that this regulation shall not prohibit the carrying out of servicing and repairs as will not create or involve a source of ignition or if the work is carried out in accordance with conditions approved by an inspector.

8. THE ZONING PRINCIPLE

It has already been pointed out that there are a number of factors effecting the classification of areas. In addition to these, there are other characteristics to take into account, these are:

- 8.1 the physical characteristics of the dangerous goods. This can be described as either vapour properties or densities, whether the vapours are heavier or lighter than air;
- 8.2 whether the dangerous goods are liquids or gases;
- 8.3 pressures at which the dangerous goods are contained.
- 8.4 A careful study of all the relevant facts must be made in order to assess the hazard which may exist. For example heavier than air gases tend to spread out at low levels and remain at lower levels if there is no air movement. Vertical heights need not be afforded the same attention as when dealing with a lighter than air gas which will rise, for example take a look at the different properties of petrol and CNG.

8.5 Probability of Presence

For the purposes of prescribing or delineating of hazardous locations most codes recognise three principal zones according to the duration of the presence of explosive gas-air mixtures, i.e. continuous, frequent to intermittent, not likely or for short duration.

- 8.6 These conditions are described in the British Standard BS 5345 MP 6105 or AS 2430:1982 - Part I as follows:
 - 8.6.1 Zone 0 (BS 5345): Class I Zone O (MP 6105):

These areas will be generally in those which an explosive gas/air mixture is continuously present for long periods.
 - 8.6.2 Zone 1 (BS 5345); Class I Zone I (MP 6105):

Are areas where explosive gas/air mixtures exist intermittently or periodically or under leakage conditions.
 - 8.6.3 Zone 2 (BS 5345); Class I Zone II (MP 6105):



Are areas where an explosive gas/air mixture is not likely to occur under normal operation and if it does occur will only exist for a short time.

- 8.7 In so far as the dangerous goods inspector is concerned the formal classification of a hazardous area can only extend to what the statutory regulations prescribe in respect of isolation from sources of ignition.

9. CLASSIFICATION OF AREA

Obviously not every situation can be exemplified in the standards nor could we describe them all in one document. However, the following examples are given of the more common situations, reference should be made to either AS 2430:1976, or MP 6105.

9.1 Fuel Dispensing (Located in Outside Locations)

9.1.1 Class 3(a) Dispenser (Petrol)

- (a) Zone I: Class I Zone I

The dispenser: the area including rooms and buildings not suitably separated extends vertically 1.2 m from the base of the pump and extends 3 m horizontally around the dispenser.

In addition, the area extends around the dispensing point: vertically 1.2 m from the ground extending 3 m horizontally.

Equipment which is installed above the hazardous area which may produce sparks or hot material to fall within the hazardous area shall be suitably protected to prevent any hot material from falling into the area. (See figures 1 and 1A).

- (b) The Zone 2 or Class I Zone II area delineated in MP 6105, AS 2430 Part I, 1976, is outside the "source of ignition" minimum isolation distance laid down in the regulations so delineation is not mandatory under the Dangerous Goods Act. Note that this area extends out to 8 m from the pump and extends 0.45m above ground level in the standards.

9.1.2 Class 2(d) Dispenser (LPG)

The same conditions apply as for class 3(a). (See figures 1 and 1A)

Rotating Joints

Note that where a pump was designed so that radial arm joints were incorporated to the cabinet and the nature of design was such and it was thought there was a potential source of leakage, then it shall be necessary to classify the inside of the pump as Zone 1 or Class I Zone I.

9.1.3 Class 2(b) Dispenser (CNG)

Zone 1- Class I Zone I;

Dispenser: the area extends vertically and 3 m horizontally (see figures 2 and 3).



Dispensing point: the area extends 3 m vertically, taken from ground level, and extends horizontally.

Damage to light fittings: because of the possibility of a CNG dispensing nozzle damaging standard light fittings should it accidentally disconnect during the filling procedure (hose whip) any such fittings within the radius of the end of the dispensing hose shall be protected in an approved manner. Polycarbonate or armoured glass lenses are suitable.

NOTE:

- (1) Zonal classification distances in the above cases are greater for Zone 1, Class I Zone I than prescribed in various standards because of regulatory distances required for sources of ignition are greater.
- (2) Designated refuelling areas: where vehicle refuelling areas are fixed or marked and it is quite clear that vehicles may only be refuelled in that area the Zone 1 Class I Zone I location shall only be considered for the extent of this area and not for the extent of the traverse distance of the hose.
- (3) Petrol and LPG dispensers do not require physical separation, (see figure 5).
- (4) See figure 6 concerning situation where LPG and LPG pumps are installed within 3 m radius of a CNG dispensing point but are fitted with suitably physically protected equipment.

9.2 Storage of Dangerous Goods

9.2.1 Class 3(a) and (b) Otherwise than in Bulk Storage: (Tins and drums, containers not exceeding 250 ltrs capacity).

- (a) Type A Depot: (Drums decanted from). Zone 1 or Class I Zone I: Within the distance of 1 m above the top of drums and 3 m laterally.
- (b) Zone 2 or Class I Zone 2: Extends 0.5 m vertically above the Zone 1 or Class I Zone I area and 2 m beyond the above mentioned zone laterally.
- (c) Type A Depot (Drums under seal). Zone 1 or Class I Zone I: within the distance of 1 m above the top of the drum and 3 m laterally.
- (d) Types B, C, D or E Depot (drums under seal). Zone 1 or Class I Zone I shall extend inside the depot.
- (e) Zone 2 or Class I Zone II shall extend outside to a height of 1.5 m above ground level and 3 m laterally from any opening in a building or storage depot.
- (f) Types B, C, D or E (drums otherwise than under seal). Zone 1 or Class I Zone I: the entire interior of the depot.
- (g) Zone 2 or Class I Zone II: shall extend outside the depot to a height of 1.5m above ground level and laterally 5 m from any opening within a building.
- (h) In particular, refer to regulations 31, 33 and 41 of the Dangerous Goods (Class 3 - Flammable Liquids Regulations) 1985 when delineating any areas mentioned above.



9.2.2 Class 3(a) and (b) in Standard Bulk Storage Tanks.

(a) Above ground (without floating roof).

1. Zone 1 or Class I Zone I:

The area surrounding the tank 3 m vertically above the tank and extending laterally to 3 m from the shell, reducing 5 m above ground level and extending laterally from the shell to the bund wall, or to 6 m, whichever is further.

2. Zone 2 or Class I Zone II: to a height of 1 m beyond the Zone 1 or Class I Zone I area extending 8 m to a maximum of 15 m depending on the capacity of tank.

(b) Underground

1. Zone 1 or Class I Zone I: Within space 1.5 m above and below and 1.5 m laterally from ventpipe outlet.

2. Zone 2 Class I Zone II: Pit within 3 m of pipes connected to tank.

Pit within 8 m horizontally and 1 m above fillpipe of tank.

Within space from ground level to 1.5 m below ventpipe outlet and extending laterally 1.5 m from ventpipe and 5 m below termination of ventpipe.

Within space to 0.5 m above ground level and 3 m laterally from fillpipe opening (see regulations 51 and 52 (Class 3 Flammable Liquids Regulations 1985).

9.2.3 Class 2d (LPG) Storage

(a) Cylinders, filling and storage:

As laid down in AS 2430:1982 - Part 1, or MP 6105:1976.

(b) Above ground storage tanks:

As laid down in AS 2430:1982 - Part 1, or MP 6105:1976

NOTE: There are slight differences in distance quoted between the two documents, which do not amount to compromising safety, therefore both codes are acceptable (lesser of distances shall apply).

9.2.4 Class 2(b) CNG Storage

As laid down in NZS 5425:1980 - Part I.



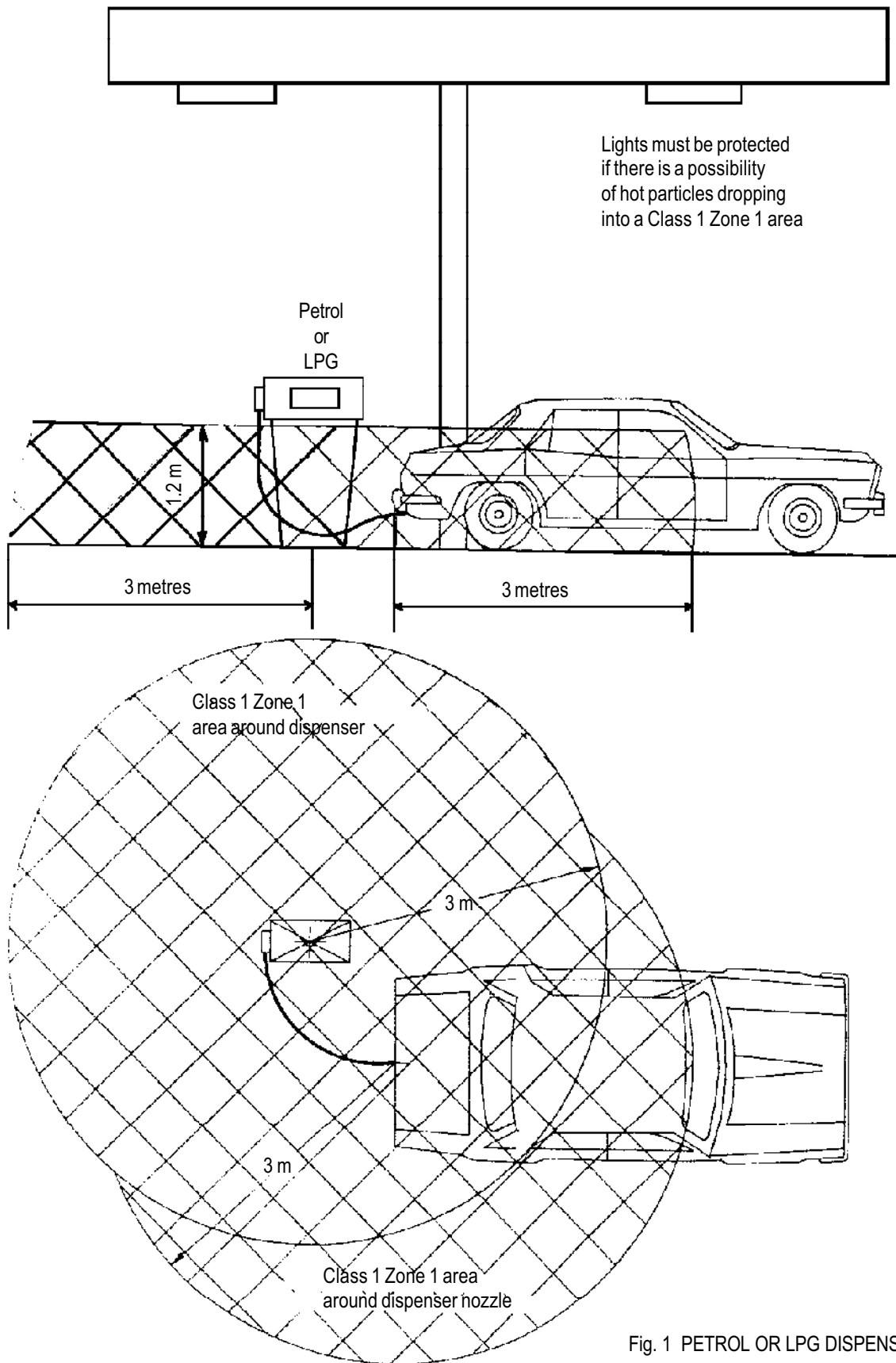


Fig. 1 PETROL OR LPG DISPENSER



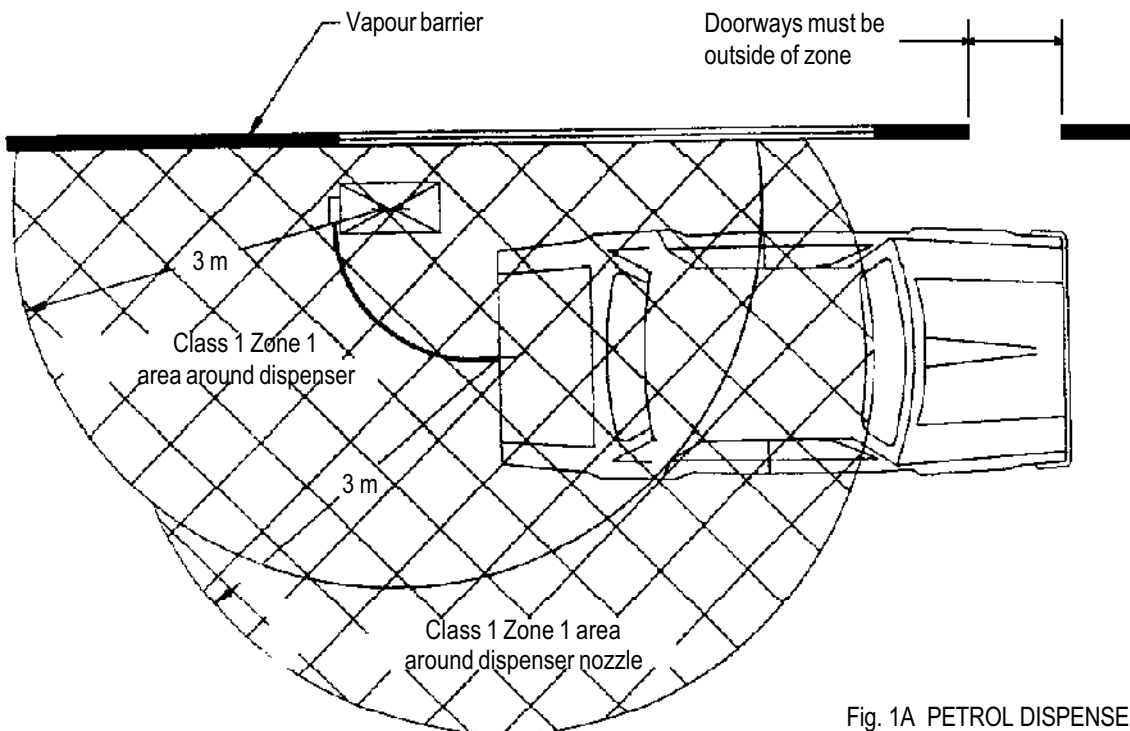
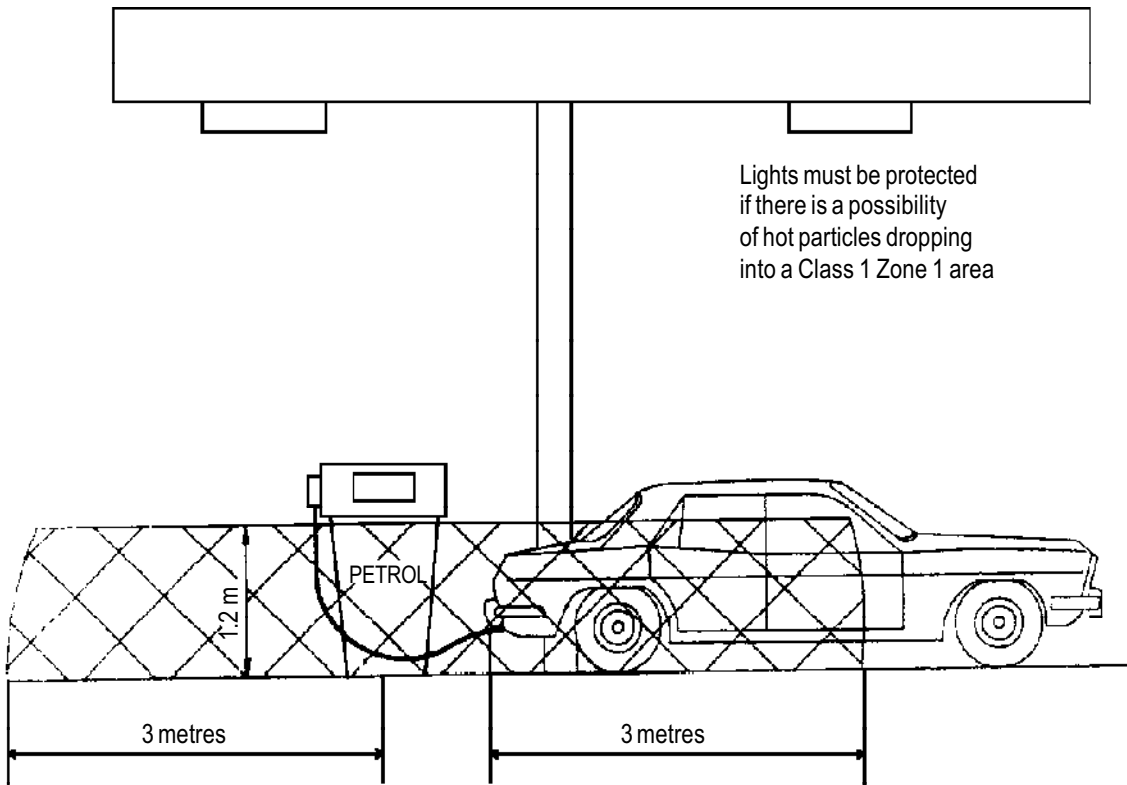


Fig. 1A PETROL DISPENSER



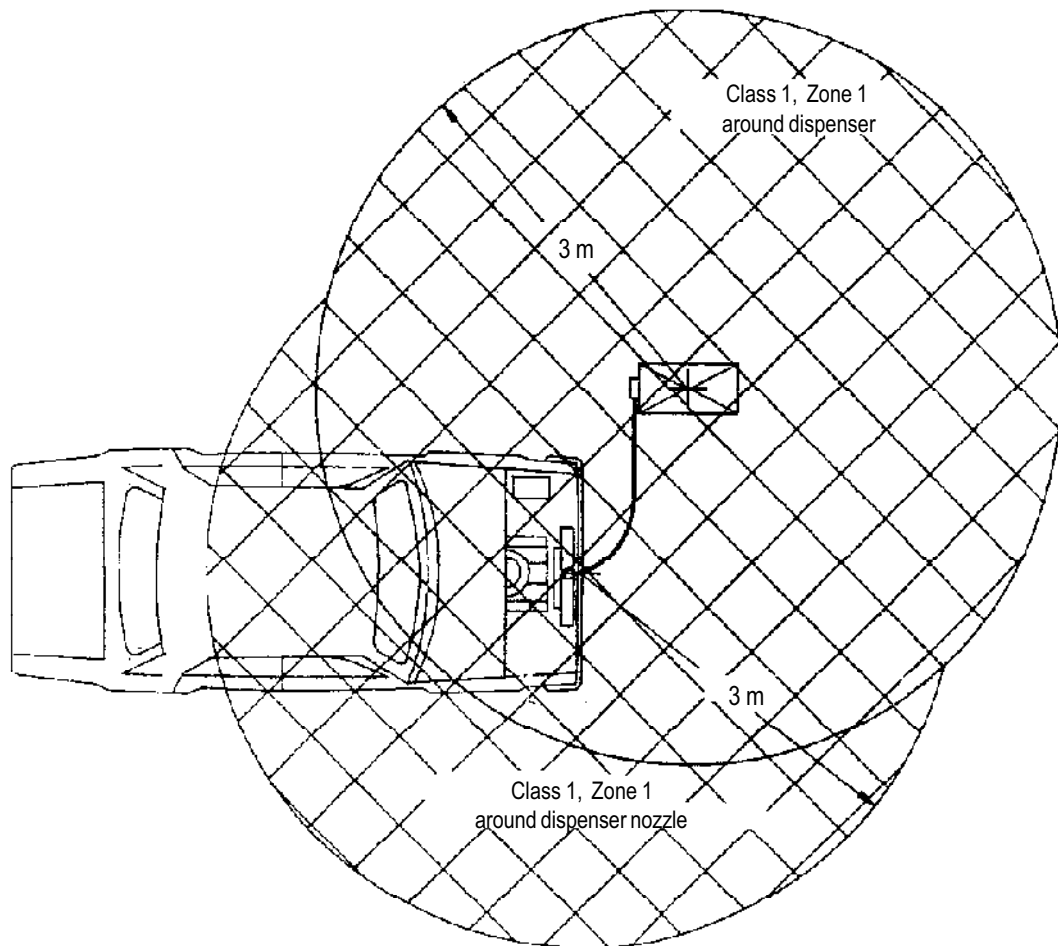
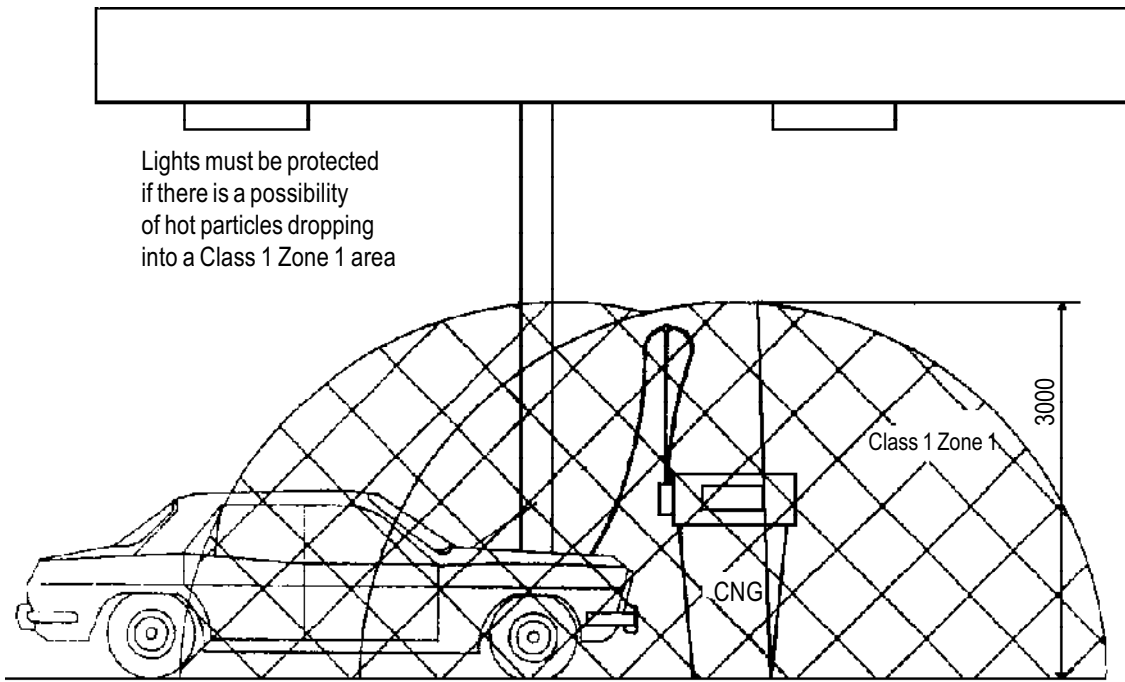


Fig. 2. CNG DISPENSER

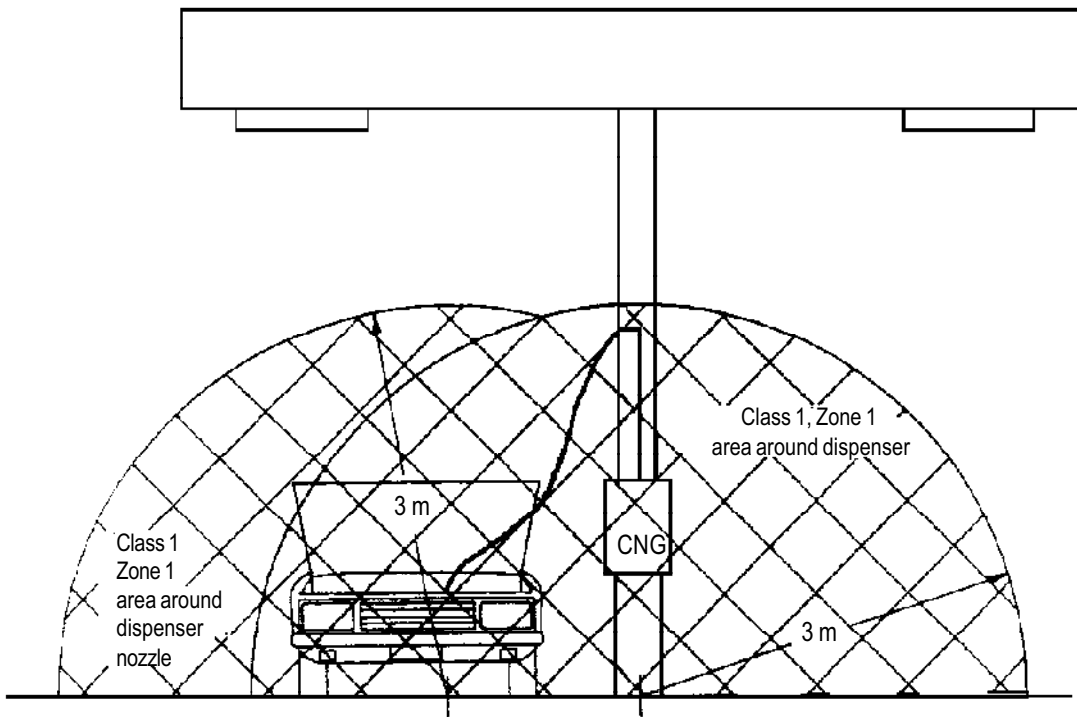
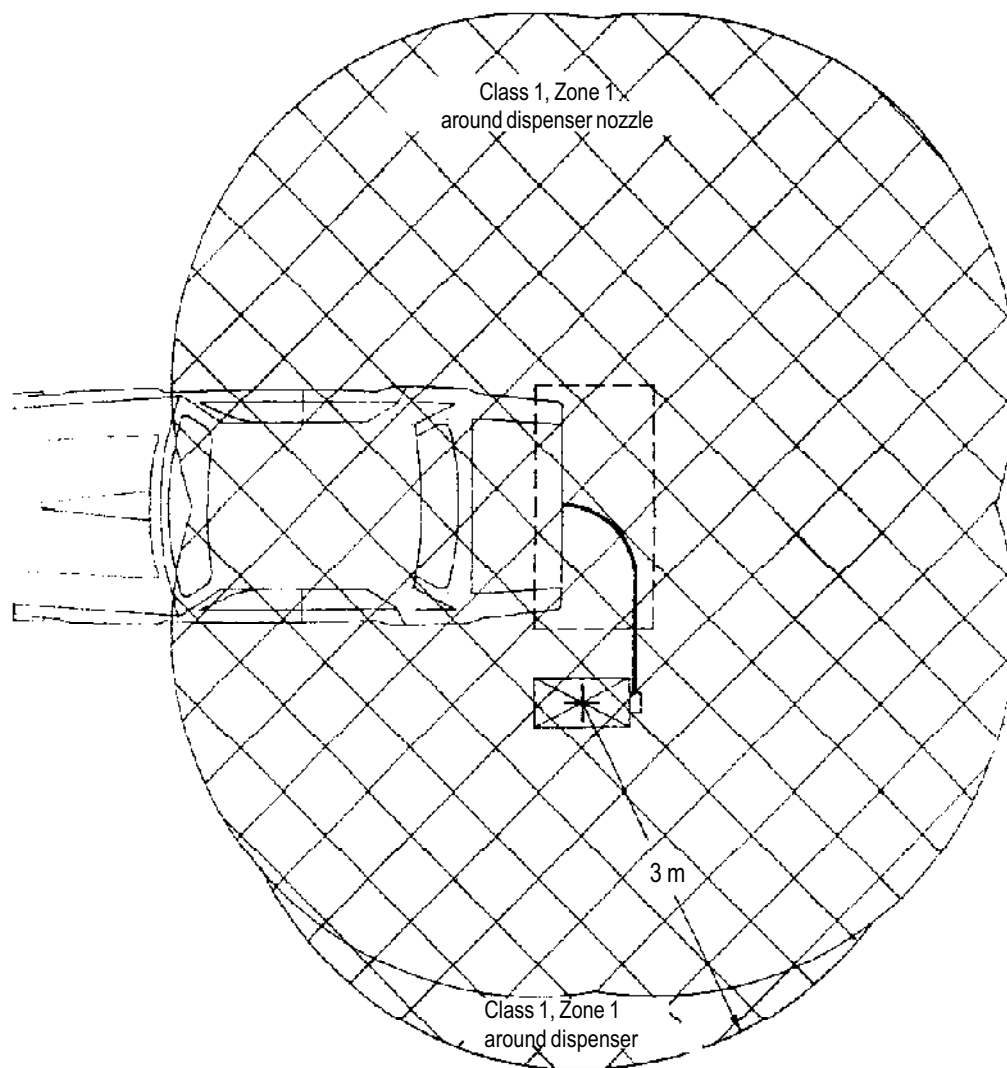


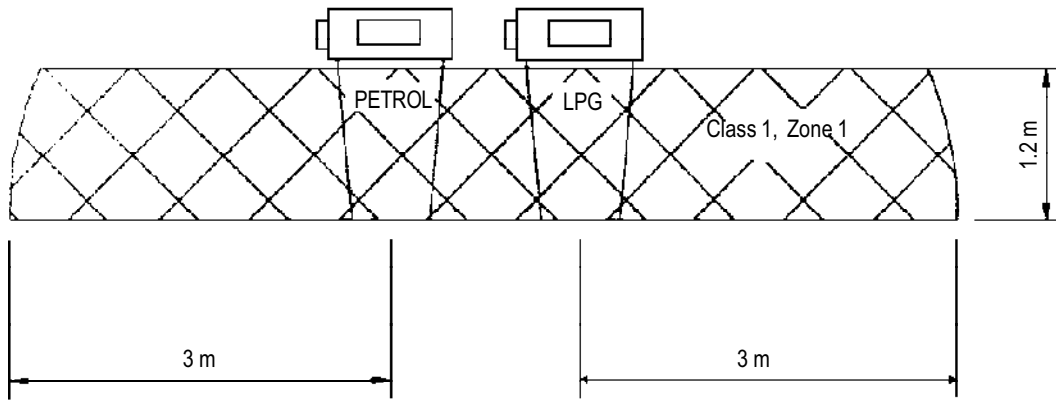
Fig. 3



Where a specific area for dispensing fuel is clearly marked on the forecourt, the Class 1, Zone 1 hazardous area may be by definition from the boundaries of that marked area rather than from the extent of the hose arc.

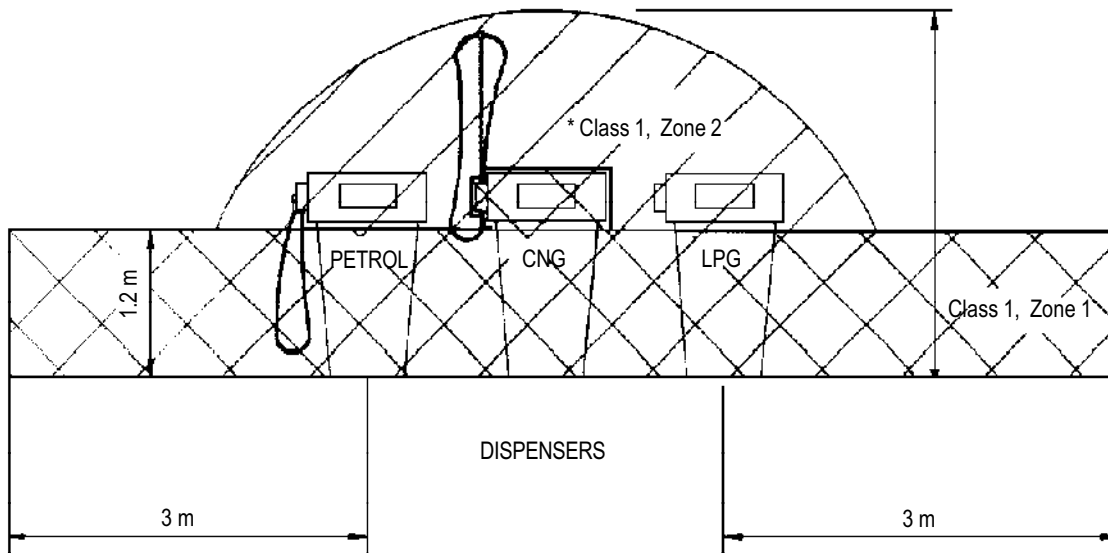
Fig. 4 SPECIFIC DISPENSING AREA





NOTE: Petrol and LPG dispensers do not require specific physical separation

Fig. 5



* Where petrol and LPG pumps are installed within the 3 m radius of a CNG dispensing point, the area above 1.2 m of the pumps shall be considered to be Class 1, Zone 2 where the electrical equipment, such as cash preset pads, light points and pump island lighting are approved as being suitably physically protected by the Chief Inspector and conforms with the Wiring Regulations 1976.

Fig. 6

