

FIRE PROTECTION + RESIDENTIAL SMOKE ALARM SYSTEM

TO ALARM THE OCCUPANTS OF THE BUILDING IN THE EVENT OF FIRE BREAKS OUT.

- SMOKE DETECTOR

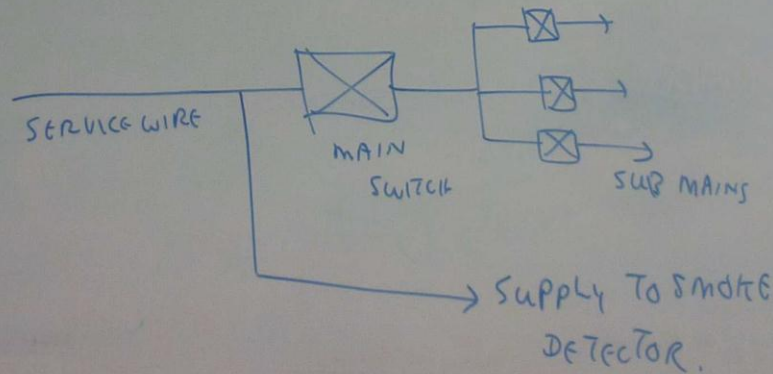
- DETECT THE SMOKE
- SOUND THE ALARM

- SPRINKLER SYSTEM

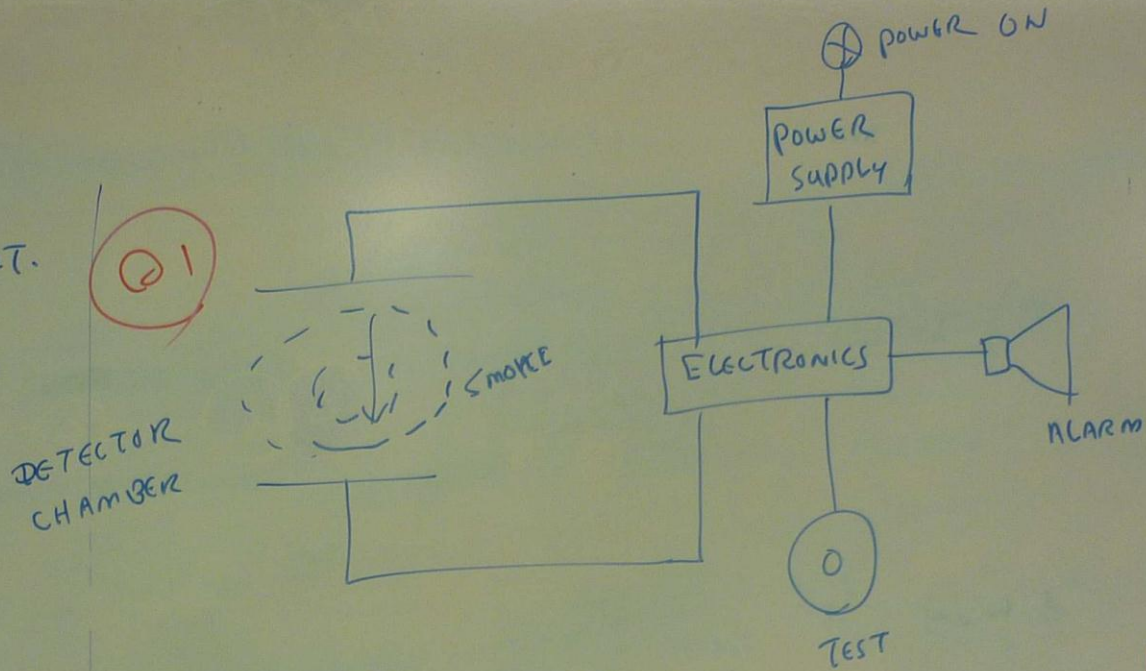
- SMOKE / HEAT DETECTION + AUTOMATIC WATER SPRAYING

- DIRECT ELECTRICAL SUPPLY TO SMOKE DETECTOR
WHICH CAN NOT BE INTERRUPTED BY MAIN SWITCH

Q4



Q1.



WHEN FIRE BREAKS OUT, THE SMOKE CONTAINING THE CARBON PARTICLES ENTERS SMOKE DETECTOR CHAMBER, ELECTRIC CURRENT PASSES THROUGH AND THE SIGNAL IS AMPLIFIED TO SOUND THE ALARM.

- CARBON PARTICLE DETECTOR
- LIGHT DETECTOR

IONIZATION
SMOKE
DETECTOR

LOCATION OF SMOKE DETECTORS

Q2

- CLOSE TO BED ROOMS
- TOP OF STAIRS
- OUTSIDE BED ROOMS

IONIZATION SMOKE
DETECTOR

IN KITCHEN - THERMAL SMOKE DETECTOR

AVOIDANCE

Q3

AVOID LOCATING SMOKE ALARMS IN AIR STREAMS WHICH MAY CARRY SMOKE PARTICLES

LIMITATION

Q3

AVOID TO INSTALL SMOKE ALARM IN KITCHEN (UNLESS THERMAL SMOKE ALARM IS USED)

- IN BATH ROOM,
- IN GARAGE
- AT VERY HUMID AREA
- FIRE PLACE

3 m FROM BATH ROOM

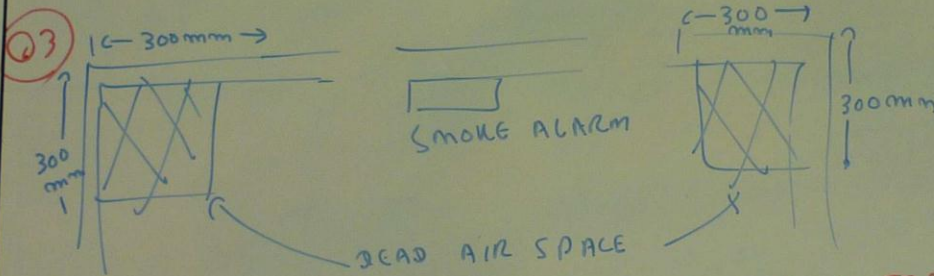
6.5 m FROM GAS

HEATER

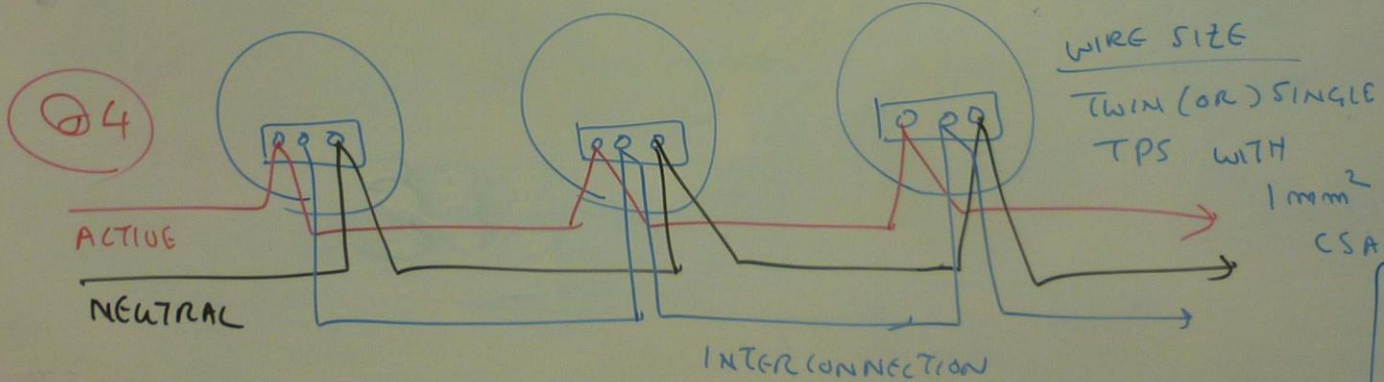
WIRING

SMOKE ALARM IS CONNECTED TO ANY CIRCUIT WHICH IS ENERGIZED 24 HR/DAY

AVOID TO INSTALL THE SMOKE ALARM AT DEAD AIR SPACE



BCA CODE — BUILDING CODE OF AUSTRALIA



Q5

AS 3000

4.6

Smc

4.7

Q5

AS 3000 : 2007

SECTION (4)

4.6 (PAGE 195 → 199)

↳ 4.11

SMOKE DETECTOR / HEATER INSTALLATION RULES

4.7.1 ALL COOKING APPLIANCES ARE TO BE PROVIDED WITH SWITCH

4.6 REFER B.C.A

NATIONAL BUILDING CODE
LOCATION / NUMBER OF SMOKE DETECTOR

HIGH TEMPERATURE / HIGH RISK OF FIRE

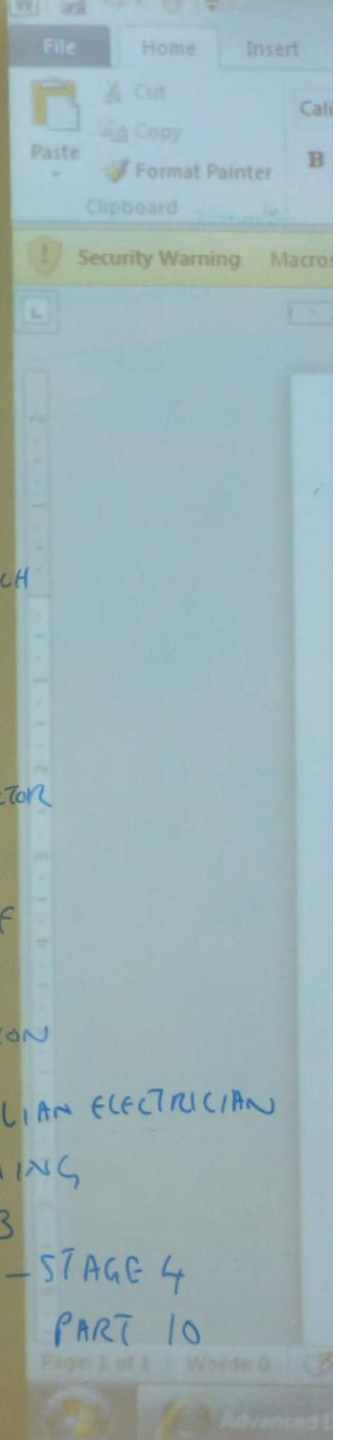
PROVIDE WITH EXPLOSION PROTECTION

SINGLE
H
1mm²
CSA

TABLE 20.1

AS 2380 STAGE 4 - PART 10
HAZARD LIGHTING
PANEL

AUSTRALIAN ELECTRICIAN
TRAINING
9033
ROW(11) - STAGE 4
PART 10



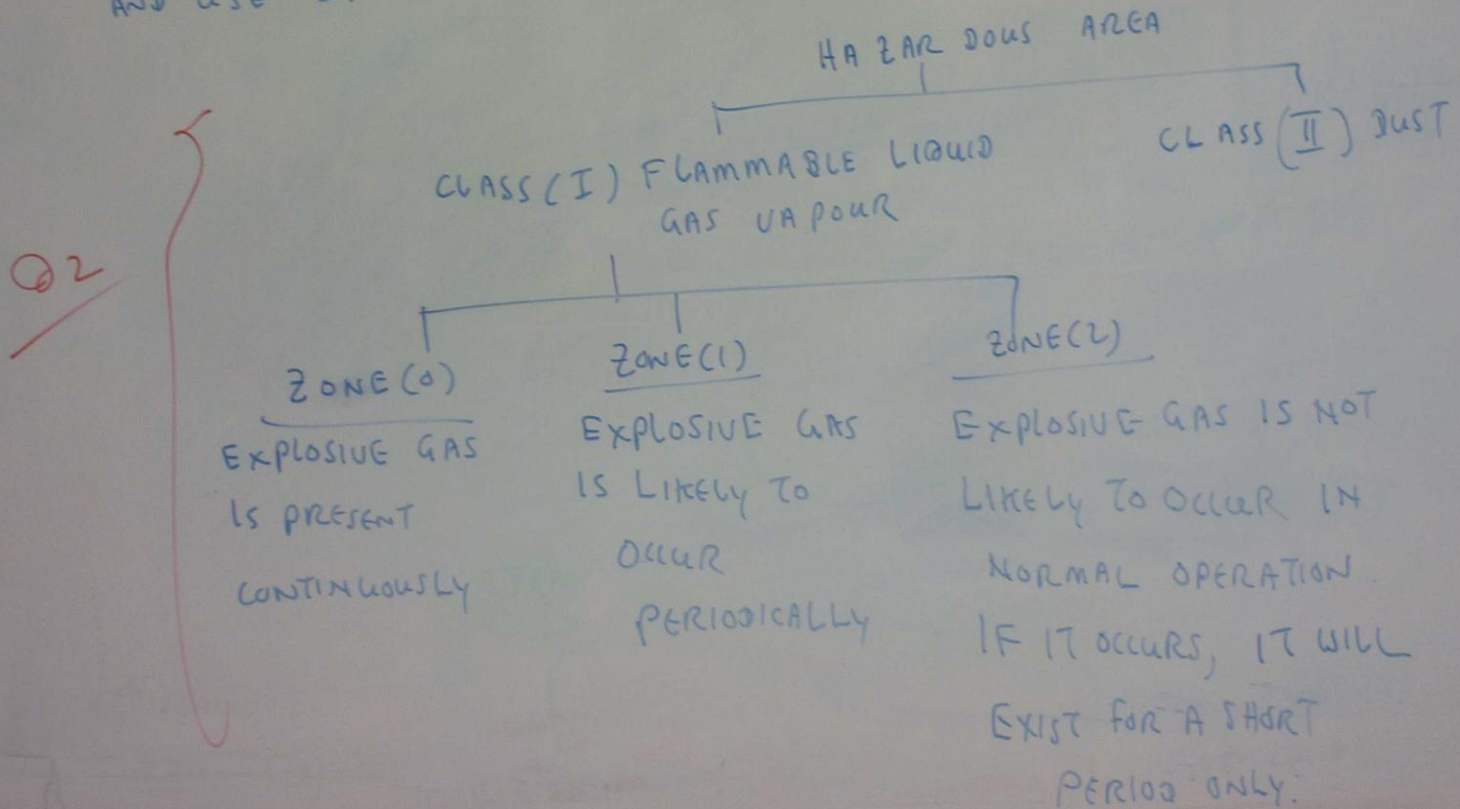
TUTORIAL

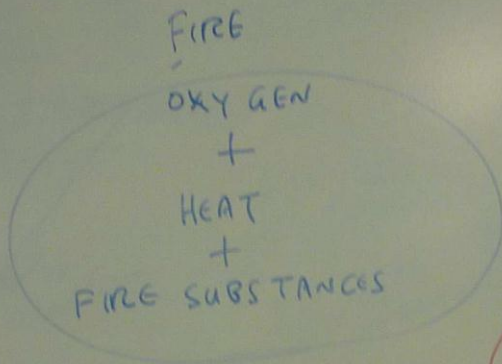
- ① EXPLAIN THE CONSTRUCTION AND OPERATION OF SMOKE ALARM
- ② WHERE ARE THE APPROPRIATE LOCATIONS OF SMOKE ALARM?
- ③ WHERE SHOULD BE AVOIDED TO INSTALL THE SMOKE ALARM?
- ④ EXPLAIN THE WIRING SYSTEM FOR SMOKE ALARM.
- ⑤ NAME AND CLAUSES OF AUSTRALIAN STANDARDS REGARDING SMOKE ALARM AND HEAT

HAZARDOUS AREA

Q1
AN AREA IN WHICH AN EXPLOSIVE AT MOSPHERE IS PRESENT (OR) MAY BE EXPOSED TO BE PRESENT.

- SPECIAL PRECAUTION IS NEEDED FOR CONSTRUCTION, INSTALLATION AND USE OF ELECTRICAL COMPONENTS.





INTRIN
Equip

@3

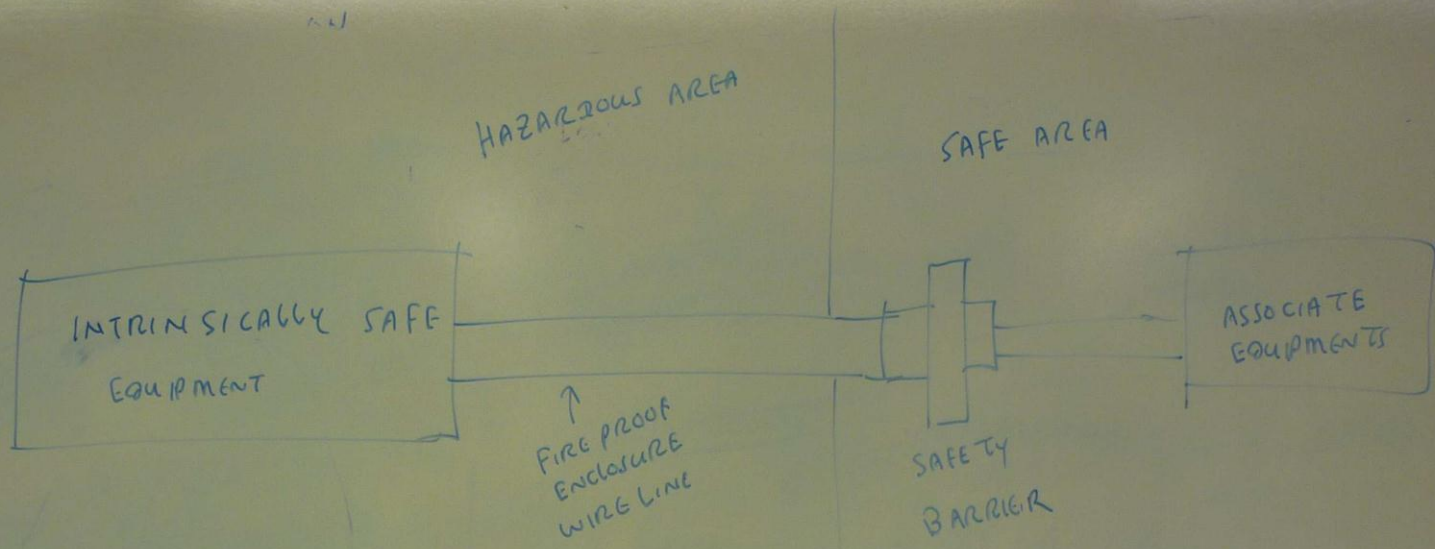
PROTECTION

- EXCLUSION
- EXPLOSION CONTAINMENT
- ENERGY LIMITATION
- DILUTION
- AVOIDANCE OF IGNITION SOURCE

EQUIPMENTS

As 2380.9 EXM - NON SPARKING

03



EX (i) ELECTRICAL SYSTEM

FORCED VENTILATION

— PROTECTION — SEALED AND FIRE PROOF ENCLOSURE

04

NO - OPEN WIRING

NO SODIUM VAPOUR LAMP IN HAZARDOUS AREA

NO BATTERY CHARGER

NO SWITCHING DEVICE

EXm - NON SPARKING

IN MENT

TION

UTION SOURCE

Q5

AS 3000: 2007

SECTION (7) SPECIAL ELECTRICAL INSTALLATIONS

7.7 HAZARDOUS AREA PAGE (326)

AS/NZS 60079-10.1 GAS

60079-10.2 DUST

7.7.2.3 REDUCTION

7.7.2.4 ELECTRICAL EQUIPMENTS

AS 60079-14

AS 60079-17 INSPECTION &
MAINTENANCE

TUTORIAL

- ① DEFINE HAZARDOUS AREA
- ② CLASSIFY THE HAZARDOUS AREAS
- ③ WHAT KINDS OF PROTECTIONS ARE TO BE APPLIED IN HAZARDOUS AREAS?
- ④ WHICH DEVICES ARE NOT ALLOWED IN HAZARDOUS AREA?
- ⑤ LIST THE RULES RELATED TO HAZARDOUS AREA.

- assigning the degree of hazard for many specific activities (e.g. spray-painting booths, petrol-dispensing pumps, flammable liquid storage), which are classified under AS 2430, *Part 3* and called up by AS 3000, *Clases 9.4* and *9.7*; or
 - assessment of the area by the methods set down in AS 2430, *Part 1*.
- AS 2430 is called up by *Clause 9.4* of AS 3000.

20.3 Explosion protection techniques

Methods of explosion protection

Once it has been established that a hazardous area exists and the area has been classified into zones, for a particular installation, consideration should be given to keeping electrical wiring and equipment away from the hazardous area. This would eliminate the need for explosion protection to be employed and thus reduce the cost of the electrical installation. Where this is not practical, an approved explosion protection technique must be employed.

Several types of explosion protection can be used,

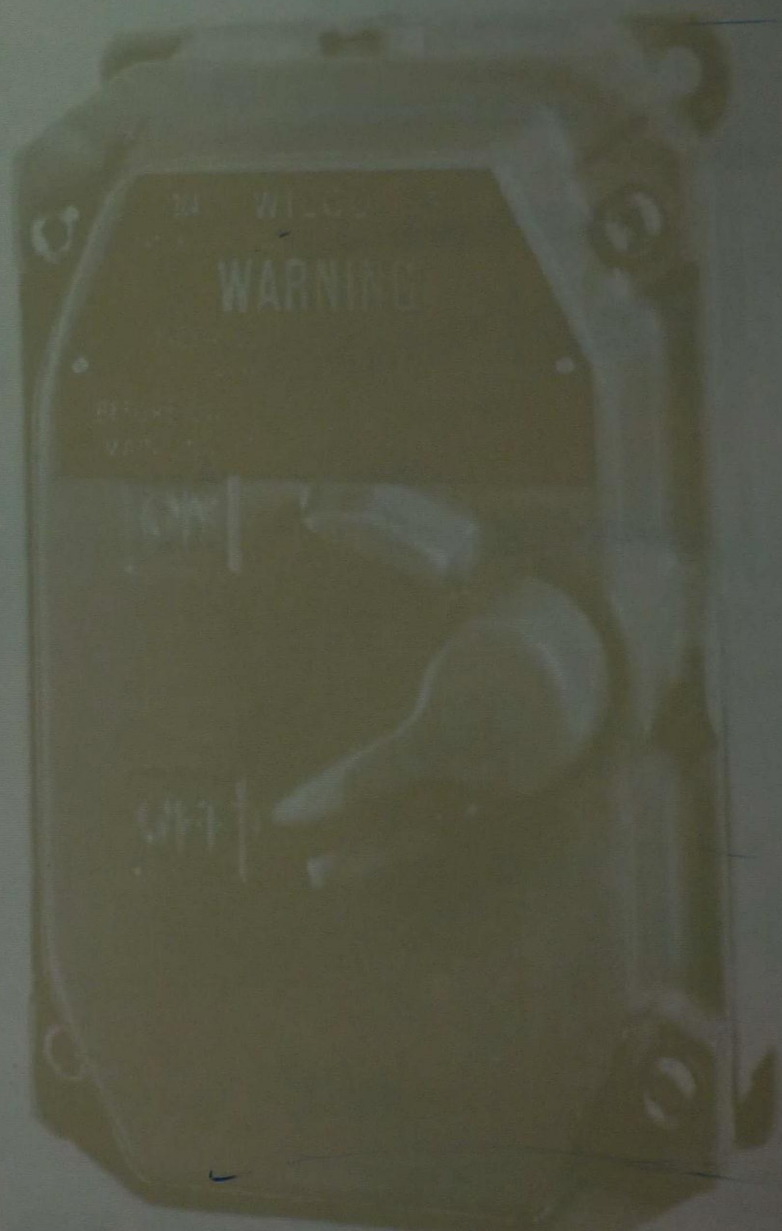
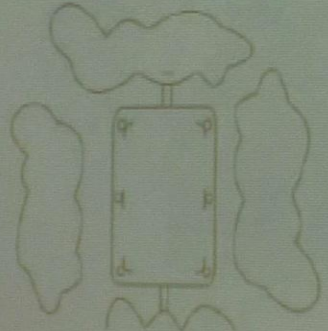




Table 20.1 Explosion protection techniques

Method of protection	Recognised protection types*	Symbol*
Exclusion  <p data-bbox="202 863 656 942">Flammable or combustible material cannot enter electrical system</p>	Dust-exclusion ignition-proof Hermetic sealing Encapsulated Non-sparking Oil immersion Pressurised enclosure or room Sand-filled (or powder-filled)	 DIP Ex h Ex m Ex n Ex o Ex p Ex q
Explosion containment 	Flameproof enclosure Non-sparking	Ex d Ex n

internal source of flammable gas or vapour. In these cases the pressurisation dilutes any flammable gas or vapour to concentrations well below that needed for an explosion.

Sand-filled (Ex q)

Electrical equipment is filled with a sand-type material to prevent arcing from igniting an external explosive atmosphere.

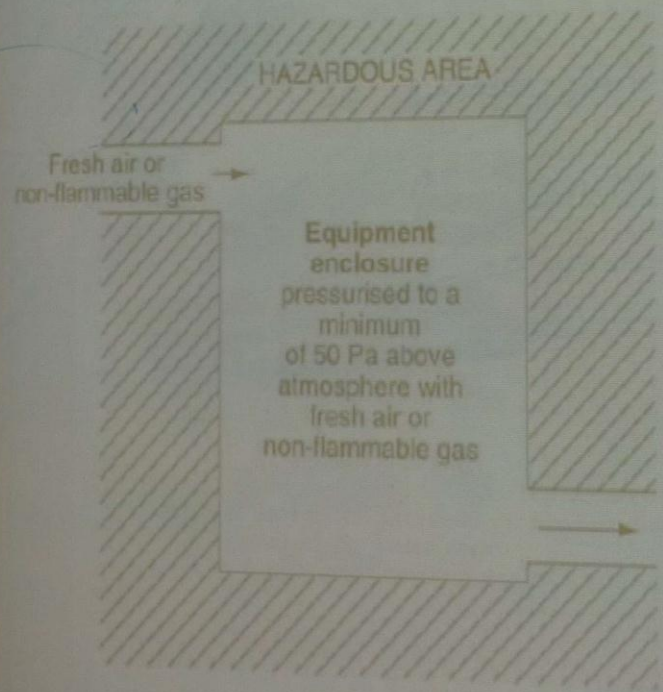


Fig. 20.2 Pressurised enclosure (Ex p)

An explosion within the enclosure will not damage the enclosure, but at the same time will prevent the transmission of flame or heat to the explosive atmosphere external to the enclosure. Figure 20.3 shows some of the basic features of this type of protection.

The flameproof technique is used extensively where it is necessary or desirable to locate power and arcing devices in hazardous areas. As this technique involves the design of the enclosure and not the circuit components, standard and readily available components are used. However, installation and maintenance costs are high. The explosion technique is easily voided if flame paths are damaged or otherwise obstructed or if cover screws are not correctly installed. Work can be carried out on flameproof equipment only when the hazardous area is proven free of flammable gases.

Typical items of equipment for which the flameproof technique is used are motors, motor starters, push-button stations, isolation switches, solenoid valves, light fittings, and control and measuring devices (see Fig. 20.4).

Intrinsic safety, AS 2380.7 (Ex i)

This type comprises an electrical system in which the heat from arcing, cables and equipment or a fault cannot produce enough energy to ignite an explosive atmosphere with which it is in contact. There are two categories of intrinsic safety: 'ia' and 'ib'. Ex ia involves more stringent tests and can therefore be used in areas of

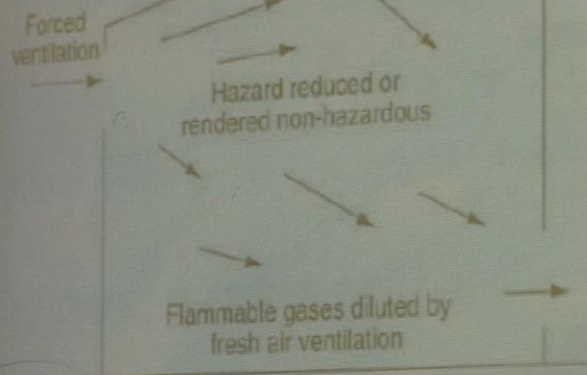
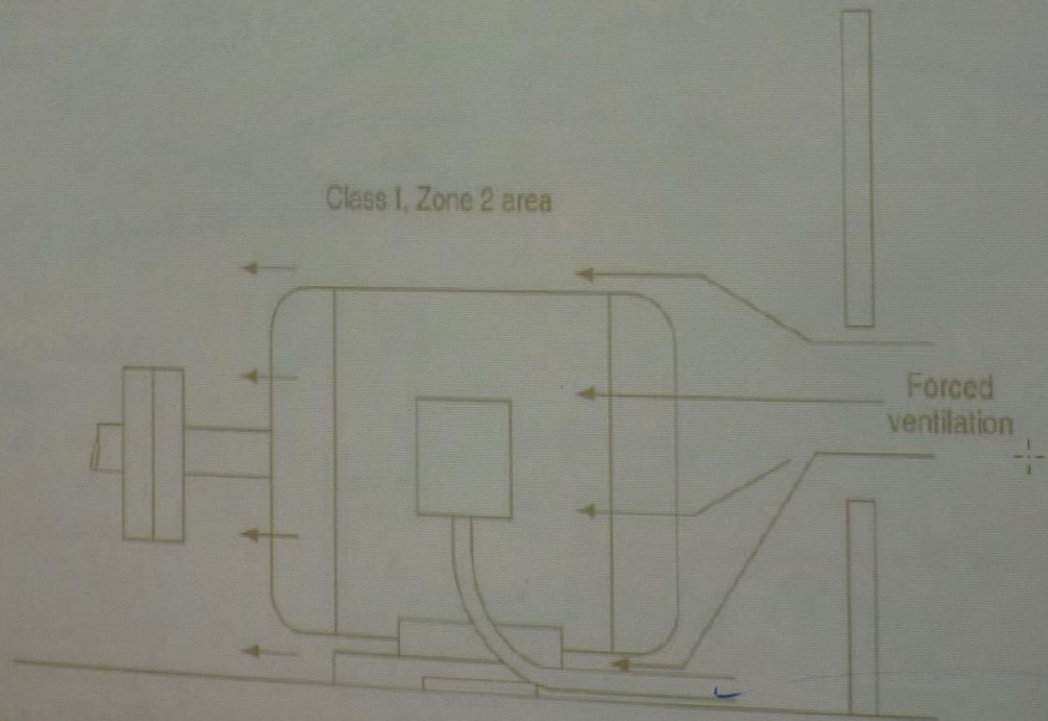


Fig. 20.6(a) Dilution ventilation

permitted in a hazardous area. AS 3000, Clause 9.5.3 also prohibits the use of hazardous areas of:

- battery chargers, their control equipment and batteries being charged, unless this equipment is certified for the hazardous area in question;
- low-pressure sodium-vapour discharge lamps, as the free sodium in these lamps can produce enough energy to ignite a flammable atmosphere on contact with water (this could easily occur if a lamp were dropped or otherwise broken in a hazardous area);
- equipment containing liquid dielectrics with a flash-point less than 250°C.

Wiring systems not permitted in hazardous areas are listed in section 20.5.



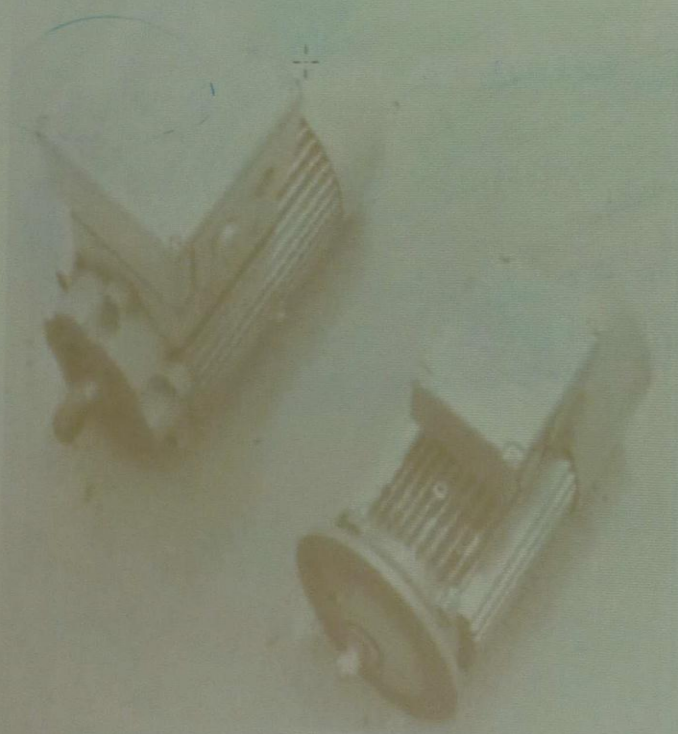




Fig. 20.7 The motor on the left is flameproof (Ex d) with an increased safety (Ex e) terminal box. Note the larger size of the increased-safety terminal box compared with the

Table 20.2 (continued)

Protection technique	Australian/ New Zealand Standards	Notes
Increased safety	AS 2380.6	
		
(Ex e)		
Pressurised room/enclosure	AS 2380.4	
		
(Ex pi)		
Encapsulated	AS 2431	

Fixed wiring

Clauses 3.13.2 and 3.16

Clause 3.17.1

Clauses 3.13.2 and 3.18.1 and AS 2381.10

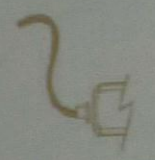


Flexible connections

Clauses 3.13.8 and 3.16.1.2

Clauses 3.13.8 and 3.17.1.2

Clause 3.13.8 and AS 2381.10



Cable glands

To AS 1828, or AS 2380.6 for Ex e only

To AS 1828 for entry to Ex d enclosures

DIP or AS 1828



Conduits and pipes

Clause 3.16.2.1

Clause 3.17.1.1

Clauses 3.13.2 and 3.18.1 and AS 2380.10



Sealing

Clause 3.16.2.3

Clause 3.16.2.3

AS 2381.10



Plugs and sockets

Clause 3.16.4

Clause 3.17.3

AS 2236 and AS 2381.10



Isolation

Clause 3.11

Clause 3.11

Clause 3.11 and AS 2381.10



Enclosure of earthing conductors

Clause 3.10

Clause 3.10

Clause 3.10