SCHEDULE 1

Essential Health and Safety Requirements

SUPPLEMENTARY REQUIREMENTS IN RESPECT OF EQUIPMENT

Requirements applicable to equipment in equipment - group I

Requirements applicable to equipment in category M 1 of equipment-group I

30.—(1) Equipment must be so designed and constructed that sources of ignition do not become active, even in the event of rare incidents relating to equipment.

(2) Equipment must be equipped with means of protection such that—

(a) either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection; or

(b) the requisite level of protection is ensured in the event of two faults occurring independently of each other.

(3) Where necessary, equipment must be equipped with additional special means of protection.

(4) Equipment must remain functional with an explosive atmosphere present.

(5) Where necessary, equipment must be so constructed that no dust can penetrate it.

(6) The surface temperatures of equipment parts must be kept clearly below the ignition temperature of the foreseeable air/dust mixtures in order to prevent the ignition of suspended dust.

(7) Equipment must be so designed that the opening of equipment parts which may be sources of ignition is possible only under non-active or intrinsically safe conditions. Where it is not possible to render equipment non-active, the manufacturer must affix a warning label to the opening part of the equipment.

(8) If necessary, equipment must be fitted with appropriate additional interlocking systems.

Requirements applicable to equipment in category M 2 of equipment-group I

31.—(1) Equipment must be equipped with means of protection ensuring that sources of ignition do not become active during normal operation, even under more severe operating conditions, in particular those arising from rough handling and changing environmental conditions.

(2) The equipment must be de-energised in the event of an explosive atmosphere.

(3) Equipment must be so designed that the opening of equipment parts which may be sources of ignition is possible only under non-active conditions or via appropriate interlocking systems. Where it is not possible to render equipment non-active, the manufacturer must affix a warning label to the opening part of the equipment.

(4) The requirements regarding explosion hazards arising from dust applicable to equipment category M 1 must be applied.

Requirements applicable to equipment in category 1 of equipment - group II

Explosive atmospheres caused by gases, vapours or mists

32.—(1) Equipment must be so designed and constructed that sources of ignition do not become active, even in the event of rare incidents relating to equipment.

(2) It must be equipped with means of protection such that—

(a) either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection; or

(b) the requisite level of protection is ensured in the event of two faults occurring independently of each other.

(3) For equipment with surfaces which may heat up, measures must be taken to ensure that the stated maximum surface temperatures are not exceeded even in the most unfavourable circumstances.

(4) Temperature rises caused by heat build-ups and chemical reactions must also be taken into account.

(5) Equipment must be so designed that the opening of equipment parts which might be sources of ignition is possible only under non-active or intrinsically safe conditions. Where it is not possible to render equipment non-active, the manufacturer must affix a warning label to the opening part of the equipment.

(6) If necessary, equipment must be fitted with appropriate additional interlocking systems.

Explosive atmospheres caused by air and dust mixtures

33.—(1) Equipment must be so designed and constructed that ignition of air and dust mixtures does not occur even in the event of rare incidents relating to equipment.

(2) It must be equipped with means of protection such that—

(a) either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection; or

(b) the requisite level of protection is ensured in the event of two faults occurring independently of each other.

(3) Where necessary, equipment must be so designed that dust can enter or escape from the equipment only at specifically designated points.

(4) The requirement in sub-paragraph (3) must also be met by cable entries and connecting pieces.

(5) The surface temperatures of equipment parts must be kept well below the ignition temperature of the foreseeable air and dust mixtures in order to prevent the ignition of suspended dust.

(6) With regard to the safe opening of equipment parts, sub-paragraph 32(5) applies.

Requirements applicable to equipment category 2 of equipment - group II

Explosive atmospheres caused by gases, vapours or mists

34.—(1) Equipment must be so designed and constructed as to prevent ignition sources arising, even in the event of frequently occurring disturbances or equipment operating faults, which normally have to be taken into account.

(2) Equipment parts must be so designed and constructed that their stated surface temperatures are not exceeded, even in the case of risks arising from abnormal situations anticipated by the manufacturer.

(3) Equipment must be so designed that the opening of equipment parts which might be sources of ignition is possible only under non-active conditions or via appropriate interlocking systems. Where it is not possible to render equipment non-active, the manufacturer must affix a warning label to the opening part of the equipment.

Explosive atmospheres caused by air and dust mixtures

35.—(1) Equipment must be designed and constructed so that ignition of air and dust mixtures is prevented, even in the event of frequently occurring disturbances or equipment operating faults which normally have to be taken into account.

(2) With regard to surface temperatures, sub-paragraph 33(5) applies.

(3) With regard to protection against dust, sub-paragraph 33(3) applies.

(4) With regard to the safe opening of equipment parts, sub-paragraph 34(3) applies.

Requirements applicable to equipment category 3 of equipment – group II

Explosive atmospheres caused by gases, vapours or mists

36.—(1) Equipment must be so designed and constructed as to prevent foreseeable ignition sources which can occur during normal operation.

(2) Surface temperatures must not exceed the stated maximum surface temperatures under intended operating conditions. Higher temperatures in exceptional circumstances may be allowed only if the manufacturer adopts special additional protective measures.

Explosive atmospheres caused by air and dust mixtures

37.—(1) Equipment must be so designed and constructed that air and dust mixtures cannot be ignited by foreseeable ignition sources likely to exist during normal operation.

(2) With regard to surface temperatures, sub-paragraph 33(5) applies.

(3) Equipment, including cable entries and connecting pieces, must be so constructed that, taking into account the size of its particles, dust can neither develop explosive mixtures with air nor form dangerous accumulations inside the equipment.

Supplementary requirements in respect of protective systems

General requirements

38.—(1) Protective systems must be dimensioned in such a way as to reduce the effects of an explosion to a sufficient level of safety.

(2) Protective systems must be designed and capable of being positioned in such a way that explosions are prevented from spreading through dangerous chain reactions or flashover and incipient explosions do not become detonations.

(3) In the event of a power failure, protective systems must retain their capacity to function for a period sufficient to avoid a dangerous situation.

(4) Protective systems must not fail due to outside interference.

Planning and design

Characteristics of materials

39.—(1) With regard to the characteristics of materials, the maximum pressure and temperature to be taken into consideration at the planning stage are the expected pressure during an explosion occurring under extreme operating conditions and the anticipated heating effect of the flame.

(2) Protective systems designed to resist or contain explosions must be capable of withstanding the shock wave produced without losing system integrity.

(3) Accessories connected to protective systems must be capable of withstanding the expected maximum explosion pressure without losing their capacity to function.

(4) The reactions caused by pressure in peripheral equipment and connected pipe-work must be taken into consideration in the planning and design of protective systems.

Pressure-relief systems

40. If it is likely that stresses on protective systems will exceed their structural strength, provision must be made in the design for suitable pressure-relief devices which do not endanger persons in the vicinity.

Explosion suppression systems

41. Explosion suppression systems must be so planned and designed that they react to an incipient explosion at the earliest possible stage in the event of an incident and counteract it to best effect, with due regard to the maximum rate of pressure increase and the maximum explosion pressure.

Explosion decoupling systems

42. Decoupling systems intended to disconnect specific equipment as swiftly as possible in the event of incipient explosions by means of appropriate devices must be planned and designed so as to remain proof against the transmission of internal ignition and to retain their mechanical strength under operating conditions.

43. Protective systems must be capable of being integrated into a circuit with a suitable alarm threshold so that, if necessary, there is cessation of product feed and output and shutdown of equipment parts which can no longer function safely.