

CHAPTER IV ELECTRIC INSTALLATION

102. Restriction on electric installation and apparatus. –

Save as provided in this chapter, no electric wiring shall be installed and no electric apparatus shall be used in any refinery, installation, storage shed, service station or in any other place where petroleum is refined, blended, stored, loaded or unloaded.

103. Hazardous area. –

For the purpose of this chapter, an area shall be deemed to be a hazardous area, where –

- (i) petroleum having flash point below 650 C or any inflammable gas or vapour in a concentration capable of ignition is likely to be present.
- (ii) Petroleum or any inflammable liquid having flash point above 650 C is likely to be refined, blended, handled, stored at above its flash point.

104. Classification of hazardous area. –

(1) A hazardous area shall be deemed to be -

- (i) a zone “0” area, if inflammable gas or vapours are expected to be continuously present in the area; or
- (ii) a zone “1” area, if inflammable gases or vapours are likely to be present in the area under normal operating conditions; or
- (iii) a zone “2” area, if inflammable gases or vapours are likely to be present in the area only under abnormal operating conditions or failure or rupture of an equipment.

(2) If any question arises as to whether hazardous area is a zone “0” area or a zone “1” or a zone “2” area, the decision thereon of the chief controller shall be final.

105. Extent of hazardous area. –

The extent of hazardous area shall be as laid down in the fourth Schedule.-

Provided that the Chief Controller may, increase or reduce the extent of hazardous area where there are special circumstances which, in his opinion, warrant such increase or reduction, and the persons affected shall be informed of his decision .

106. Fixed electric apparatus. –

(1) No electric apparatus shall be allowed in a zone “0” area: Provided that this sub-rule shall not prohibit the use in a zone “0” area of an intrinsically safe apparatus of a type approved in writing by the Chief Controller and in connection with an intrinsically safe circuit, where use of such apparatus cannot be completely excluded.

(2) All electric apparatus installed or used in a zone “1” area shall be either. –

- (i) a flame proof or intrinsically safe apparatus of a type or types approved in writing by the Chief Controller or
- (ii) an industrial-type apparatus housed in an enclosure or a room which has been made safe by pressurizing or purging with a plenum of atmosphere free from significant concentration of any inflammable gas or vapour and so arranged and inter blocked that in case of failure of the pressurizing or purging agent, the electricity supply is automatically cut off or a warning is automatically given to a person in attendance who shall take suitable measures to prevent a hazard.

(3) All electric apparatus installed or used in a zone “2” area shall, be either

- (i) a non-sparking apparatus of a type approved by the Chief Controller; or
- (ii) an apparatus of any of the types permitted under sub-rule (2).

(4) Where the approval of the Chief Controller is sought for any type of electric apparatus for use in hazardous area, the person desirous of manufacturing the apparatus shall submit to the Chief Controller;

- (i) a comprehensive report accompanied by all necessary drawings, calculations giving references to recognized code or codes followed, full details of design and construction and

necessary test certificates from the recognized bodies in respect of the apparatus and its components.

(ii) a scrutiny fee of rupees five hundred.

107. Fixed electric wiring. –

(1) All conductors of an intrinsically safe circuit in connection with an intrinsically safe apparatus installed in any hazardous area shall be so laid as to prevent invasion of such circuit by current arising from contact or electrostatic or electromagnetic induction from any other circuit.

Conductors of intrinsically safe circuits shall be effectively protected against mechanical damage.

(2) All electric wiring in a hazardous area, other than the conductors of an intrinsically safe circuit, shall be effectively sealed at all joints, mechanically protected and adequately supported throughout its length and shall consist of –

(i) approved armoured cable with correctly designed terminations, complete with armour clamps, the armoring being carried and electrical clamps to provide mechanical support to the cable and electrical continuity; or

(ii) approved metal sheathed cable with correctly designed and installed terminations; or

(iii) single or multicore insulated cables accommodated in solid drawn heavy gauge screwed galvanized conduits used in conjunction with approved flameproof fittings, the conduit being sealed at both ends and installed in such a manner as to permit internal condensation to drain to a point or points from which it may be removed; where a conduit runs from a zone “1” area to a zone “2” area or an area which is not a hazardous area, an adequate seal shall be provided outside the boundary of zone “1” area;

(iv) single or multicore mineral insulated cable of approved type in conjunction with approved flame-proof type glands at all joints and terminations;

(v) bare conductors contained in an approved flameproof or forming part of an intrinsically safe circuit.

(3) Insulated cables without metallic sheathing or armoring but accommodated in a conduit shall not be buried in the open ground in any hazardous area;

(4) The electric supply circuits of each electric pump in a hazardous area shall be -

(i) separately protected by a fuse or circuit breaker set to operate when the current in the circuit so exceeds the rated current for such a period of time as to involve danger; and

(ii) provided with an individual isolating switch at the main supply point for each electric pump including its integral lighting system, if any.

(5) If the Chief Controller is satisfied that the requirements of sub-rules (1) and (2) may be modified or relaxed in any class of electric wiring, he may authorize such modification or relaxation for such period and subject to such conditions as he may think fit.

108. Earthing and bonding. –

(1) All electrical systems and equipments and all structures, plants and other non-current-carrying metallic parts of major electric apparatus or any major metallic object in any place where petroleum is refined, blended, stored, loaded or unloaded shall be efficiently earthed; the resistance value of and earthing system to the general mass of the earth, shall not be more than-

(a) 4 ohms in the case of electrical systems and equipment or a valve that ensures the operation of the protective device in the electrical circuit, whichever is lower, and

(b) 10 ohms in the case of all non-current carrying metallic parts of major electric apparatus or any major metallic object.-

(2) All joints in pipelines, valves, plants, storage tanks and associated facilities and equipments for petroleum shall be made electrically continuous by bonding or otherwise; the resistance value between each joint shall not exceed 1ohm.

(3) A piping which is not in electrical contact with the associated tank or vessel shall be efficiently connected to such tank or vessel by a flexible conductor and earthed.

109. Cathodic protection. –

(1) Cathodic protection system where employed shall be designed and installed in accordance with the current recognized practice and so maintained as -

(a) not to affect adversely metallic bodies in the zone of protection; and

(b) to eliminate the danger of sparking in a hazardous area.

(2) The metallic structures, pipelines, valves, plants and associated equipment under cathodic protection shall not be broken for repair or maintenance unless a heavy gauge conducting cable is clamped to each side of the intended break for establishing between them an electrical bond and the cable shall remain clamped until repair or maintenance work is completed and the break rejoined.

110. Protection against stray current. –

(1) Where high values of stray currents are likely to exist, both the rails of spur lines shall be insulated from a railway siding which is used for the loading or unloading of tank wagons.

(2) On electrified railway systems, live-contact rails and overhead electric lines shall be terminated outside the area where tank wagons are loaded or unloaded, such rails or overhead lines shall not be allowed with in a refinery or an installation.

(3) No joint in a pipeline or associated equipments shall be broken save as provided in sub-rule (2) of rule 109.

111. Portable electric apparatus.-

(1) No person shall install or use in a hazardous area any portable electric lamp or apparatus other than a portable lamp or apparatus of a type approved by the Chief Controller after such examination and test and for such application as he may specify.

(2) No mains operated portable lamp shall be operated at a voltage exceeding 25 volts above the earth : Provided that the Chief Controller may, at his discretion, allow higher operating voltage not exceeding 55 volts above earth.

(3) All portable lamps or apparatus other than a self-contained lamp or apparatus shall be connected to the mains in such a manner and used under such conditions as the Chief Controller may specify.

112. Maintenance of approved electric apparatus and wiring. –

All electric apparatus and wiring in a hazardous area shall at all times be so maintained as to retain the characteristic on which their approval has been granted.

113. Repair and test work. –

(1) No flame-proof or intrinsically safe apparatus shall be opened and no work likely to impair the safety characteristics of such apparatus or electric wiring connected thereto shall be carried out until all electrical supply has been cut off from the said apparatus or wiring. The power supply shall not be restored thereto until the work has been completed and the safety characteristics provided in connection with the apparatus and wiring have been fully restored.

(2) Notwithstanding anything contained in this rule, use of soldering apparatus or other means involving flame, fire or heat or use of industrial type apparatus in a zone "1" area shall be permitted for the purposes of effecting repairs and testing and alternations, provided that the area in which such apparatus or wiring has been installed, has first been made safe and certified by a competent person after testing with an approved gas-testing apparatus to be safe and free from inflammable vapours, gases or liquids and is maintained in such conditions, so long as the work is in progress.

114. Certificate of electric installation. –

(1) Before engineering any electric circuit and any electric apparatus in hazardous area for the first time and after each repair maintenance or alteration work carried out in such circuit or apparatus, a competent person shall issue a certificate under his signature to the effect that the circuit and the apparatus have the safety characteristics upon which their use in such area has been approved.

(2) The certificate referred to in sub-rule (1) shall be preserved by the occupier of the premises and shall be produced to the Inspector on demand : Provided that the certificate issued for each repair and maintenance work need not be preserved for a period exceeding six months.

115. Precautions against corrosion. –

(1) Where necessary, all electric apparatus and equipments and conduits carrying electric wiring in a hazardous area shall be regularly treated with a suitable protective paint.

(2) The certification label indicating the flame-proof or intrinsically safe nature of the apparatus or equipment shall not be painted over or treated in any manner to impair the legibility of the particulars written stamped or embossed on such label.