



NATIONAL PETROCHEMICAL COMPANY STANDARDS

ENGINEERING STANDARD FOR LIGHTING SYSTEM DESIGN

ES-EL-04

REVISION :



CONTENTS

- 1 SCOPE
- 2 STANDARDS AND CODES
- 3 GENERAL
- 4 ESSENTIAL LIGHTING
- 5 VITAL LIGHTING
- 6 FLOOD LIGHTS
- 7 STREET LIGHTING
- 8 AIRCRAFT WARNING LIGHTS
- 9 LEVEL OF ILLUMINATION
- 10 SOCKET OUTLET AND PLUGS

TABLE 1

THIS DOCUMENT IS THE PROPERTY OF NPCC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPCC.



THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.

1 SCOPE

This standard describes the general characteristics and special requirements for lighting design, type of lamps and fittings and small power distribution in petrochemical plants.

2 STANDARDS AND CODES

IEC, IES, NEC standards and API recommendation shall be applied for lighting design and installation. Where reference is made to any standard and code herein, it is understood that equivalent IEC standard is preferable.

3 GENERAL

The plant shall be provided with a main lighting system and an emergency lighting system.

3.1 Lighting methods and materials shall be suitable for the area classification in which they are installed.

3.2 Lighting panel and lighting fixtures shall be installed in such a manner that they will not impair or obstruct the normal clearances of passage ways for personnel or equipment. Mounting of lighting fixtures to cable trays shall be restricted to situations where there is no alternative.

3.3 In general adjacent lighting fittings shall not be supplied from the same circuit, if applicable.

3.4 Lamp fittings in structures shall be located that maintenance and lamp changing can be effected without the use of ladders or other equipment. In high buildings such as compressor house, maintenance and lamp changing shall be possible by using the overhead crane.

3.5 Plant lighting circuits (excluding level gauge lighting) shall be designed for automatic switching via photo-electric relay:: Control circuits for photo-electric relays shall be 'fail-safe', i.e. to switch the lights on if a fault occurs in the photo-electric relay.



THIS DOCUMENT IS THE PROPERTY OF NPCC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPCC.

- 3.6 The plant lighting panels shall feed the normal plant lights and 220 V outlets. The essential lighting panels shall feed the essential lighting,, level gauge lighting and the vital lighting in the plants.
- 3.7 Each lighting panel shall be 380/220 V, three-phase, four-wire and supplied from a circuit breaker in the motor control center.
- 3.8 Lighting panels shall be 3 PH+N. They shall consist of a four pole main switch and outgoing circuit breakers.
- 3.9 Lighting panels for use in outdoor areas and large industrial buildings such as workshops shall consist of a four-pole switch (3 PH+N) and three single-pole circuit breakers.
- 3.10 Lighting branch circuits shall be protected with maximum 16 A circuit breakers; initial loading shall not exceed 12 A.
The normally operating lighting load should be balanced within practical limits, across three phases at all main switch boards.
- 3.11 Spare branch circuit 'breakers shall be provided on the basis of 20% of circuits installed initially.
- 3.12 Lighting panels for indoor installations shall be sheet metal cabinets with hinged doors. Lighting panels for outdoor installation shall be made of insulating material and provided with a sun canopy. Outdoor panels shall preferably be installed in nonhazardous area.
- 3.13 The minimum degree of protection shall be IP 31 for indoor installation and IP 64 for outdoor installation.
- 3.14 The substations shall have photo-electric cell for all lighting control of the area. Moreover, in its related control room and on the panel itself shall be a hand/auto switch to override the photo-electric cell.
- 3.15 As far as practical, fluorescent lighting fixtures shall be used throughout the plant. Fixtures shall be located near valves or pumps, in pipe alleys and as close as possible to instruments so that special lighting for instruments is not required.
- 3.16 Lighting installations shall be designed to obviate stroboscopic effects.



THIS DOCUMENT IS THE PROPERTY OF NPC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPC.

- 3.17 All exposed lighting fittings should be of weatherproof construction.
- 3.18 In the selection of lamps and fittings, consideration should be given to ensure maximum lamp life and the minimum likelihood of internal moisture accumulation (i.e., effects of vibration, operating temperature, breathing).
- 3.19 The number of types of lamps and fittings should be standardized as much as possible.
- 3.20 Lighting fixtures for indoors shall be fluorescent type, suitable for general illumination and using warm white tubes. In areas equipped with acoustical ceiling, flush ceiling mounted fixtures shall be used.
- 3.21 Branch circuits from outdoor lighting panels to the lighting' fittings shall be done by armoured cables. The cables shall be installed aboveground in cable trays. If aboveground installation is not practical, the branch feeder cables may be installed underground.

4 ESSENTIAL LIGHTING

4. The essential lighting system shall consist of a number of fittings of the normal lighting installation, which shall be connected to the essential lighting panels.
- 4.2 Fixed essential lighting shall be installed at strategic points in the installations, including control rooms, switch rooms, fire-fighting stations, first-aid rooms, watchmen's offices, the main entrances and all other buildings and areas where required for safety reasons. Location and electrical arrangement shall be such that danger to personnel in case of a power failure is prevented and escape routes are lit. Essential lighting shall have intensities as required for the purpose.



4.3 The number of essential lighting fittings as part of the total number of fittings shall be determined as follows:

- Utility area 50%
- Process area 50%
- Control room & basement 50%
- Substation, auxiliary room, compressor & generator building 50%

4.4 In remote areas, where only a few fittings are required and based on economic considerations, self-powered lighting fittings with battery back-up may be used.

5 VITAL LIGHTING

5.1 In case of failure of an emergency diesel generator supply, a number of lighting fittings in the control room and the basement of the control room, as well as auxiliary rooms, shall be connected to a standby supply. This supply shall be connected to an independent inverter with battery back-up to avoid complete darkness during start-up of the diesel generator. Battery back-up time shall be 1.5 hr. The number of vital lighting fittings as part of the total number of fittings shall be determined as follows:

- Control room, basement, auxiliary room 10%

5.2 Substations and fire fighting stations shall be equipped with portable battery operated handlamps with wall-mounted support bracket and battery charger. Handlamps shall be installed near each door.

5.3 Vital equipment and control panels in the complex shall be illuminated by means of self-powered lighting fittings with battery back-up. These shall be connected to the essential lighting panel.

THIS DOCUMENT IS THE PROPERTY OF NPCC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPCC.