



TECHNICAL REQUIREMENTS

ELECTRICAL

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ILLUMINATION

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1. SCOPE

The present document is intended to define the technical requirements of the illumination..

2. REFERENCES

The following standards, acts of law and other documents are referenced in the standards:

HN-98:2000 *Natūralus ir dirbtinis darbo vietų apšvietimas. Apšvietos ribinės vertės ir bendrieji matavimo reikalavimai*

OL-TR-GR-000 *General Requirements*

OL-TR-ER-000 *Electrical. General*

3. TERMS AND DEFINITIONS

For terms and definitions see:

- Section III of HN-98.

4. GENERAL

4.1 Whole illumination system will be installed providing the illuminance according to HN-98 requirements (see Table 1).

Table 1. Illuminance Values

Item	Value
General illuminance in the territory	20 ÷ 30 lx
Local illuminance close to purification station, valves, etc. within the borders of outdoor process aggregate	75 ÷ 100 lx
Inside the substations	200 ÷ 300 lx
Control room and other closed places where operators can work	200 ÷ 500 lx

4.2 Especial attention will be paid for local illumination above the equipment, machinery and other places, where the general illuminance is not sufficient.

4.3 In general most of outdoor illuminators will be equipped with reflectors. Protection will be applied to outdoor illuminators that are installed at the staircases, pathways and other places where they can be inadvertently damaged.

4.4 The drawings prepared for the installation of illumination systems will include:

- a) Illuminator type, approximate installation place and height;
- b) Detailed drawing for illuminator mounting used to assist;
- c) Circuit numbers and wire numbers and other measurements.

4.5 Lighting of process units, pump stations, main and internal roads, maneuvering yards, rooms for personnel, control rooms and storage and handling tanks should be executed with maximum employment of fixtures with fluorescence light sources and electronic starters.

- 4.6** The starters controlled by photoelectric cell will automatically switch on the whole external illumination. The starters can be controlled manually in order to be able to switch on and switch off from Control Room manually, if the photoelectric cell is faulty. Loading of Lighting Circuits:
- a) Should not exceed 80% of rated loading in explosion hazard areas;
 - b) Should not exceed 90% of rated loading outside explosion hazard areas.
- Lighting shall be design as 1-phase, TN-S system installation. Circuits shall be protected by means of 16A MCB's.

- 4.7** Contractor will endeavor to install lighting fixtures of local lighting installation for communication roads, stairs, platforms, etc. to ensure lighting source replacement without using ladder. All lamps shall be proof to voltage jumps (around 180 percent).

- 4.8** The installation drawings will be developed where the requirements for the illumination of the plant evacuation will be specified.

- 4.9** Fluorescence light sources of extended life time (about 30000 hours) should be employed in explosion-proof fixtures and in fixtures located in not easily accessible locations, where replacement of the light source is difficult.

Illuminators of emergency shall be located at 30 m intervals or less from each other.

Illuminators of emergency will be connected to emergency supply panel, if any, or will be connected to other rather than to power supply of the principal illumination. A solution which will allow usage of emergency lighting as basic lighting during normal operation should be employed.

- 4.10** The number of fixtures for emergency systems should be matched in percentages in relation to basic lighting as per given rules in Table 2.

Table 2. Lighting Fixture for Emergency Systems

Area to be Lighted	Emergency-to-Basic Lighting Fixture Number
Rooms within Control Room	50 %
Rooms in Switchgear	30 %
Other Locations	20 %

- 4.11** All distribution panels of illumination circuits will have 20 percent of spare circuits and capacity. Illumination panels with portioned out buses will be used, when the supply sockets and illumination circuits are connected to the same panel. Illumination bus of distribution panel will be controlled by photoelectric cell, but the voltage will be constantly connected to power supply bus. Equipment, signalling and other control circuits will be supplied from the transformer and distribution panels that are separated from illumination, pipe heating, etc. Illumination panels should have 3 phase power supply.

- 4.12** Circuits of emergency will be used especially for illumination circuits of important meters, emergency eye washing places and showers. Circuits of emergency will not be controlled by photoelectric cells.

- 4.13** The illumination of roads will satisfy the following minimum requirements:
- a) The illuminators will be equipped with high-pressure sodium lamps;
 - b) Illumination poles will be installed at each road angle and crossing;
 - c) The distance between the poles will be from 30 to 45m;
 - d) Each pole will be properly grounded;

e) The minimal pole height 8m.

4.14 The illumination of tank fleet will satisfy the following minimum requirements:

- a) The illuminators will be of floodlight type;
- b) The pathways and ramps will be properly illuminated;
- c) The measures will be taken for temporal illumination and the supply for instruments during tank repair and maintenance.

4.15 The floodlights will be installed continuously to illuminate properly the zones of heat exchangers and reactor for bleeding the catalyst, checking and repair during operating cycle.

4.16 Illumination cables usually will be laid above the ground in cable trays. The usage of cable ducts and the connections of general use will be limited. The cable conductors will be marked with different colors or numbered and may have too large cross-section the voltage drop in long distances to be limited.

4.17 Voltage drop that occurs during normal operation of illumination system will be limited to 5% in low voltage branch circuits unless the particular or special equipment requires to improve the voltage control. The influence of the transformer secondary circuit branches is insignificant and it can be ignored referring to the calculation of normal voltage drop. The voltage drop will be calculated referring to the nominal equipment values and in general will be spread according to the following laws:

- a) 2.5% between distribution centers and distribution panels for illumination, equipment and other low voltage values;
- b) around 5% or less in branch circuits from distribution panels to the process aggregate (except floodlights) for general consumption in the premises, emergency needs and illumination of evacuation and maximum 5 % for the most remote lamp or socket;
- c) 2,5 % in the branches from the distribution panel to the floodlights.

4.18 The emergency illumination fixtures with fluorescence light sources should be for all outside process units (towers, columns, heaters, etc.) and should be 20 ÷ 30% of principal illumination

4.19 The safety and evacuation illumination shall be used for control rooms, compressors and pumps rooms, in buildings and rooms with 100 and more employees.

4.20 Every lamp must be connected to the grid by using a junction box.