Engineering Standard

SAES-O-204 10 March 2012

Security Lighting

Document Responsibility: Safety and Security Standards Committee

Saudi Aramco DeskTop Standards

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1 Introduction

1.1 This Standard covers mandatory requirements governing the design and installation of security lighting for Saudi Aramco industrial facilities classified under SAES-O-201, Section 4.2.

1.2 This Standard shall be used in conjunction with Security Directive SEC-04 issued by the High Commission for Industrial Security (HCIS), Ministry of Interior, Government of Saudi Arabia. The details of the requirements can be found in SEC-04.

2 Conflicts and Deviations

2.1 All conflicts between Standards, Requisitions for Material, related Specifications, Codes, Forms, Drawings and other documents shall be resolved as per SAES-O-201, Section 2.

2.2 Any deviations from the provisions of this Standard shall be resolved as per SAES-O-201, Section 2.

3 References

All referenced Specifications, Standards, Codes, Forms, Drawings and similar material shall be of the latest issue (including all revisions, addenda and supplements) unless stated otherwise.

3.1 Saudi Aramco References

Saudi Aramco Engineering Standards

SAES-M-100	*Saudi Aramco Building Code*
SAES-O-201	*Application of Security Directives*
SAES-O-203	*Security Gate*
SAES-O-204	*Security Lighting*
SAES-O-205	*Integrated Security Systems*
SAES-O-206	*Security Devices*
SAES-O-207	*Power Supply*
SAES-P-100 - 199	*Electrical Standards*
SAES-Q-001	*Criteria for Design and Construction of Concrete Structures*

3.2 Industry Codes and Standards

Underwriters Laboratories (UL)

UL 1598 *Luminaires*

Illuminating Engineering Society of North America (IESNA)

- *The IESNA Lighting Handbook; Reference & Applications*

National Fire Protection Association (NFPA)

NFPA 70 *National Electrical Code*

Security Directives

SEC-04 *Security Lighting*

4 General Requirements

The lighting systems specified in this standard define the minimum requirements for security related lighting at facilities. The details of each requirement can be found in SEC-04.

The standard commences covers all lighting types used in security related lighting. All lighting installations shall comply with the requirements of the applicable Saudi Aramco Engineering Standards referenced in Section 3 of this directive.

The details are shown below.

4.1 Perimeter Lighting

Perimeter lighting shall illuminate the fence line and its surrounding area with the minimum light levels specified in SEC-04. The design shall ensure that lighting system components do not interfere with cameras and other sensors.

Lighting poles shall typically be 5 m high, spaced 20 m apart and be installed in the area allocated for lighting in SAES-O-202. The type of perimeter lighting shall depend on the facility classification. The light pole height and spacing may be varied as long as the light intensity specified in SEC-04 is met. If required, higher light intensity levels shall be used to maximize the quality of perimeter camera images.

4.2 Area Security Lighting

Area lighting deployed for security related requirements shall have an average illuminance of 5 lux. Poles used for area lighting shall be between 10 m to 30 m

in height.

Area lighting shall be designed so that it shall not interfere with perimeter intrusion detection sensors, assessment cameras (such as glare, blinding or extreme bright spots within the camera field-of-view or the intrusion detection area), or be an aid to defeating the intrusion sensors.

4.3 Checkpoint Lighting

Checkpoint lighting shall illuminate designated areas with the minimum light levels specified in SEC-04. Designated areas are the approach, exit and gatehouse area of the checkpoint or locations within the checkpoint where illumination is required due to operational considerations. Lighting in the checkpoint area shall be uniform with all light illumination overlapping adjacent light illumination.

Lights used for checkpoint Lighting shall have a Color Rendering Index (CRI)>50 as defined by the Illuminating Engineering Society of North America (IESNA) handbook.

Light levels and luminaire aiming angles shall be sufficient to clearly identify incoming vehicles, vehicle license plates, pedestrians, vehicle drivers and cargo at least 10 m away from the gate house anywhere in the checkpoint area and permit inspection of people, vehicles, goods and documents.

4.4 Gatehouse Interior Lighting

Gate House interior lighting shall provide adequate task level lighting with illuminance at the countertop level, inside the gate house, at least 300 lux (30 fc). It shall be controlled by a dimmer mounted inside the gatehouse.

4.5 Shared Fence Lighting

Shared fence lighting requirements apply when a new facility is set up next to an existing facility that already has perimeter lighting and intrusion detection. The intention of this requirement is to ensure that there is minimal interaction between the two facilities security systems and each security system functions independently of the other.

Shared fence lighting shall illuminate the fence line and its surrounding area as specified in SEC-04. Lighting along the fence line shall be uniform with all light illumination overlapping adjacent light illumination.

4.6 Common Requirements

The details of all common requirements for the lighting system can be found in SEC-04. The sections below provide a brief summary.

4.6.1 Lighting System Design

The lighting system for perimeter, area lighting and shared fence lighting shall be designed based on lighting calculations using the point by point method. This calculation sheet shall be available for inspection by Industrial Security Operations (ISO) and HCIS.

Computer plotter prints shall be supplied with all security lighting proposals showing grid patterns and calculations covering perimeter, area lighting at perimeter fences and shared fence lighting.

4.6.2 Lighting Poles

Poles shall be made of aluminum or hot-dipped galvanized steel and shall be grounded in accordance with NFPA-70 and the applicable provisions of SAES-P-100 through 199.

4.6.3 Luminaires

All luminaires shall reach full intensity in the time specified in SEC-04. The body shall be made of corrosion resistant material and sealed against the environment. They shall be designed so that they can be aimed in horizontal and vertical directions. The luminaires shall meet the requirements of UL 1598.

4.6.4 Lamp Characteristics

Any lighting technology may be used as long as light levels at designated distances are maintained and a minimum light output of 48,000 lumens is maintained. Lamps used in coastal areas shall be designed for the environment.

4.6.5 Cabling

Cabling for the lighting system shall be buried and fully comply with the applicable provisions of SAES-P-100 through 199. When cables rise above ground they shall be encased in rigid metal conduit or inside the support masts for the lights.

4.6.6 Power Supply

4.6.6.1 In Class 1 & 2 facilities perimeter lights shall be powered by two dedicated power circuits.

Each light shall be on an individual circuit from the ring main.

Each light shall be connected to a different ring main than the light adjacent to it.

4.6.6.2 Lights shall be powered by an emergency power generator in the event of power failure as specified in SAES-O-207.

4.6.6.3 Power supply shall comply with the requirements of SAES-O-207 and applicable provisions of SAES-P-100 through 199.

4.6.7 Lighting Control

4.6.7.1 Perimeter, area lighting, checkpoint lighting and shared fence lighting shall be controlled automatically. The lighting controls shall be designed so the lights are energized prior to darkness, or during the day, at a time suitable for the run-up period of the lamps used.

4.6.7.2 Lighting controls shall energize the lights when the ambient natural lighting level is 1.6 times the average horizontal perimeter light illuminance design level or 15 lux (1.5 fc), whichever is higher. This ensures that the designed illuminance is met during dusk and dark periods of the day as well as after dark.

4.6.7.3 A manual backup switch to power on designated lights on shall be provided in the security control room.

4.6.7.4 A switch shall be provided to permit the use of alternate perimeter, area or shared fence luminaires if required. Activation of this switch shall cause every alternate luminaire to turn on.

4.6.7.5 Security lighting shall be independent of other lighting and power systems at the facility.

4.6.7.6 All switchgear controls and switches for security lighting shall be located in a locked and secure facility.

4.6.8 Lighting System Maintenance

Proponent shall ensure that all special equipment and tools for lighting system maintenance are available onsite.

Proponent shall implement a luminaire group relamping program based on the manufacturers Lamp Lumen Depreciation (LLD) factors. This program shall be designed to replace all lamps when the lamp reaches between 70% to 80% of its estimated life. Maintenance organizations shall maintain a maintenance log of each security light lamp history and the estimated date of replacement based on the LLD factor.

Proponent shall implement a maintenance program to ensure all luminaires are cleaned on a regular basis at intervals of 24 months or less based on Lamp Direct Depreciation (LDD) factors. More frequent cleaning should be performed for facilities located in areas prone to dirt accumulation on the luminaire.

Proponent shall implement a maintenance program to replace failed lamps or lighting system devices within 72 hours of detection. If adjacent luminaires or luminaires used for perimeter lighting fail, at least one of them shall be repaired within 24 hours.

The full details of the maintenance requirement can be found in SEC-04.

Revision Summary

10 March 2012 New Saudi Aramco Engineering Standard.