

JIS

JAPANESE INDUSTRIAL STANDARD

Lighting of Tunnels for Motorized Traffic

JIS Z 9116—1990

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by

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. In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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1. Scope

This Japanese Industrial Standard specifies the qualitative reference relating to the lighting of tunnels for roads provided mainly for motorized traffic, hereafter referred to as the "tunnel".

Remark: The qualitative reference defined in this Standard means the fundamental lighting technological conditions for lighting in tunnels and on the connected roads before and after the tunnel desirable to prepare for safe operation of motorcars taking into consideration the change of complex perceptive characteristic occurring in vision of operator of the motorcar to approach to, enter and pass through the tunnel and his psychological reaction and the environmental conditions proper to tunnel.

2. Definitions

For the main terms used in this Standard the definitions in JIS Z 8113 apply, and the rest of the terms shall be as follows:

- (1) Terms Relating to Tunnels The terms relating to tunnels shall be as follows.
 - (a) design speed The speed of motorcar to be taken as base for design of road.
 - (b) traffic density Number of motorcars passing through a certain section of road in a defined period of time.
 - (c) construction limit Limit for securing space to prohibit the placing matters able to be obstacles in the range of a certain defined width and height to secure the safety of passage for motorcars and walkers on road.
 - (d) visual range Length of the top point of obstacle in height 10 cm on central line of concerned driveway able to get unobstructed view from the height 1.2 m on the central line of the driveway measured along the central line of the concerned driveway.

Applicable Standards:

JIS Z 8113-Glossary of Lighting Terms

JIS Z 9111-Lighting for Roads

(2) Terms Relating to Lighting The terms relating to lighting shall be as follows.

- (a) road surface luminance The luminance of road surface near to the frontal steady gazed point seen in looking angle of declination 1 degree from the position of eyes of operator.
- (b) luminance in access zone The mean luminance of visual field in vision angle 20 degrees taking the tunnel as center seen from the position of eyes of operation in front by visual range of the entrance of tunnel.
- (c) continuous lighting The lighting facilities established continuously in a single road part of road except tunnel, bridge, etc.
- (d) flickering The phenomenon sensed as nonstational stimulus in the case where the light from a series of light sources coming in sight in relatively little period.
- (e) glare The visual perception generating discomfort or deteriorating visual function because of excessive luminance or excessive luminance contrast.
- (f) array of lighting apparatus Method to array the lighting apparatus along the tunnel. As for this array, there are faced each other array, staggerd array, one-sided array, central array, etc.
- (g) layout of lighting apparatus Method of layout for lighting apparatus determined by the mounting height, interval and array of lighting apparatus.

3. Items to Be Attended to in Plan of Tunnel Lighting

The items to be attended to in the plan of tunnel lighting shall be as follows.

- (1) State of Visual Field Near Entrance The luminance of sky, artificial structures such as road surface, etc., natural features on the earth and slope near to the entrance in the visual field of operator of motorcar approaching to the tunnel and their occupying rate in the visual field.
- (2) Conditions of Structures Shape of section of tunnel, total length, plane and longitudinal line shape of road in tunnel, surface state, reflectance, etc. of road surface, wall surface, ceiling surface.
- (3) Traffic State The design speed, traffic density, passage method, mixing ratio of large-sized cars, etc.
- (4) Ventilating State Existence of exhaust system, ventilating method, transmittance of air in tunnel, etc.
- (5) Plan of Maintenance and Control Cleaning method, cleaning frequency, etc.