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## Lighting applications - Tunnel lighting

Eclairagisme - Eclairage des tunnels

Angewandte Lichttechnik - Tunnelbeleuchtung

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## European foreword

This document (CEN/TR 14380:2024) has been prepared by Technical Committee CEN/TC 169 “Light and Lighting”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN CR 14380:2003.

In comparison with the previous edition, the following modifications have been made:

- The whole content has been rewritten to comply with the CEN/CENELEC Internal Regulations part 3 rules applying to Technical Reports (informative document);
- The definitions have been updated following EN 12665:2024, as closely as possible;
- A new Clause 5 (“Dimensioning rules for the lighting of road tunnels”) replaces the previous subclause 4.2 (“Distinction between long and short tunnels”), Clause 5 (“Lighting of long tunnels”) and Clause 6 (“Artificial lighting of short tunnels and underpasses”);
- The clause “Emergency lighting” has been renamed “Lighting in emergency conditions”;
- The term “Standby lighting” has been replaced by “Safety lighting”;
- In Clause 6 “Lighting in emergency conditions”, a Note has been added on the requirement of safety lighting in tunnels concerned by the European Directive 2004/54/EC 12/2022;
- The previous Clause “Traffic signals” has been removed;
- In Annex A and Annex B, the levels of daytime luminance in the interior zone have been adapted in accordance with the latest developments at CIE;
- A new Annex C has been added: “The CIE perceived contrast methodology”;
- Limited adaptations in Annex D “The space and time adaptation method as used in France”;
- A new Annex E has been added: “An energy saving approach: practice from Italy”;
- The previous Annex “Veiling Luminance Method As Used In The Netherlands” has been removed;
- The term “electric lighting” replaces “artificial lighting”;
- The following figures have been updated: Figures 3, Figures A.1, A.2, A.3, Figures C.1, C.2, Figures D.1, D.2, D.3 to D.8, Figures F.1, F.4, F.5, Figures G.1 and G.2.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

## Introduction

The aim of tunnel lighting is to ensure that users, both during the day and by night, can approach, pass through, and exit the tunnel without changing direction or speed with the degree of safety commensurate to that on the approach road.

To achieve safe passage through a road tunnel, it is necessary that all users have sufficient information regarding the course of the road ahead, possible obstacles and the presence and actions of other users. Furthermore, it is necessary that users, particularly drivers of motor vehicles, have at least an equal sense of security to that experienced on the approach roads.

Principal characteristics that describe the quality of tunnel lighting are:

- the luminance of the road surface,
- the luminance of the walls up to 2 m in height above the road surface,
- the uniformity of the luminance distribution on the road and walls,
- the control of induced glare,
- the avoidance of critical flicker frequencies.

In some cases, the illuminance of the road surface is used.

All photometric quantities are based on photopic photometry.

## 1 Scope

This document describes the current practice in the design of the lighting of road tunnels and underpasses for motorized and mixed traffic. This concerns arrangements, levels and other parameters including daylight, which are related only to traffic safety. Aspects concerning visual comfort are generally chosen in agreement with national rules. The information in this report concerns any tunnel or underpass where the decision to provide lighting has been taken by any authority working within national legislation or other constraints. The design is based on photometric considerations, and all values of luminance or illuminance are maintained values.

The main body of the report covers the common aspects of Tunnel Lighting, and the various methods currently used in Europe are detailed in the annexes. No single method is recommended.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12665, *Light and lighting — Basic terms and criteria for specifying lighting requirements*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665 and the following apply. ISO, IEC and CIE maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>
- e-ILV International Lighting Vocabulary: available at <https://cie.co.at/e-ilv>

### 3.1 Tunnel related zones

#### 3.1.1

##### **entrance portal**

<of a road tunnel> part of a road tunnel construction that corresponds to the beginning of the covered part of the road tunnel or, when open sun screens are used, to the beginning of the sun screens

[SOURCE: EN 12665:2024, 3.5.41]

#### 3.1.2

##### **exit portal**

<of a road tunnel> part of a road tunnel construction that corresponds to the end of the covered part of the road tunnel or, when open sun screens are used, to the end of the sun screens

[SOURCE: EN 12665:2024, 3.5.45]