

AS/NZS 1158.3.1:2020
Lighting for roads and public spaces
Part 3.1: Pedestrian area (Category P) lighting — Performance and design
requirements

Amendment No. 1

Revised text amendment

Publishing and Approval Dates

Council of Standards Australia Approval: 2 September 2024

New Zealand Standards Approval Board Approval: 7 August 2024

Published: 18 October 2024

Summary

This Amendment applies to the following elements:

- Clauses 1.2, 1.3.5, 1.3.6, 2.4, 3.1.3.4, 3.2, 3.3, 3.4, 3.5.3, 3.6.1, 3.6.2, 3.7.1.2, 3.7.1.3, 4.2.2, 4.3.1, 4.3.2, 4.5.2.4, 4.6.1, 4.6.2, 4.6.3, 4.9.1, 4.9.2, F3.2.1, F3.2.2
- [Tables 2.2](#), 2.5, [3.1](#), [3.3](#), [3.4](#), 3.5, 3.6, [3.7](#), [3.8](#), [3.9](#), [3.10](#)
- Figures 2.1, 4.1, 4.2, 4.3, 4.4, 4.7, 4.8
- Bibliography

Amendment Details

AS 1158.3.1:2020 is amended as follows. The amendments should be inserted in the locations as instructed.

Element	Instruction/New text
Cl 1.2	After “1158.2 Part 2: Computer procedures for the calculation of light technical parameters for Category V and Category P lighting”, <i>add</i> the following: 4282 Control of the obtrusive effects of outdoor lighting 60598.2.3 Part 2.3: Particular requirements — Luminaires for road and street lighting (IEC 60598-2-3, Ed. 3.1 (2011) MOD)
Cl 1.3.5 (new)	After Clause 1.3.4, <i>add</i> the following: 1.3.5 car parks outdoor 1.3.5.1 off-road car park area either on grade or on a structure that is on a separate land title to the road reserve and is designed for the parking of vehicles and includes defined entries and exits and access road(s) 1.3.5.2 on-road car parking parking spaces on the road reserve including parallel, angle and median parking and parking for the disabled
Cl 1.3.6 (new)	After Clause 1.3.5, <i>add</i> the following: 1.3.6 S/P ratio

Element Instruction/New text

R_{SP}
ratio of the luminous output of a source evaluated according to the CIE scotopic spectral luminous efficiency, $V'(\lambda)$, to the luminous output evaluated according to the CIE photopic spectral luminous efficiency, $V(\lambda)$

Note 1 to entry: The S/P ratio is expressed by

$$R_{SP} = \frac{K'_m \int_0^\infty s(\lambda) V'(\lambda) d\lambda}{K_m \int_0^\infty s(\lambda) V(\lambda) d\lambda}$$

where
 K'_m = approximately 1 700 lm·W⁻¹ is the maximum luminous efficacy for scotopic vision
 K_m = approximately 683 lm·W⁻¹ is the maximum luminous efficacy for photopic vision
 $s(\lambda)$ = the relative spectral distribution of the source, and λ is the wavelength

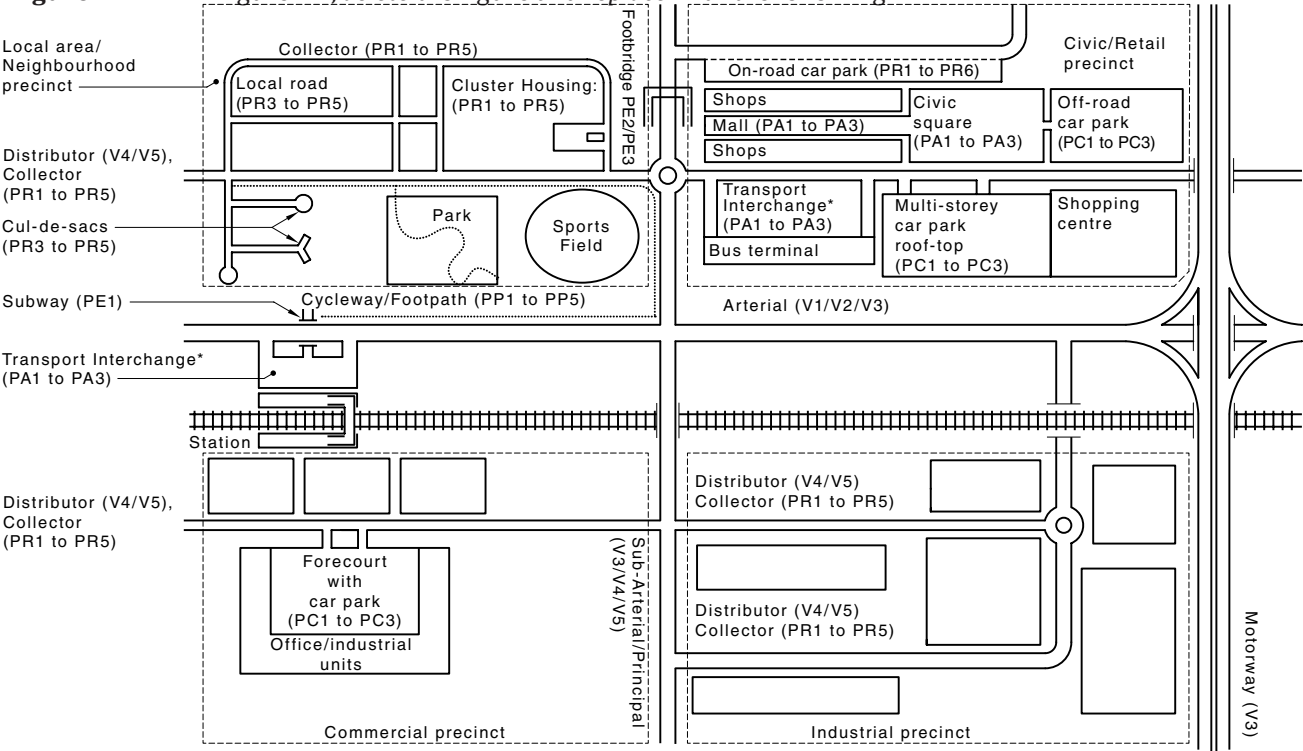
Note 2 to entry: The S/P ratio has unit one.

[SOURCE: CIE S 017/E:2020, Entry 17-21-113]

CI 2.4 Delete text in item (e) and replace with the following:

For outdoor off-road car parks (including roof-top car parks) (PC)—Table 2.5.

Figure 2.1 Figure 2.1, delete the figure and replace with the following:



* See Clause 1.1 regarding Disability Discrimination Act 1992 (Cth) otherwise (PA1/PA2/PA3)

Table 2.1 Delete table footnote f.

Table 2.2 Delete current table and *replace* with the following:

Table 2.2 — Lighting subcategories for pathways

1	2	3	4	5
Type of pathway		Selection criteria ^{a,b,c}		Applicable lighting subcategory
General description	Basic operating characteristics	Pedestrian/cycle activity	Fear of crime	
Pedestrian, cycle, etc. orientated pathway, e.g. footpaths, including those along local roads ^d and arterial roads ^e , walkways, lanes, park paths, cyclist paths	Pedestrian, cycle, mobility devices, scooter, etc. traffic only	N/A	High	PPI ^c
		High	Medium	PP2 ^c
		Medium	Medium	PP3
		Medium	Low	PP4
		Low	Low	PP5

^a The selection criteria of Columns 3 to 4 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the pathway will determine the applicable lighting subcategory.

^b See Appendix A for guidance on choosing the applicable level of each selection criteria for the environment and purpose of a lighting scheme.

^c Where there are vertical surfaces of high reflectance (e.g. light coloured walls bordering on an alleyway) alongside the pathway, the next lower lighting subcategory may be selected.

^d Where the footpath is along a local road and subcategory PP1 or PP2 is selected, the light technical parameters for that subcategory should only apply to the formed footpath.

^e Footpaths associated with arterial roads are deemed not to require separate lighting provided that—

- the road is lit to at least the applicable level of Category V lighting conforming to AS/NZS 1158.1.1; and
- the footpath is unshaded, e.g. there are no substantially continuous building awnings, trees (refer to AS/NZS 1158.1.2) and the footpath is contiguous with the roadway.

Table 2.5 1 Delete table title and *replace* with the following:
Lighting subcategories for outdoor off-road car parks (including roof-top car parks)

2 Delete “For any designated areas for pedestrians to cross” and *replace* with the following:
Designated areas for pedestrians to cross circulation roadways and access roadways

Table 3.1 Delete table and *replace* with the following:

Table 3.1 — Light technical parameters (LTP)

Parameter	Symbol
Average horizontal illuminance	$\bar{E}_h$
Point horizontal illuminance	E_{Ph}
Point horizontal illuminance within the pathway surround	E_{PhS}
Illuminance uniformity Category P	U_{E2}
Point vertical illuminance	E_{Pv}
Discomfort glare index	DGI_p

CI 3.1.3.4 Delete NOTE and *replace* with the following:

NOTE: Off-road parking installations are not considered as part of public lighting by AS/NZS 4282 and are within the formal scope of AS/NZS 4282.

Cl 3.2 and 3.3 Delete Clause 3.2 and 3.3 and replace with the following:

3.2 Light source requirements

3.2.1 General

The choice of light source should be based on an analysis of all the factors relevant to the particular application, including aesthetics, environmental factors, light source mortality, lumen depreciation, cost and energy use.

For correlated colour temperature (CCT) and colour rendering index (CRI) for light sources, refer to SA/SNZ TS 1158.6.

NOTE: The performance and characteristics of a light source are not fully defined by CCT and CRI metrics and consideration should be taken of the spectral power distribution (SPD) of a light source.

3.2.2 Design lumen value

Except as detailed below the initial (lamp or luminaire) lumen value, as conventionally evaluated using the CIE 1924 Standard Observer for photopic vision (i.e. the $V(\lambda)$ function), shall be used in the calculations.

The exceptions are—

- (a) for lighting road subcategories PR3, PR4, PR5, PR6; and
- (b) for pathways and cyclist subcategories of PP4 and PP5.

For the subcategories listed above the lumen multipliers shall be used to derate the effective lumens when using light sources with an S/P ratio < 1 and/or a CCT $< 2\,500$ K.

Lumen multipliers shall be derived according to either 3.2.2 (a), 3.2.2 (b) or 3.2.2 (c). The lumen multipliers determined shall be used to calculate the Design Lumen value using the following formula:

Design lumen value = Initial lumen value $\times$ lumen multiplier

- (i) Using S/P ratio—
 - (A) for sources with S/P ratio ≥ 1 , no derating (lumen multiplier = 1); and
 - (B) for sources with S/P ratio < 1 , derate using the formula—

$$\text{Lumen multiplier} = 0.65 \times \text{S/P ratio} + 0.35$$
- (ii) Using CCT, if the S/P ratio is not available—
 - (A) for sources with CCT $\geq 2\,500$ K, no derating (lumen multiplier = 1);
 - (B) for sources with CCT between 1 900 K and 2 500 K, derate using a lumen multiplier of 0.85; and
 - (C) for sources with CCT $\leq 1\,900$ K, derate using a lumen multiplier of 0.50.
- (iii) For sodium vapour lamps—
 - (A) for high-pressure sodium lamps, derate using a lumen multiplier of 0.75; and
 - (B) for low-pressure sodium lamps, derate using a lumen multiplier of 0.50.

Lumen multipliers of a value greater than 1.0, such as for sources with high S/P ratio, shall not be used.

NOTE 1: These requirements are included to compensate for the shift in sensitivity of the eye towards the blue end of the spectrum at low light levels, resulting in decreased sensitivity of the eye to yellow/red light and increased sensitivity to blue light, and also for the generally poorer colour rendering of sources with lower S/P ratio. The low brightness of the scene will be further exacerbated by the low reflectance of any surrounding foliage to yellow light.

NOTE 2: The values for high-pressure sodium and low-pressure sodium lamps are given for historical purposes.

Refer to the following references:

- (A) Fisher, A.J., "Can a lumen be less than a lumen so that white light is better than yellow in road lighting? Part two." *Lighting*. 2001. **21** pp. 42-46.
- (B) Bergen, T., "Recommendation on derating LED sources in the lower P category roadway lighting levels", Centre for Pavement Engineering Education, 4/10/2022, <https://www.pavementeducation.edu.au/info/documents/publications/publications/recommendation-on-derating-led-sources-in-the-lower-p-category-roadway-lighting-levels>.
- (C) CIE Publication No. 191, Recommended system for Mesopic photometry based on visual performance. International Commission on Illumination, Vienna, 2010.

CI 3.5.3 Delete the first paragraph and *replace* with the following:

The value of the light source lumen depreciation (LLD) associated with the light source operating hours (replacement interval) is to be determined for the calculation of E_{Ph} , E_{PhS} , E_{Pv} and shall be obtained from data applicable to the specific luminaire and light source chosen.

CI 3.6.1 Delete Clause 3.6.1 and *replace* with the following:

3.6.1 Conformance of the design

The design of the lighting scheme shall be deemed to conform with this document provided—

- (a) the luminaire used conforms to AS/NZS 60598.2.3; and
- (b) when created in accordance with the relevant procedures in Section 4, it satisfies the applicable light technical parameters of [Tables 3.3 to 3.10](#) when considered together with the applied maintenance factor and the documentation listed in Appendix C is provided.

CI 3.6.2 Delete Clause 3.6.2 and *replace* with the following:

3.6.2 Conformance of the installed lighting scheme

After installation of a lighting scheme conforming to Clause 3.6.1, the installation shall be deemed to continue to conform with this document provided—

- (a) an audit of the installation shows that it accurately replicates the final design (i.e. "as built" verification);
- (b) the final design documentation includes any changes to the original design made or agreed to by the designer in response to circumstances arising during installation and these changes do not cause non-conformance of the design with the requirements of Clause 3.6.1;
- (c) either—
 - (i) the maintenance regime referred to in Appendix C, Item (k) is implemented; or
 - (ii) an alternative maintenance regime is implemented that can be demonstrated to provide a maintenance factor equal to or better than the design value.

Conformance of the installed lighting scheme to the LTPs shall be based on calculation according to AS/NZS 1158.2, not by site measurement. See Section 4 for the particular and relevant design methods and requirements for use in assessing conformance to the specified light technical parameters.

Table 3.3 Delete the table and *replace* with the following:

Table 3.3 — Values of light technical parameters for roads in local areas

1	2	3	4
Lighting subcategory	Light technical parameters (LTP)		
	Average horizontal illuminance ^{a,b} ($\bar{E}_h$)	Point horizontal illuminance ^{a,b} (E_{Ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2}) (max/avg)
	lx	lx	
PR1	7	2	8
PR2	3.5	0.7	8
PR3 ^{d,e}	1.75	0.3	8

Table 3.3 (continued)

PR4 ^{d,e}	1.3	0.22	8
PR5 ^{d,e}	0.85	0.14	10
PR6 ^d	0.7	0.07	10

a These values are maintained.

b Conformance is achieved by being greater than or equal to the applicable table value.

c Conformance is achieved by being less than or equal to the applicable table value.

d See Clause 3.2 for lumen derating values for light sources with S/P ratio < 1 and/or CCT < 2 500 K.

e When the luminaires are to be supported on existing electricity reticulation poles, the subcategories PR3, PR4 and PR5 may be reduced to the next lower subcategory PR4, PR5 and PR6 respectively.

NOTE: Where there is a significant fear of crime or where required by the relevant authority then for enhanced lighting of the formed pathways, see [Table 3.4](#).

Table 3.4 Delete the table and replace with the following:

Table 3.4 — Values of light technical parameters for pathways

1	2	3	4	5	6
Lighting sub-category	Light technical parameters				
	Average horizontal illuminance ^{a,b} ($\bar{E}_h$)	Point horizontal illuminance ^{a,b} (E_{Ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2}) (max/avg)	Point vertical illuminance ^{a,b} (E_{Pv})	Pathway Surround Illuminance ^{a,b,d} (E_{PhS})
	lx	lx		lx	lx
PP1	10	2	5	1	1
PP2	7	1	5	0.3	0.5
PP3	3	0.5	5	0.1	0.25
PP4 ^f	1.5	0.25	5	0.05 ^e	0.12
PP5 ^f	0.85	0.14	5	0.02 ^e	0.07

a These values are maintained.

b Conformance is achieved by being greater than or equal to the applicable table value.

c Conformance is achieved by being less than or equal to the applicable table value.

d Required unless deemed otherwise by the relevant authority (see Clause 4.6).

e For luminaires with mounting heights of 1.5 m or less, the EP_v values need not be applied.

f See Clause 3.2 for lumen derating values for light sources with S/P ratio < 1 and/or CCT < 2 500 K.

Table 3.5

- 1 Delete "NOTE".
- 2 Add "(max/avg)" after " (U_{E2}) ".

Table 3.6

- 1 Delete "NOTE 2".
- 2 Add "(max/avg)" after " (U_{E2}) ".