

no daytime lighting. Ramps with parking along one or both sides are called sloping floor designs and require only basic garage illuminance.

In garages, the entrance area is defined as the drive aisle and any immediately adjacent parking stalls, from the portal or physical building line to about 20 meters (66 ft.) inside the structure. Where parking is not provided next to the drive lane, the width of entrance area should be defined by adjacent walls, if any. However, the width should not exceed 15 meters (50 ft.). Higher illuminance is needed during the day for this transition area which connects full daylight to the relatively low interior illuminance levels. A garage entrance is somewhat analogous to a tunnel portal, except that vehicle speeds are much lower— typically only 10 to 20 km/hr (6 to 12 miles/hr). Ordinarily, garage entry involves turning off a street or service road. Entrances designed with a straight run of 50 meters (164 ft.) or more can accept vehicles at higher speeds and may require correspondingly longer transition areas. Beyond the first 20 meters (66 ft.), the illuminance can be stepped down in successive stages, such as one-third incre-

ments, from the 500 lux (50 fc) entrance area to the 20 lux (2 fc) ramp area or the 10 lux (1 fc) basic area, over each 10-meter (33 ft.) run length.

10.3 Uniformity

As with parking lots, the average of the lowest area of garage floor illuminance may be used as an alternative calculation of the minimum rather than the absolute lowest point. This area is a rectangle (see **Annex B**). A point, centered below one of the luminaires, should be used to calculate or measure the most likely maximum illuminance value. To start the design, an *average overall* illuminance value may be chosen — 50 lux (5 fc) for parking floors and proportionately higher values for elements requiring greater illuminance. The maximum and minimum points are then calculated. If the minimum is met and the ratio of the maximum and minimum *points* falls within the 10:1 uniformity ratio given in **Table 2**, the design meets the criterion. Further analysis of uniformity based on minimum areas would be needed if alternate designs are considered (e.g., the use of larger lamps at greater spacing to cut energy consumption and/or reduce capital cost).

Table 2: Recommended Maintained Illuminance Values for Parking Garages

	Minimum Horizontal ² Lux	fc ⁴	Maximum/Minimum Horizontal Uniformity Ratio ³	Minimum Vertical ⁵ Lux	fc ⁴
Basic ¹	10	1.0	10:1	5	0.5
Ramps ⁶					
Day ⁷	20	2.0	10:1	10	1.0
Night	10	1.0	10:1	5	0.5
Entrance Areas ⁸					
Day ⁷	500	50		250	25
Night	10	1.0	10:1	5	0.5
Stairways ⁹	20	2.0		10	1.0

¹ For typical conditions. While these values are intended to address personal security issues, some retailers may increase them to further offset perceived concerns. Top levels of garages open to the sky should use the "Enhanced Security" column of **Table 1** (see **Section 4.1** and **Section 4.3**). Research has shown that, under certain conditions of limited contrast (such as concrete wheel stops on concrete garage floor), this level is needed to provide good visibility of the wheel stop (see reference 18 and **Annex D**).

² Measured on the parking surface, without any shadowing effect from parked vehicles or columns. For preliminary design, an *average* value of 50 horizontal lux (5 hfc) for basic (and equivalent for other conditions) may be calculated (see **Section 10.3**).

³ The highest horizontal illuminance area, divided by the lowest horizontal illuminance point or area should not be greater than the ratio shown (see **Section 10.3** and **Annex B**).

⁴ Rounded conversion of lux to footcandles (see **Annex E**).

⁵ Measured at 1.5 meters (5.0 ft.) above parking surface at the point of lowest horizontal illuminance, excluding facing outward along boundaries (see **Section 11.1** and **Annex B**).

⁶ Applies to clearway ramps (no adjacent parking) but not to sloping floor designs (see **Section 10.2**).

⁷ Daylight may be considered in the design calculation (see **Section 10.5**).

⁸ A high illuminance level for about the first 20 meters (66 ft.) inside the structure is needed to effect a transition from bright daylight to a lower internal level (see **Section 10.2**).

⁹ See **Section 10.4**.