

Guidelines for Croquet Court Lighting January 2023



**The technical standards contained herein are
those that have been provided to
Standards Australia for inclusion into
AS2560 Sports Lighting
and should be used by clubs, pending the
revision and re-issue of the
Australian Standard**



LIGHTING A CROQUET COURT

INTRODUCTION

Croquet is a sport of skill, strategy and tactics that involves hitting round balls with a mallet through hoops embedded in a grass playing court. It is a low impact sport played on equal terms by both male and female of any age or ability. Croquet is based on English imperial measurements with the standard court measuring 28 yards (25.6m) width by 35 yards (32m) length. Six steel hoops are placed in specific locations on the court with a wooden peg placed in its centre.

Whether croquet is played at social or international level unless played in good daylight, like all other sports croquet requires good lighting for it to be played safely and enjoyably.

Correct lighting is required to ensure adequate vision for players, officials and spectators.

Gateball is also played on croquet courts and these guidelines are thought suitable for that sport.

LIGHTING REQUIREMENTS

Light Fixtures

In today's world of lights, the LED has become the standard for sports lighting and prices have come down drastically. You will still pay more for the initial cost, but maintenance and energy costs plummet in the long term, so you will save money.

Poles

To support croquet lighting fixtures, poles made of steel, aluminium or fiberglass are available. They can be straight or tapered and anchored or buried. Council's may have a building code that address the installation of poles, be sure to check with your own council. Sports lighting companies often also need to address maximum possible winds.

Illuminance and uniformity

As each particular coloured ball must be distinguish from the others, adequate uniform lighting must be present. This is particularly applies to distinguish blue from black in lower light situations where players and onlookers cannot readily discern the colour of the balls or scoring clips if they are any distance away. With the majority of croquet players retired and in their senior years (average age of croquet players is mid 70's with many in 90's) this vision problem is then generally exacerbated. The outcome for croquet is then the need for higher illuminance levels, higher uniformity (the variation in overall illuminance) and lower uniformity gradient (variation in illuminance over short distance) than normal expectations and other sports.

The main variations of croquet include Golf Croquet, Association Croquet and Ricochet.

While most interaction is near and around the hoops in Golf Croquet and thus requiring the highest illumination, in the case of Association and Ricochet in addition high illumination is



needed in the corners and sides and near the centre peg when the player's ball must hit another ball in these regions. Play is often over long distances of 20 metres or so.

High illumination is therefore needed across the full court as well as high uniformity and low gradient.

Colour Rendering Index

Croquet is played with up to eight different coloured small 92mm diameter balls on the one court, each of which must be able to be distinguished from each other and over long distances (up 30 metres). It is a vital part of the game for the players to see the vivid colours of the croquet balls in order to aim at the correct ball in sequence. Given this requirement and the naturally declining eyesight of this age group it is important to have a high Colour Rendering Index.

Glare

Characteristics of the aging eye give older individuals more problems with glare. As the eye ages, the lens yellows and the eye becomes more sensitive to glare. With croquet having 50% over the age of mid 70's and many having to wear eyeglasses, With play occurring in many areas where high glare can occur, this constant exposure can become harmful or at least very irritating. Therefore a low glare rating is required.

Pole height and location

Where possible columns should be at least 1.5 metres outside the court boundaries (Principle Playing Area- PPA) to avoid obstruction and allow players to line up (stalk) and play the strikers ball when placed on any part of the boundary.

Four Corner poles are preferred or four side poles where corner poles are not possible.

Given that players must see coloured balls over long and short distances and anywhere on the court, luminaires must be placed at not less than 15 metres for corner poles or 12 metres for side poles, above the centre of the PPA to avoid both shadows from the players and glare from the luminaires and to provide adequate uniformity.

LIGHTING TECHNICAL PARAMETERS

Level of play	Average horizontal Maintained illuminance (\bar{E}_h) lux	Minimum horizontal uniformity		Maximum uniformity gradient per 2.5 m		Maximum glare rating (GR)	Minimum colour rendering index (R_a)
		(E_{hmin}/\bar{E}_h) (U_1)	(E_{hmin}/E_{hmaz}) (U_2)	G	UG		
All Levels	250	0.7	0.5	25%	1.33	40	70

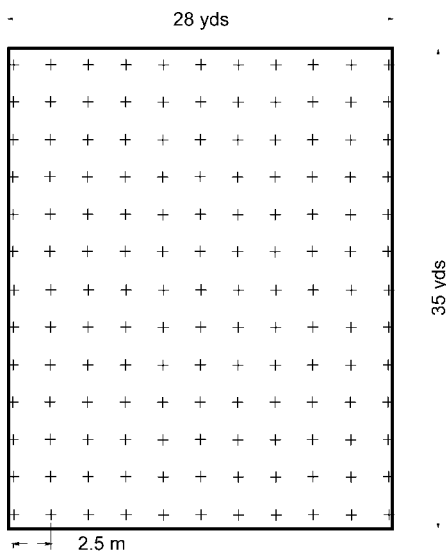


Where two or more courts are adjacent, and with luminaires operating simultaneously U_2 may be reduced to a minimum value of 0.4.

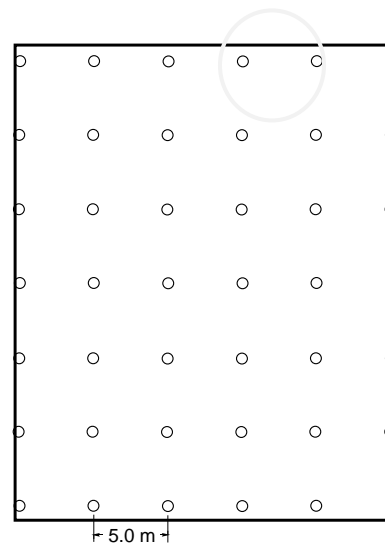
Calculation and measurement grids

Because play is often from or very near the boundaries of the croquet court it is important that calculations and measurements of illuminance commence as near as possible to all boundaries of the croquet court.

Calculations and measurements of illuminance and uniformity shall be made in grids - 2.5m x 2.5m for calculations and 5m x 5m for measurements as follows:

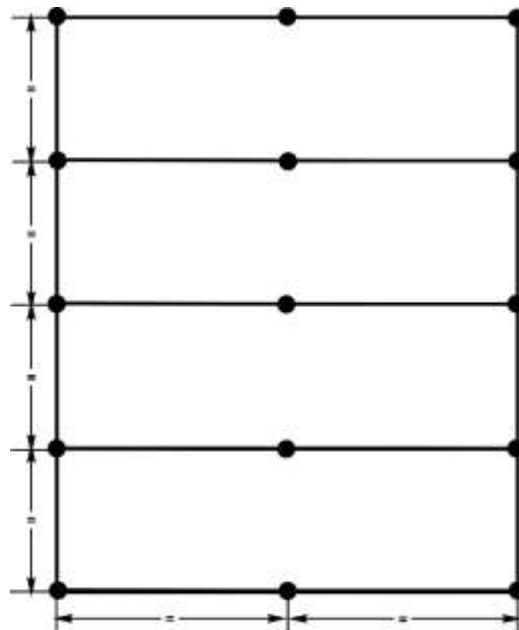


Calculation grid



Measurement Grid

Glare Observer Positions





SELECTING A LIGHTING DESIGNER

There are many lighting design companies around Australia. Ensure one is selected who has experience in design of sports field lighting under Australian Standards AS2560.1 2018 Part 1: General principles and AS2560.2 2021 Sports Lighting Part 2: Specific applications. Check their experience preferably in croquet court lighting. Design calculations should be provided by a competent person with access to luminaire photometric data and design aids. The following information should be provided by the designer as required under clause 1.11 of AS2560.2 2021 "Basis of conformance":-

- (a) A statement prepared by a competent person that either:
 - [i] states that the design satisfies the LTPs at all times throughout its projected life when considered together with the maintenance assumptions; and
 - [ii] Identifies, and justifies any aspects of the design that do not satisfy the Light Technical parameters, and/or other recommendations, e.g. luminaire locations and heights.
- (b) The essential details of all elements to be illuminated.
- (c) A scaled plan showing significant features and the proposed lighting scheme with luminaire locations, mounting height, and relevant aiming information.
- (d) The Lighting Technical Parameters (LTP).
- (e) Calculations that indicate that the design would satisfy the LTPs and any assumptions, e.g. reflectance factor used for determining the glare rating (GR).
- (f) Calculations in accordance with AS/NZS 4282 - Control of the obtrusive effects of outdoor lighting. (this can be a governing factor as the spill light effecting adjacent properties
- (g) State any switching/dimming options, and show conformance on each area for each switching/dimming option.
- (h) Details of the luminaires and light sources to be used, e.g. luminaire identification details, light source type/colour, luminous flux, power, Colour rendering Index (CRI).
- (i) The photometric data substantiated by reference to a test report/s (e.g. a test number].
- (j) The maintenance factor used in the design and its basis, including the following:
 - [i] Luminaire dirt depreciation (LDD) factor, and cleaning cycle.
 - [ii] Light source lumen depreciation factor [LLD].



(iii) Light source life expectancy.

In addition uplift (tilt) and rotation direction of each luminaire shall be specified together with the direction of maximum intensity.

Illuminance isolines of maximum 20 lux separation should also be provided. This will give a better visual indication of the variation in illuminance more so than the normal spot levels.

SELECTING AN INSTALLER

Lighting installation is just as important as the design stage. Obtain a budget estimate from an experienced sports lighting installation contractor. Sports lighting is a specialist field of work, and if not completed precisely, your completed installation may not meet the necessary standards required to ensure your club meets its insurance and regulatory obligations. A specialist contractor will guarantee that the installation will meet or exceed the lighting design intent and structural requirements. Check with your local Council as to whether a development approval (DA) will be required including any necessary Council/government fees.

A Geotechnical Survey and Report to determine the ground conditions for foundation design for the light poles by a qualified and certified engineer will be required. The engineer will design and certify the appropriate foundation utilizing the most suitable and cost effective foundation for the project, these include piered, pad, screw piled and capped, grout injected, CFA continuous flight auger and star-fins. In addition the light poles and fittings will need to be designed to withstand the wind loads of the region.

Specialist Sports Lighting providers can design and construct the complete electrical reticulation required for your lighting system to ensure the light levels are maintained. They will need to determine both the electrical demand and the capacity of the existing system to support the increased demand. There will need to be an assessment of the various types of control equipment to operate, control and monitor the lighting system. The Lighting contractor will need to submit load approval and necessary supply authority paper work and issue certificates of compliance for electrical and structural requirements. All works are to be installed to the Australian Standards and local supply authorities service and installation rules.

It is important that the installer complete the installation to the design parameters and in this regard the installer should provide a report that installation complies with the design in accordance with Australian Standards AS2560.1 2018 Part 1: General principles, clause 5.3 "Installation Report".



APPLYING FOR A GRANT

There are many Federal, State and Local Government Grants available as well as from non-government sources. Most of the questions relating to an application include how the community will benefit. Remember there will be hundreds of other applications for the limited funds. You need to show why your application should be put in the top group. Some of the questions asked may include:

How will the project boost the liveability of the local community:-

- How does the project relate to public transport?
- How does it relate to other sporting and recreational facilities?
- How close is it to assist the potential users e.g. Affordable housing.
- How does it relate to the demographics of the district?
- The use of low voltage LED lighting will reduce the electricity demand in the community thereby assisting the overall community needs.

Who and how many in the community will benefit from the project (Need to show increased patronage):-

- Lighting of court/s will allow many of our senior citizens to lead a better social and more active lifestyle during the evenings rather than the more extreme day-time temperature and extreme UV exposure.
- Lighting will cater for development of the sport for schools and the like after school hours.
- The project will also allow for increased use for the working population and community groups (e.g. Men's Shed, Rotary, Probus, Lions club, church group, etc) during more suitable after working hours.

Letters of support:-

As many letters of support as possible should be obtained including:

- Local State and Federal Politicians
- Local Council
- Community groups indicating how the project will allow them greater use (night)