

## Introduction

Statistics show that night tennis is a major growth area in the sport, therefore a club with good lighting becomes more vibrant with increased use and revenue. Illuminated outdoor courts provide additional available hours for play for those people working during the day who have limited time available to play tennis.

The aim of a tennis court lighting installation is to control the brightness of the ball and the background against which it is viewed, so that the ball is visible, regardless of its location and speed. At the same time minimising any potential adverse effects of obtrusive and spill lighting.

With any lighting installation there are a number of considerations and conflicting interests that need to be taken into account. Interested parties range from the club, its members, local municipality, electricity supplier and neighbours. The intended standard of play is also a major consideration.

## Planning permission

Many local government authorities have introduced stringent requirements in respect to obtrusive and spill lighting for sports lighting installations. Before commencing, find out what are the planning permission obligations and address these as early as

possible. Special aviation and traffic spill lighting restrictions may also apply to your area.

## Court lighting levels

The lighting level to be provided by the floodlighting depends on the intended standard of play.

Standard of play	Average Initial Lux level	Average Maintained Lux level	Minimum average uniformity
Social Play	310 Lux	250 Lux	0.6
Club Competition	435 Lux	350 Lux	0.6
International	1250 Lux	1000 Lux	0.7

\* after lamp burn-in and allowance for lamp depreciation and dust build-up.

Lux is the standard unit of illuminance. As a comparison, the illuminance on an overcast day can be in excess of 7500 lux. The lux levels are specified over the principal playing area. (ie between the marked surface of the court). The lux levels are calculated and measured at 1.0 metre above the court surface.

The illuminance levels should include for a Maintenance Factor (typically MF = 0.8, i.e. 80%) to take account of the light depreciation due to the lamp aging and dust build-up. It may take

several years (depending on the level of local air pollution, i.e. dust) of use before the lux level depreciates to the MF = 0.8 level (i.e. 80% of initial lux level).

The uniformity ratio ensures that the light level over the court is reasonably even and there are no overly bright or dark spots. The lighting level should always be calculated using computer generated lux plots on a 2.0 by 2.0 metre grid over the court for both the initial lighting levels (expected at handover) and the maintained

\* lighting levels (taking into account the Maintenance Factor).

This should be done by a lighting professional experienced in floodlighting design. When evaluating differing proposals it is essential to check all proposals are using the same lux levels, uniformities, maintenance factors and calculation grids.

### Types of lighting configurations

The type of lighting system is dependent on your needs, as there are pros and cons for each type of lighting system. Basically there are two broad types of lighting systems, corner lighting and side lighting. Corner lighting systems are typically used for double court configurations include 1500 / 2000 watt metal halide 'open face' type general purpose floodlights.

Lighting masts should not be less than 15 metres high for normal club applications. Masts are usually located outside the courts in the respective corners of the area to be illuminated. Side lighting systems are generally used for single court configurations and typically use 1000 watt metal halide 'shoe box' type floodlights specifically designed for the requirements of tennis lighting. Poles range from 8 - 12 metres for normal club applications and may be as low as 6 metres for residential applications only. There may be either 4 or 6 lights per court and the light poles may be installed either inside or outside the enclosure fence.

### Construction considerations

Before installation, consider the future expansion options. It can be financially advantageous to make allowances during the initial installation rather than retrofitting. This may include an allowance for conducting and wiring only so floodlights and poles can be retrofitted at a later stage.

Foundation must be to the manufacturer's specifications and to the requirements of the municipal engineer's department. All pole installations should be designed and certified by a structural engineer.

Light poles should be incorporated into fencing where possible to ensure clear side and back runs. If this is not possible light poles should still be placed with sufficient run off space and should also be padded in case of player collision.

The planning permit may require the use of an automatic time clock to turn lights off at a pre-set time. Coin or token operated meter can also be installed. If so, ensure there is easy adjustment of the time charge by club management and that there is an override switch / key for continuous lighting. Arrange the light switches taking into account alternate uses of the lighting, e.g. end/end vs side/side. However where possible switching should be arranged on a per court basis to minimise energy wastage when courts are not in use.

### Other considerations

Provide some indication of imminent switching off of the courts light. (eg buzzer or warning lighting). Is there adequate lighting to exit the court and club area when the courts lights are off?

It can take up to 10 minutes for a metal halide lamp to reach full output when started cold and up to 20 minutes for a hot restrike. It is recommended that a sign be placed in the vicinity of the lighting control switches, bringing to the attention of the users, the time delay to restart the lights after they have switched off.

The average life of a lamp is different for each type. The life of a metal halite lamp is dependent not only on how many hours it is used for but also for how long it is used on each use (ie switching cycle). Repeated short uses will reduce the expected life of the lamp significantly.

Mains voltage variation can have a dramatic effect on the life and operation of metal halide lamps. Prolonged higher voltage can cause shortened lamp life and voltage surges may even cause lamp failures. Voltage drop can also have a significant effect on the light output of the floodlights. Ensure your electrician has oversized cabling for voltage drops within the floodlight manufacturer's specification. The light output from metal halide lamps depreciates over time, typically the illuminance after 2000 hours will be between 25% and 40% less than that of the lamps at 100 hours use.

Maintenance of the lighting system is one of the most important considerations when choosing lighting equipment. Apart from replacing lamps, the reflectors and visors need to be cleaned and the lamp aiming may need adjustment. Always check that floodlights are manufactured by a reputable supplier and are approved to Standards Australia codes.

### Measuring light levels

It is essential to check that your floodlighting installation performs to the standard to which it was designed. This is done using a light meter. Lighting measurements should be checked on handover of the installation against the initial expected lighting level (i.e. MF=1.0) lux plot.

Some hints when taking light measurements include:

- Light meter to be 1.0 meter above court surface,
- Light meter to be held horizontally,
- Avoid shadowing light meter,
- Make sure there is no sunlight or stray light from other areas when measuring,
- Use a 15 point grid based on court line intersections.

Periodically check the lighting levels for under Maintained\* average lux levels; the lamps may need cleaning or replacing.

### Lifecycle costs

Court owners need to be aware of the overall cost of a lighting system. Not only is there the initial cost and the ultimate replacement costs that need to be provided for. Also there are the not insignificant energy running costs and maintenance costs which need to be budgeted for.

### FAQs

**What is the difference between Quartz Tungsten and metal halide lamps?**

*Quartz Lamps provide a lumen output of 22 lumens / watt and are recommended only for use on domestic courts. Advantage is low cost of luminaire and pole. Major disadvantage is the high running costs. Metal Halide are the most popular and recommended lamp for*

*domestic, clubs, commercial and international use because of the good colour rendering with the 'white light', relatively high lumen output (90 lumens / watt), and efficient running costs.*

**Is court lighting expensive to run?**

*The cost of running a single court with 6 off 1000 watt metal halide lamps is generally around \$1 per hour in most built up areas. Additional to these costs would be lamp replacement and cleaning costs.)*

### Information Sheet

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