GUIDANCE NOTE 04
Floodlighting
INTRODUCTION

Good lighting is important for local sport as it provides more opportunities to train and play, and assists to maximise the use of facilities.

In the cricket context, floodlighting of select grounds in key locations to support the growth of short formats of our game is becoming more important to the sport. Additionally, the lighting of grounds in our northern states is essential to ensure that climatic conditions and issues of daylight savings can be overcome.

This Guidance Note highlights the critical issues in relation to floodlighting for outdoor cricket play and practice and indoor facilities for non-televised level cricket. It provides necessary information to assist in the planning and development of lighting for cricket environments.

This Guidance Note is not intended to specifically consider lighting for International and Domestic / First Class levels of play under the Cricket Facility Hierarchy as venues will often involve stadium style infrastructure and require specialist lighting consultancy advice as part of a project delivery team.

Specifically considered within the Guidance Note are lighting considerations for community cricket facilities that relate to Premier / Regional, Club (Home) and Club (Satellite) venues and associated levels of play.

Consideration also needs to be given to the joint use of cricket playing fields with other seasonal sports such as Australian Rules Football, Rugby codes and Football (Soccer) for which specific lighting recommendations exist. In the majority of cases, venues will have developed lighting in direct response to the lighting needs of other such sports. This means reconciling lighting for cricket with the lighting of other ground and venue users is an important factor to encourage new lighting options for night play cricket.

In the absence of a formal Australian Standard, this Guidance Note and other reference documents including the IESANZ Lighting Guideline Series LG-4.01 Sports Lighting Cricket, Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines and WA Sports Dimensions Guide for Playing Areas should be used to help construct a basis for cricket floodlighting projects.

The added usage benefits of lighting for cricket

The lighting of practice wicket areas, and particularly those that provide multi-use activities are important to extend the use of practice areas later into the evening, at times where daylight savings is not supported or simply to create opportunities for use during winter months.

Floodlighting also provides opportunities to maximise income by allowing greater programming, flexibility and optimisation of facility use. It will be important to balance these benefits against the initial expense, ongoing energy and maintenance costs and the implications for site management and supervision.

Cricket Australia also supports the floodlighting of fields that support increased usage from other sports, events or community usage where activities are compatible and the impact on playing and training areas for cricket are not adversely affected.

The primary application of floodlighting for cricket should be based on the ability to cater for additional competition(s), carnivals and matches, and assisting to maximise the use of existing venues for a broader range of activities (for example midweek T20 fixtures).
FLOODLIGHT PLANNING

The requirements and associated issues around planning, installation and operation of floodlights are primarily controlled by Local Government Authorities and in many instances, will be different from Council to Council.

Each Local Government Planning Scheme and associated zoning controls will determine on what basis (if any) floodlighting will be an accepted use of each individual site.

In most instances a Planning Permit and associated community consultation will be required prior to a floodlighting project being able to progress.

In addition to Planning Permits, Building Permits will be required for a floodlighting installation where the height of floodlight poles exceeds local conditions and controls.

Planning challenges include:

- **Ground Conditions:** Poor or contaminated soil conditions will require special mitigation measures. In many cases, sport and recreation venues have historically been established on land fill sites or may be developed in areas where rock is present near the natural level, thus making foundations, excavating and trenching more costly to undertake.

- **Flood Inundation Overlays** and the need to factor in types of equipment used and mounting heights (eg. electrical safety).

- **Light spill** into nearby residential areas and minimisation of light that may be deemed obtrusive.

- **Nearby transport systems** such as rail and road usage and potential adverse impact from light spill.

- **Major utility services** underground or overhead prevalent through community sport and recreation grounds potentially limiting pole placement and clearances for maintenance access.

- **Potential impact of aviation:** All venues within 6 kilometres of an airport need to advise the Airport Operator and limitations may be placed on floodlight intensities and/or pole heights potentially acting as obstructions.

- **Provision for cyclone and earthquake withstand conditions.**

- **Ecological consequences** and limitations placed on artificial lighting where venues exist close to significant habitat areas.

Identify planning constraints early in a project and design & budget accordingly for them.
LIGHTING STANDARDS FOR CRICKET

Australian Standards

No Australian Standard (AS) specific to Outdoor Cricket floodlighting in Australia currently exists.

AS 2560.1 General Principles of Outdoor Sports Lighting provides the basic principles on which outdoor sports field lighting should be provided (including cricket fields). Cricket has historically followed Australian Standards developed for similar fast moving small ball sports such as Baseball and Softball (AS 2560.2.6) and Hockey (AS 2560.2.7) to guide cricket field floodlighting developments to date.

There is also no Australian Standard that offers specific guidance on the lighting for Indoor Cricket. Instead the requirements for indoor sports played at multi-purpose indoor sports centres are captured more generally within Australian Standard AS 2560.2.2-1986 Guide to Sports Lighting – Part 2.2-Lighting of Multi-purpose Indoor Sports Centres. This standard is for multi-purpose sports and not applicable to the lighting of areas dedicated to a specific sport.

International Standards – EN 12193

The European Sports Lighting Standard ‘EN 12193 Light and Lighting – Sports Lighting 2007’ contains recommendations specific to both Outdoor and Indoor Cricket. The requirements for Outdoor Cricket specified match those also prescribed for Baseball in EN 12193.

IES Lighting Guide LG 4.01 Outdoor Cricket - 2013

The Professional Body representing Lighting Design in Australia and New Zealand, the Illuminating Engineering Society of Australia and New Zealand has developed a Lighting Guide for Outdoor Cricket. LG-4.01 Sports Lighting: Cricket - 2013.

This guide does not cover Indoor Cricket. It notes a separate guide is to be published for Indoor Cricket LG-4.02 Sports Lighting: Indoor Cricket however this has no identified timeframe for its development.

This Lighting Guide for Outdoor Cricket LG - 4.01 offers a wide range of relevant technical guidance information for the lighting of cricket venues. It refers to the Class I, II and III (or 1, 2 and 3) categories in the specification of Lighting Standards and cites the European Lighting Standard EN 12193 as a reference.

The Lighting Class system per European Standard EN 12193 is recognised in this Guidance Note as the basis for community cricket facility lighting guidance.

The lighting technical parameters in the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 for non-televised venues are consistent, in the main, with the horizontal illuminance parameters contained in European Standard EN 12193.

EN 12193 does however contain the further general sporting requirement that Vertical illuminance be measured 1m above ground and not be less than 30% of the horizontal level. The provision of adequate vertical illuminance is recommended with consideration of the levels recommended in EN 12193.

The IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 offers a structured set of requirements that knit with requirements also listed in European Standard EN 12193. It offers a basis for lighting of community cricket facilities used for Outdoor Cricket in Australia and provides relevant information in the absence of any specific Australian and New Zealand Standard.

The provision of adequate vertical illuminance needs to also be considered with reference to EN 12193.

Any corresponding recommendations for Indoor Cricket should also be considered if a proposed corresponding IESANZ Lighting Guide LG 4.02 is published specific to Indoor Cricket.
Queensland Cricket Technical Guidelines: Cricket Oval and Practice Wicket Floodlighting

The Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines offer technical recommendations of a detailed nature for cricket playing fields and also represents a suitable lighting basis.

Guidance for practice wickets and multiple field modified cricket are also provided.

Lighting technical parameters for horizontal illuminance are consistent, in the main, with European Standard EN 12193 and the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01, and detailed specifications for the provision of Vertical Illuminance are also provided.

Designs compliant with the requirements of the Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines are seen as compatible with the recommendations in this Guidance Note, with the exception that a Glare Rating minimum GR=50 is adopted in-line with that recommended in IESANZ Lighting Guide for Outdoor Cricket LG - 4.01, for all levels of competition including Class III.

Television Broadcast Lighting

Because lighting for television broadcast involves a range of further considerations that are only expected to apply at International and Domestic / First Class venues, lighting requirements are not specifically considered within this Guidance Note.

IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 does however address the requirements for International and Domestic / First Class venues and Colour Television Broadcast for cricket in the event further details are required.
CRICKET PLAY FORMATS

This Guidance Note considers five unique playing area situations.

1. Outdoor playing area
2. Outdoor practice nets
3. Outdoor multi-oval formats
4. Indoor Cricket court
5. Indoor practice nets.

Sporting dimensions and pertinent definitions are detailed within other sections including Guidance Note 01: Pitches and Playing Fields, Guidance Note 02: Outdoor Training Facilities and Guidance Note 07: Indoor Cricket.

The figures below identify key common elements referenced for the lighting of outdoor playing areas and Indoor Cricket court situations only. The areas for outdoor practice nets, outdoor multi-oval formats and indoor practice nets are not represented visually as there are no formalised or standardised dimensions for these play environments.

The varied dimensions of playing areas must be a key consideration when planning and designing lighting infrastructure for both indoor and outdoor play and practice.

<table>
<thead>
<tr>
<th>LEVEL OF COMPETITION</th>
<th>PREFERRED PLAYING FIELD DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MINIMUM</td>
</tr>
<tr>
<td>INZCRICKET (AGES 5 TO 8)</td>
<td>25m</td>
</tr>
<tr>
<td>UNDER 10</td>
<td>30m</td>
</tr>
<tr>
<td>UNDER 12</td>
<td>40m</td>
</tr>
<tr>
<td>UNDER 14</td>
<td>45m</td>
</tr>
<tr>
<td>UNDER 16</td>
<td>45m</td>
</tr>
<tr>
<td>OPEN AGE (COMMUNITY CLUB)</td>
<td>50m</td>
</tr>
<tr>
<td>OPEN AGE (PREMIER/REGIONAL)</td>
<td>65m</td>
</tr>
<tr>
<td>DOMESTIC MEN’S AND UNDERAGE NATIONAL MALE EVENTS</td>
<td>82m</td>
</tr>
<tr>
<td>DOMESTIC WOMEN’S AND UNDERAGE NATIONAL GIRLS EVENTS</td>
<td>58m</td>
</tr>
</tbody>
</table>

Further details are available on playing field dimensions in Guidance Note 1: Pitches and Playing Fields.

* The SQUARE (inclusive of the turf table) is the specifically prepared area of the field of play with which the match pitch is situated. It is generally an area 27.4m x 27.4m as defined in EN12193.
LIGHTING PERFORMANCE

The planning, design and layout of floodlighting infrastructure is critical to ensure the required uniformity of illumination, to minimise glare and obstruction to participants and play and to minimise the obtrusive effects of outdoor lighting.

Floodlighting illuminance levels for most sports depend on the following three factors:

1. Safety and comfort of participants, officials and spectators
2. The size, speed and contrast of the ball, and
3. The level of competition to be played (and trained for) under floodlit conditions.

As a fast moving ball sport the lighting illuminance requirements for cricket are generally comparatively higher than for the ball sports of Australian Rules Football, Rugby codes and Football (Soccer) – the seasonal sports that cricket typically shares venues with.

Illuminance requirements are most important in the centre wicket (pitch) and square areas where heightened activity occurs. For this reason higher illuminance levels are specified in this area than for the outfield.

Illuminance is also important to adequately disclose the position of boundaries.

There are also several other factors in lighting design that need to be taken into account, including the following:

Uniform lighting ensures the eye is not forced to compensate for marked changes in lighting levels through perceived light and dark patches in the field of view during play and is thus able to adequately gauge the trajectory and position of the ball and that of other participants.

Control of glare is important to ensure visual comfort is acceptable for all sports participants and spectators. In practice, glare is controlled by ensuring floodlights are mounted at adequate height and selected from types that well control the distribution of light to the playing surface.

Colour temperature of the floodlight lamps is the colour the lamp, and light it emits, appears and should be consistent and ideally one value between 4000K and 6000K.

Colour rendering measured as Colour Rendering Index (CRI) shall ≥ 65. This index measures the degree to which the playing area and colours lit are accurately portrayed to participants and spectators.

Lighting objectives

Lighting objectives for community cricket adapted from the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 include, to:

- create good visibility for players, officials and spectators;
- provide sufficient and uniform illumination of the field and the ball through its flight;
- convey the scene and player team colours;
- produce a suitable visual background against which the players and the ball are contrasted to enable quick and clear identification;
- control and restrict glare;
- control obtrusive lighting impacts to neighbours and limit waste upward light.
Play level classifications

Classifications (Class I, II & III) are defined under the European Lighting Standard EN 12193 and adapted for cricket as follows:

**Lighting Class I – International and National play** shall meet this classification.

Class I is set for top level competition. In the cricket context, this level is likely to include non-televised international, domestic, first-class and state level fixtures and events. Venues will be designed to accommodate international and national competition which generally involves large spectator capacities with long potential viewing distances. Top level (high performance) training can also be included in this Class.

**Lighting Class II - Regional Level Competition or Local Club Competition** play shall meet this classification.

Class II is set for mid-level competition such as Premier, regional and/or high level club competition, which may involve medium size spectator capacities with medium viewing distances.

Premier cricket, high level club or regional squad training can also be included in this Class.

**Lighting Class III - Low Level Competition** play shall meet this classification.

Class III is set for local community club (selective only) or recreational level competition which does not generally involve spectators.

General training, physical education (school sports) and recreational activities can also be included in this Class.

**Cricket Training – Match Practice and Training**

In addition reduced levels of lighting may also be suitable for centre wicket cricket training.

Selection of the Lighting Class (EN12193)

<table>
<thead>
<tr>
<th>LEVEL OF COMPETITION</th>
<th>LIGHTING CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>INTERNATIONAL AND NATIONAL</td>
<td>✔</td>
</tr>
<tr>
<td>REGIONAL</td>
<td>✔</td>
</tr>
<tr>
<td>LOCAL</td>
<td>✔</td>
</tr>
<tr>
<td>TRAINING</td>
<td>✔</td>
</tr>
<tr>
<td>RECREATIONAL/SCHOOL SPORTS (PHYSICAL EDUCATION)</td>
<td>✔</td>
</tr>
</tbody>
</table>

Table source: EN 12193 – 2007: Table 3

An important task is the categorisation of the Lighting Class for a prospective venue. Notably EN 12193 reflects the fact that more than one level of play may occur under a given classification.

The Lighting Classes as defined above are adapted for use within the Australia cricket context, also addressing the community cricket levels of play and associated club structure, as the basis to define recommended cricket lighting criteria in the following tables.
## LIGHTING CRITERIA FOR OUTDOOR CRICKET

### Lighting Criteria for Non-televised Matches

<table>
<thead>
<tr>
<th>CLASS</th>
<th>SQUARE</th>
<th>UNIFORMITIES</th>
<th>OUTFIELD</th>
<th>UNIFORMITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AVERAGE LUX</td>
<td>Emin/Eave, U1</td>
<td>Emin/Emax, U2</td>
<td>AVERAGE LUX</td>
</tr>
<tr>
<td>I</td>
<td>750</td>
<td>0.7</td>
<td>0.5</td>
<td>500</td>
</tr>
<tr>
<td>II</td>
<td>500</td>
<td>0.7</td>
<td>0.5</td>
<td>300</td>
</tr>
<tr>
<td>III</td>
<td>300</td>
<td>0.5</td>
<td>0.5</td>
<td>200</td>
</tr>
</tbody>
</table>

### Minimum Colour Rendering, R<sub>a</sub><sup>8</sup>, Maximum Uniformity Gradient, U<sub>G</sub>, Maximum Glare Rating, GR

<table>
<thead>
<tr>
<th>MINIMUM COLOUR RENDERING, R&lt;sub&gt;a&lt;/sub&gt;&lt;sup&gt;8&lt;/sup&gt;</th>
<th>MAXIMUM UNIFORMITY GRADIENT, U&lt;sub&gt;G&lt;/sub&gt;</th>
<th>MAXIMUM GLARE RATING, GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;65; preferable** ≥90</td>
<td>20% per 5m</td>
<td>50†</td>
</tr>
</tbody>
</table>

* Values of illuminance measured at the time of commissioning an installation (i.e. “day one”) should be greater than the maintained illuminance values shown above – see maintenance clause. A nominal maintenance factor of 0.8 is recommended, the initial values will therefore be 1.25 times the values shown in the tables.

** If future upgrading to a level suitable for television broadcasting is intended or likely; the selection of light sources with CRI R<sub>a</sub><sup>90</sup> should be considered.

† GR should be ≤40 for each batsman in direction of view towards the opposite wicket.

Source: IESANZ Lighting Guide for Outdoor Cricket LG - 4.01: Table 1

### Lighting Criteria for Cricket Training and Match Practice

<table>
<thead>
<tr>
<th>LEVEL OF PLAY</th>
<th>AVERAGE HORIZONTAL ILLUMINANCE (MAINTAINED), LUX</th>
<th>UNIFORMITIES</th>
<th>MINIMUM COLOUR RENDERING, R&lt;sub&gt;a&lt;/sub&gt;&lt;sup&gt;8&lt;/sup&gt;</th>
<th>MINIMUM CLARE RATING, GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match practice</td>
<td>200</td>
<td>0.6</td>
<td>0.4</td>
<td>65</td>
</tr>
<tr>
<td>Non-body contact training*</td>
<td>100</td>
<td>0.5</td>
<td>0.3</td>
<td>65</td>
</tr>
</tbody>
</table>

* Ball training and physical training: non-body contact only.

Source: IESANZ Lighting Guide for Outdoor Cricket LG - 4.01: Table 3.
OUTDOOR CRICKET LIGHTING CLASSIFICATIONS AND ASSOCIATED CONSIDERATIONS

<table>
<thead>
<tr>
<th>CRICKET FACILITY HIERARCHY</th>
<th>CRICKET PROFESSIONAL TELEVISIONED MATCHES</th>
<th>CLASS I SEE A</th>
<th>CLASS II SEE B</th>
<th>CLASS III SEE C</th>
<th>CRICKET TRAINING &amp; MATCH PRACTICE SEE D &amp; E</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic / First Class</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premier / Regional</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Club (Home)</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Club (Satellite)</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subject to specific competition risk assessment and consultation with the relevant Cricket Association and facility provider noted below:

A. Class I - Non-televised high level competition use anticipates:
- Non-televised matches.
- International / Domestic match and training use.
- Use at the ‘Elite and Mastery’ pathway levels.
- Selective ancillary use by Premier / Regional levels (e.g., finals).
- Use at the ‘Talent’ levels of the cricket pathway – particularly ‘Breakthrough – Australia A’ and ‘CBA Shooting Stars’ and ‘Strong Performances – National Senior Competitions’.
- Capacity for large spectator galleries.
- Long potential viewing distances.

B. Class II – Club competition use anticipates:
- Non-televised matches.
- Domestic / First Class training use.
- Club (Home) or Club (Satellite) match and training use.
- Use at the ‘Talent’ pathway levels particularly ‘Skill & Determination – National 2nd Tier Competition and performance program’ and ‘Potential is identified – Premier 1sts, National youth competitions and programs’.
- Capacity for medium spectator galleries.
- Medium viewing distances.

C. Class III – Local club competition (selective only), recreational, competition and training use anticipates:
- Non-televised matches.
- Club (Home) and Club (Satellite) match use under risk assessed conditions and agreed by relevant Cricket Association or competition administrator.
- Club (Home) and Club (Satellite) training use.
- Use at the ‘Talent’ pathway levels under risk assessed conditions and agreed by relevant Cricket Association, competition or program administrator, particularly for ‘Potential is identified – Premier 1sts, National youth competitions and programs’.
- Use at the ‘Foundation’ level for ‘Playing and Competing’ participation levels under risk assessed conditions and agreed by relevant Cricket Association or competition administrator, particularly junior and local senior competition and recreational level play.
- Generally involving small to no spectator galleries.

D. Cricket training and match practice at a minimum 200 Lux installation anticipates:
- Use at the ‘Foundation’ pathway levels under risk assessed conditions and agreed by relevant Cricket Association or competition administrator, particularly for ‘Learning the Skills – MILO in2Cricket & MILO T20 Blast’.

E. Cricket training at a minimum 100 Lux installation anticipates:
- Use at the ‘Foundation’ participation levels under risk assessed conditions and agreed by relevant club user or program administrator and asset manager, particularly for ‘Learning the Skills – MILO in2Cricket & MILO T20 Blast’ and ‘Get Moving’ - social activities.
It is recommended that the Lighting Classification of each level of competition undertaken by the relevant Cricket Association be established within a Risk Management Framework to offer a sound basis under which competition and training activities can take place under lights.

**RISK ASSESSMENT**

Each level of cricket competition can occur across more than one Lighting Class.

This is a reflection of the differences that exist in playing standards and abilities even within a single level of competition.

For example the decision as to whether to categorise a specific outdoor competition as requiring venue lighting to Class II (500 Lux square / 300 Lux outfield) or as Class III (300 Lux square / 200 Lux outfield) will depend on the risk assessment.

Risk Assessment and Insurance coverage are pre-requisites for conducting night cricket activities under floodlights.

For each floodlit venue, verify with the venue insurer and the relevant Cricket Association the validity of insurance for the cricket activities proposed under floodlights and abide by the relevant Cricket Association's conditions and further guidelines for night play under floodlighting. **In the absence of an approved Australian Standard specifically for cricket, this risk assessment is a critical component and should have input from the local competition administrators, participating clubs, players and relevant land owners.**

Examples of risk factors to consider include:

- Composition of the competition (eg. the likelihood the competition will contain elite level players and/or express pace bowlers).
- Senior versus junior levels of play and age groups concerned, as physical capacities will vary.
- Extent of safeguards imposed by competitions (eg. speed restrictions or hard versus soft ball use).
- Extent of mandated protective equipment such as helmets, pads and other protective equipment.
- Extent to which activities that take place under lights are controlled (eg. practice drills performed under similar conditions).
- Extent to which activities may occur in smaller groups which allow added predictability regarding matters such as ball speed, trajectories and positions of participants.
- Visual aids such as playing with a white ball, specific sight screen measures to minimise distracting background or help improve the contrast with the ball during delivery.
- Any other specific measures taken to further reduce the potential for injury (eg. auditing of lighting systems).
- Factors disclosed from research of cricket competition and training under floodlights
- Other risk mitigation initiatives taken by organisers (eg. night play risk undertakings by participants).
- Other risk factors raised for consideration by venue / Cricket Association insurers as a condition for providing insurance.
- Legal framework under which a competition will run and the nature of the legal remedies available against clubs and associations for litigants seeking recourse for personal injury.
COMPATIBILITY OF CRICKET LIGHTING

The above performance standards at Class II, Class III and Training and Match Practice floodlighting for community cricket are also compatible with a range of other field based sports and activities. This means venues developed around other sports may be suitable or readily adapted for cricket and vice-versa.

The compatibility table illustrates expected lighting relationships between codes and may help identify opportunities for collateral use between cricket and other codes. This is expected to become increasingly important as the large cost for communities to construct and maintain venues increases the demand to maximise its utility.

When checking compatibility of use, note that with the exception of Baseball and Softball, the Football Codes and Hockey express the lighting requirements as consistent values across the entire play area. Cricket and Baseball / Softball require a general outfield level with a higher square or infield requirement respectively.

For example semi-professional Australian Rules Football at 200 Lux will be suitable for cricket match practice, but may not be suitable for Class III unless specific measures have been taken to boost the centre square horizontal illuminance to 300 Lux and comply with other parameters eg. vertical illuminance and glare.

### CRICKET LIGHTING COMPATIBILITY WITH OTHER CODES

<table>
<thead>
<tr>
<th>Cricket Lighting Class</th>
<th>AFL</th>
<th>Rugby Codes</th>
<th>Soccer</th>
<th>Baseball/Softball</th>
<th>Hockey AS2560.2.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I 750 / 500 Lux</td>
<td></td>
<td>Football (All Codes) Professional 500 Lux</td>
<td></td>
<td>Baseball AAA and Softball International 750/500 Lux</td>
<td>Class I 500 Lux</td>
</tr>
<tr>
<td>Class II 500 / 300 Lux</td>
<td></td>
<td>Football (All Codes) Semi-Professional 200 Lux</td>
<td></td>
<td>Baseball &amp; Softball Club Competition or bat &amp; ball training 250/150 Lux</td>
<td>Class II 250 Lux</td>
</tr>
<tr>
<td>Class III 300 / 200 Lux</td>
<td></td>
<td>Football (All Codes) Semi-Professional 200 Lux</td>
<td></td>
<td>Football (All Codes) Semi-Professional 200 Lux</td>
<td>Class III 200 Lux</td>
</tr>
<tr>
<td>Match Practice 200 Lux</td>
<td></td>
<td>Football (All Codes) Semi-Professional 200 Lux</td>
<td></td>
<td>Match Practice Cricket &amp; Match Practice</td>
<td>Class III 200 Lux</td>
</tr>
<tr>
<td>Non-body contact training</td>
<td></td>
<td>Amateur Club Competition &amp; Match Practice</td>
<td></td>
<td>100 Lux</td>
<td></td>
</tr>
</tbody>
</table>

Footnotes:

1. AS 2560.2.3 for Football (All Codes) recommends 500 Lux with Uniformity of 0.7 Minimum to Average and 0.5 Minimum to Maximum as per Class I.

2. Semi-Professional venues may be adapted for Cricket with additional centre square lighting. Conversely Cricket Class III may be adapted for Semi Professional Football Codes so long as an overall oval Uniformity of 0.6 Minimum to Average and 0.4 Minimum to Maximum can be obtained. Venues catering for Match Practice Cricket are expected to comply with All Football Codes Semi-Professional standard and vice versa.

3. Football Code Amateur Club Competition may also cater for selective cricket participation use.

4. Baseball and Softball Lighting is specified in AS 2560.2.6. In addition, peak Baseball bodies are known to have prescribed additional lighting requirements (eg Baseball Victoria).

5. Hockey lighting standards are those referred to by the International Hockey Federation (FIH). These align with European Standard EN 12193, except the FIH sets Class II minimum as per Class III at 200 Lux. Uniformity is generally specified higher than for Cricket (0.7 Minimum to Average and 0.5 Minimum to Maximum). Such higher uniformities may be possible but are unlikely delivered at cricket venues designed for Class II and III. Conversely however, Hockey venue lighting is likely to meet the lighting levels for cricket and a co-share use with cricket may be possible with due consideration to the smaller rectangular field size. It is important to also note there is an Australian Standard for Hockey whose values generally align with the above for Class I and Class II, but a 30 Lux level design is permissible for Physical Training, though rarely is such a low level used in practice.

Because standards and requirements of sporting governing bodies evolve, this information is to be used as a guide only. Verification with venue operators, Local Councils and the relevant peak sporting bodies as to the extent to which venues can accommodate compatible lighting that encourages multi-purpose access and thus opportunities for outdoor cricket play should be sought.

Cricket and Australian Rules Football are natural seasonal ground use companions. Closer scrutiny of existing Australian Rules Football lighting levels and the further introduction of CA-AFL approved artificial turf fields may reveal play opportunities for night cricket.

Also venues developed specifically for bat / stick sports such as Baseball and Hockey tend to install higher lighting levels more naturally compatible with cricket. This invites consideration of modified use overlays for Cricket where natural grassed fields are shared.
CRICKET OVAL FLOODLIGHTING LAYOUT CONSIDERATIONS

Key questions in developing a floodlighting layout are:

- Light tower or pole locations, including player safety clearances.
- Mounting height and aiming philosophy for floodlights.
- Glare control.
- Obtrusive lighting limitation per AS 4282.

In determining a suitable layout for cricket installations, extensive guidance is provided in IESANZ Lighting Guide for Outdoor Cricket LG - 4.01. The following is a précis of the key information.

Light tower or pole locations

For the large majority of community cricket grounds, the typical design will include a 4 pole design.

6 pole designs are recommended for televised play conditions. They may also be required to improve spill lighting control.

A 5m clearance (run-off) zone shall be provided from the playing area or boundary line to any light pole. As per the Football (All Codes) Standard, placement can be immediately behind a permitted boundary fence.

The Football (All Codes) Standard AS 2560.2.3 provides details on establishing the pole locations and pole heights. The same basis is acceptable for community cricket.

Figures 01 and 02 provide details of the recommended pole location zones for both a 4 pole and a 6 pole system. In these figures the ‘permitted’ zones match those of Australian Rules Football.

Figure 1: 4 Pole System
Source: Adapted figure 2 of IESANZ LG4.01

Figure 2: 6 Pole System
Source: Adapted figure 3 of IESANZ LG4.01
**Pole heights**

Adequate pole height is important to ensure good seeing conditions for participants which minimise glare to within prescribed levels and allow light to uniformly distribute throughout the playing area.

Given community based facilities will often share with football codes adopting the same criteria when setting the pole heights is beneficial.

Pole heights are recommended based on the distance $d$ determined as per the above diagrams.

For non-televised venues the mounting height is recommended as $h = 0.36 \times d$ where:

- $h$ = height of the lowest floodlight above the field surface (which may differ from the height above the base of the pole).
- $d$ = horizontal distance between floodlight oval centre or major axis through the centre of the oval.

The above corresponds to an angle of 20 degrees to the lowest floodlight from the centre of the oval (4 pole system) or oval major axis (6 pole system) ($\tan 20^\circ = 0.36$).

In any case pole heights less than 25m are not recommended for the lighting of outdoor cricket playing fields.

For Class I venues, consideration should in any case be given to increasing the pole heights to obtain 25 degrees to the lowest floodlight from the centre of the oval and thus $h = 0.47 \times d$ ($\tan 25^\circ = 0.47$).

This greater height would also be required should a venue wish to upgrade for television broadcast at a subsequent time and would also be required if the venue wished to accommodate football code professional play standards.

**Floodlighting aiming**

Floodlight aiming angle is generally recommended to not exceed 65°. The aiming angle is the angle in the vertical plane between the line of peak intensity and a downward vertical line connecting the centre of the floodlight to the ground below. Floodlighting designs will often refer to this as the floodlight ‘tilt’.

A higher mounting height will better facilitate control of glare with some publications recommending an angle up to 25 degrees to the lowest floodlight.

Conversely the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 proposes that a 4 pole system pole height may be based on the distance to a major axis rather than centre of the oval.

While the resulting pole heights with either method may be little different, keeping the basis consistent with Australian Rules Football fulfils both Cricket and Australian Rules Football requirements and aids utility.
CRICKET OVAL FLOODLIGHTING LAYOUT CONSIDERATIONS (CONT)

Glare control

A common situation with existing playing areas is the type of floodlights selected combined with a lower than recommended mounting height often see floodlights being tilted up and aimed too high in an effort to try and project light further into the play area. This in turn can lead to glare from floodlights which create difficult visual conditions for sports play and also for spectators. This may prove problematic for obtrusive light.

It is essential to give due consideration to the pole locations, the mounting of floodlights at adequate height and the aiming angle of floodlights to limit glare to within acceptable levels.

Calculation of glare rating (GR) as setout in AS 2560.1 is recommended and designs that maintain glare within the limits prescribed in the ‘Lighting Criteria’ Tables. Note the need to reduce glare where the player’s direction of view is toward the pitch. The ‘Lighting Criteria’ Table footnote recommends GR not exceed 40 in these viewing directions.

Glare calculations assume a ‘grass’ colour with diffuse reflectance in range of 0.15 to 0.25.

The positions on the play area where Glare Rating calculations are to be made match those for Australian Rules Football as per AS 2560.2.3 Figure 6 with additional positions relating to the cricket wicket. These are shown in Figure 3 adjacent.

Obtrusive lighting control

Australian Standard AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting, lists criteria for compliance to control the adverse impacts of spill light on neighbouring surrounds.

The Standard recognises 2 sets of lighting parameters based on ‘pre-curfew’ and ‘curfew’ hours of operation.

High illuminance installations such as Cricket can be exacting for compliance with light spill limitations and can significantly impact layouts where venues are situated in near proximity to residential neighbourhoods.

Review of the likely impacts of spill light at an early stage in the project is recommended to avoid major change requirements in a progressed design.
OUTDOOR PRACTICE WICKETS FLOODLIGHTING LAYOUT CONSIDERATIONS

General

In general, lighting for outdoor practice or training facilities should follow similar principles as outlined for outdoor cricket playing field lighting.

The principles and information provided within this section of the Guidance Note on outdoor practice and training facilities is also based around the minimum size of a single practice wicket, being 33m x 4m. As the size and dimensions of practice areas will vary considerably, this dimension has been used as the basis.

The Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines offer detailed technical recommendations on the lighting of outdoor practice nets and consider a floodlighting example of a dual practice wicket net.

Lighting standards and guideline recommendations

There is no specific Australian Standard for lighting of cricket practice nets. Neither is there any guidance in allied Australian Standards for Hockey and/or Baseball or in European Sports Standard EN 12193.

IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 recommends the lighting of outdoor practice wickets should match the standard of play at the venue for non-televised competitions as listed per the ‘Lighting Criteria’ tables that are referenced earlier within this Guidance Note.

The Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines offers technical guidance recommendations of a more detailed nature for practice wickets. The listed Lighting Technical Parameters for horizontal illuminance are consistent, in the main, with the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01, however detailed requirements exist in the Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines for the calculation of practice wicket vertical illuminance.

Practice wicket general lighting considerations

Practice wickets / training nets have the advantage of being a much smaller area to light. The lower proportionate cost compared with lighting a whole playing field therefore means higher lighting levels can be obtained more affordably.

The following considerations in lighting practice wickets / training net facilities are noted:

- Avoid poles/floodlights on the wicket axis (i.e. behind the bowler’s run-up or batsmen’s wicket).
- Factor the light loss due to wired fence or netting. The extent to which light will be reduced depends on the light transmission of the netting. Obtain details and factor this light loss into the illuminance design calculations.
- Provide a minimum of 4 poles located behind the batting and bowling crease and outside the pitch area.
- Consider the use of white balls and dark colour netting as a visual aid to increasing contrast and visibility.

Pole mounting height

Determine pole mounting height to satisfy the lighting technical parameters.

Practice wicket lighting measurements

The minimum calculation grid shall be as per EN12193 Indoor Cricket Nets of same dimension equating to a 2m long x 1m wide grid. A 1m x1m grid will provide a finer resolution where required.
Modified Junior Cricket Multiple Fields and Pitches

Similar principles outlined for outdoor cricket playing field lighting apply. Playing areas may be of varying size to accommodate multiple pitches and matches on a site and may be of a temporary nature.

Sizes may range from 30m to 75m typically depending on the level of competition and age of players. It may be impractical to light each playing area individually. Planning that keeps a consistent orientation of pitches is preferred to minimise glare to bowlers and batsmen.

The Cricket Oval and Practice Wickets Floodlighting - Queensland Cricket Technical Guidelines considers a floodlighting example of modified junior cricket multiple fields and pitch design. Pole layouts shall ensure each play area receives lighting from multiple directions and complies with the lighting technical parameters listed earlier within this Guidance Note.

Further Floodlighting Considerations

Besides lighting the cricket playing area there are several further lighting aspects to consider.

White ball use
The use of a white, more highly reflective ball, can be an important aid to improve visibility under floodlights.

Benefits of white ball use will reduce where:
- The ball wears and takes on a darker physical appearance requiring more frequent replacement.
- The ball is being viewed against a predominantly white background such as a fixed white sight screen or players wearing white coloured clothing.

The choice of ball for night matches is subject to ongoing research. The type and colour of ball used under floodlights shall be specifically agreed to take account of latest research and specific guidelines provided through Cricket Associations.

Safety lighting
Any venue catering for night play should give consideration to whether player safety lighting is necessary. This may be via use of hot-restrike control systems or UPS / standby generator system backups.

Spectator viewing areas
Consider in the floodlighting design open areas occupied by spectators in the design of venue lighting.

Note the European Standard requirement of 10 Lux minimum average to the spectator viewing areas for spectator visual comfort shall be considered in those areas specifically set aside for outdoor spectator viewing.

Consider that little or no playing area floodlighting may beneficially light enclosed or covered spectator viewing areas. Therefore make allowance for separate lighting systems in accordance with the Relevant Building Regulations. Comply with the further recommendations of the relevant Australian Lighting Standards, for example AS 1680 series for Indoor Lighting and AS 2293 for Exit and Emergency Evacuation Lighting.

Public lighting
Many community venues centre night time activity around the clubrooms and playing area connections. Commonly there is a car park and access road. Larger shared use sites may incorporate additional pedestrian accesses.

Public lighting is not attended to by sports floodlighting. The applicable Lighting Design Standard is AS 1158.3.1 for Pedestrian Category lighting. Separate review and consideration of the need for ancillary public lighting should be made at the time of new or upgraded venue design at which time may be most economically provided.
Emerging technologies

Consider the likely impacts of emerging technology when designing venue lighting. Higher efficiencies from new Solid State Lighting (SSL) technologies (eg. LED) may impact light pole headframes and foundation load capacities, as well as potentially reduce power demand and energy consumption which may in turn permit reduced electrical cable supply and alleviate, in some cases, the need for power supply upgrade needs.

Environment and climate change considerations

Community use facilities need to consider environmental factors with new or upgraded lighting, including:

- **Obtrusive light** - Comply with AS 4282 to minimise light spill to neighbouring sites such as residential areas and including the impacts on transport systems.
- Selection of floodlights to **eliminate or minimise waste upward spill light** that contributes to sky glow.
- **Lighting controls** to limit operation only to curfewed times.
- **Lighting controls to cater for flexible switching** of lights to reduce levels when full lighting is not required for competition (eg. training only activities).
- **Constant light output type controls** that can reduce energy by trimming initial excess lighting levels present when an installation is in its initial phase of lamp life.
- Improved **Energy Efficiency Lamp Technologies**, for example Solid State Lighting (eg LED).
- **Remote lighting control and monitoring** - Increasingly new technologies make wireless control and remote access easier inviting greater flexibility around the scheduling of lighting operation to suit user demands and better regulate unauthorised operation.
- Strategies that **encourage waste management** in the form of lamp specifications with prolonged lamp life to reduce land fill and/or which cater for recycling of components after service life.

Operation and maintenance

Lamp replacement, energy consumption and maintenance of the installation constitute important elements in the longevity of infrastructure and can involve substantial costs to properly manage the installation over its lifetime.

**IESANZ Lighting Guide for Outdoor Cricket LG - 4.01** provides information regarding the relevant considerations for maintenance.

**Considerations include:**

- Provision of a maintenance manual as part of the project commissioning and handover
- Determination of the maintenance cycle
- Verification of correct aiming and aiming records
- Lamp data to facilitate spot (individual) lamp replacements and bulk lamp replacements
- Cleaning interval
- Periodic aiming checks.

A number of simple but effective measures may be incorporated to aid the operation and maintenance. **Relevant examples include:**

- Multiple switching schemes to allow switch down and alternation of operation of particular lamp groups to reduce energy and lamp burning times
- Hours run indicators to manage the burn time of groups of lights and help equalise lamp run hours
- Curfew timers to automatically switch down and out floodlight installations inadvertently left on after hours
- Key switch controls and/or placement of controls that may operate floodlights in secure locations to prevent unauthorised operation
- Remote control and monitoring linkage to allow off site scheduling and policing of installation run times.
Further Floodlighting Considerations (Cont)

Lighting compliance
Calculation and measurements for the floodlighting installation shall be to a defined grid. Selection of a suitable measurement grid is considered in AS 2560.1, European Standard EN12193 and IESANZ LG 4.01.

For calculations the grid is 5m x 5m with a 2m x 2m grid in the square.
Further guidance regarding measurement and commissioning can be found in IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 and the Cricket Oval and Practice Wickets Floodlighting – Queensland Cricket Technical Guidelines.

Lighting design
To guarantee a quality sports lighting installation for cricket, and to ensure local site and usage conditions are considered, a lighting design and installation specification should be developed in conjunction with a sports lighting design specialist.

The design and installation contractor proposals should be carried out and reviewed by a qualified floodlighting specialist with corporate membership of the Illuminating Engineering Society of Australia and New Zealand (MIES ANZ or higher).

A list of corporate members may be found by contacting the IES: The Lighting Society via www.iesanz.org/

Lighting Capital Project Budget Elements

The following is a summary of the cost elements that will typically arise in a cricket lighting project.

Geotechnical (soil report)
Undertake a soil test at each proposed pole location.
A likely 4 pole layout will require 4 site test bore holes and an associated Geotechnical report.

Geotechnical advice is essential to minimise cost risk for construction of foundations and should disclose if the proposed pole locations contain land fill, chemically aggressive soils, rock at shallow depth all of which can contribute extra cost for foundations.

Floodlights supply
Supply costs should include floodlight, lamp, site delivery and a suitable warranty.

Floodlights installation
Installation costs should include the labour to take delivery, operationally check, check the beam distribution is correctly set and mount the floodlight onto the pole, or more usually a pole cross arm.

Pole supply
Pole supply involves the provision of a suitable pole of the correct height and duty to carry the quantity of floodlights proposed. The pole supply should include supply and freight to site and offloading at suitable positions close to the point of erection at site. Check the requirements for foundation cages and ragbolts assemblies required to be cast into the foundations. Depending on the foundation design these will be either by the pole supplier or part of the civil works construction of the pole foundations.

Pole installation
Installation costs should include assembly of the light poles at site. Note rigid steel poles usually come delivered in sections that require site assembly to the manufacturer’s instructions. Obtain specific installation instructions for any poles proposed with a lowering headframe or facilities for personal access and ensure inclusion for all correct installation measures.

Foundations
Concrete pole foundations are usually required, suitably designed by a professional structural engineer. The type of foundation will be determined based on the site conditions disclosed by the Geotechnical report. Common types include concrete bored piers and raft footings. Certification of the structural design and provision of building permits should also be allowed under this element.
Lifting / Cranage

Pole installation, aiming of floodlights and subsequent maintenance will usually involve high lift access machinery. Equipment such as crane trucks involves considering access both for the initial installation and subsequent maintenance.

Plan locations that do not entail access over the playing surface wherever possible to prevent oval damage, particularly during wet weather periods, as the vehicle weights are substantial.

Power supply

Electrical power consumption for floodlights is significant and is often much more than the clubroom and change facilities. Therefore plan for the anticipated installed load and make early application for any required power supply upgrades as this will likely take time to implement.

By way of example a Class III venue on an oval equal to a full size AFL oval may typically require 52 floodlights x 2Kw = 104 Kw which is a substantial load. Class II and Class I venues will be higher.

The power supply may entail having an electricity substation dedicated to the site or installed within the street which abuts the site. Works also include the liaison with the electricity distribution business to obtain site power supply connection.

Metering

Electrical bill metering requires clarification. In many instances metering for existing sports lighting may be lumped together with pavilion building services power. Under a new or upgraded installation it needs to be determined how the customer wishes to have the electricity consumption accounted for and what metering tariff is optimal for the site and its usage.

Separate electricity billing of the sports floodlighting use may well be required and/or advisable.

Floodlighting distribution boards

The electrical installation design will need to make provision for the Electrical Distribution Boards required to supply the new floodlights. This will usually be via a dedicated switchboard devoted to the floodlighting installation and may likely house the lighting controls where such controls are not remotely located in the field at each floodlight pole.

Lighting switching controls

Thought should be given to the methods of controls and the separate user groups that will be given access to the floodlight installation. Control may be via simple manual key switch controls or via keypad / touch screen type networked lighting controls. In addition remote access to turn floodlights on and off and to monitor the status of the floodlights on or off may be desired either now or in the future.

Cabling

Electrical cabling is required between the point of power supply to the floodlighting distribution board(s) and thence to each sports floodlighting pole.

The cabling arrangement will be devised to suit the switching flexibility required. Therefore it is important to either specify or agree with the designer the levels of switching flexibility required and whether only certain poles are required to operate under certain modes of operation.

Underground works (eg. pits and conduits)

The underground works are a significant cost element for many floodlight projects due to the large site distances around cricket playing fields.

Such works need to anticipate the trenching, backfilling, laying of safety warning tapes and markers in order to install the conduits. The works will commonly involve under boring of hard paved surfaces including paths and car park crossings and the concrete aprons around pavilions and paved spectator areas.

Underground pits and conduits are layed to suit the feed out to the sports floodlighting poles and may include ancillary conduits earmarked for future design such as electronic scoreboards, bowling machines or allied provisions for public lighting.

Lightning protection

Design to ensure lightning is safely conveyed to earth per AS 1768 requirements.
Test, aim and commission

Testing will involve functional checks and test on the electrical installation switchboard(s) and a check to ensure all lighting is functional and safe to operate.

To obtain the required lighting performance, close attention to the aiming of the floodlights is essential. A professionally aimed installation is important to realise the specified design performance.

A design aiming diagram is required that shows the position on the ground to which each floodlight is directed. This is an important part of the installation record and can be used to restore to designed arrangement should aiming become disrupted in future.

Maintenance records

Maintenance records enable the performance of the floodlighting installation to be retained through life. Such records should contain details of the routine maintenance procedures, parts details such as recommended lamps to effect replacements and the aiming record as noted above.

Design and project management

Design and project management fees will be expended to undertake design and oversee the implementation through construction and final commissioning and for which due allowance needs to be made.
Lighting Operation needs to anticipate cost allowances for the following elements.

**Energy consumption**
Billing costs for energy consumed (Kwhrs) and, depending on energy tariff structure, power demand taken (Kw) will occur.

**Maintenance**
ROUTINE MAINTENANCE WILL BE REQUIRED.
All lamps reduce their light output over their service life and spot lamp failures will also occur from time to time. Costs to make replacement involves the cost to supply the replacement lamp and the electrical contractor charge for high access equipment hire and contractor time on site to gain access, effect the lamp replacements and test functional operation.

Routine maintenance costs are also associated with annual inspections of electrical and structural elements.

For Metal Halide Lamps conventionally used, bulk lamp replacement will need to factored as lamps reach the end of their maintained service life.

Owing to the costs involved, strategies should be considered that target reduced maintenance requirements. Examples include New Solid State Lighting (eg. LED) technologies and half switching schemes that allow lamp groups to be cycled to equalise and reduce lamp run hours.

Operational controls such as remote access and user identifications and control systems that can relay information regarding luminaire operational status and early warning of abnormal operating conditions are also effective considerations.

LED lighting systems, depending on selection, can offer the further capacity for dimming of lighting levels to accommodate different play and usage options, as well as wireless control reporting of operational and maintenance status down to the individual floodlight.

**Assessing supplier lighting proposals**
Community cricket clubs will often find it challenging to assess the competing claims of lighting suppliers advocating use of their systems.

Professional lighting design review of submission proposals by experienced persons is therefore recommended which can check and compare the following information:

- Lighting Designer and Manufacturer.
- Make and model of floodlights used and their locations including mounting heights.
- Maintenance Illuminance plot (horizontal at ground level).
- Minimum and Maximum illuminances in square and infield.
- Uniformities U1 and U2 in square and infield.
- Vertical illuminance calculations.
- Light loss factor used with the maintenance illuminance.
- Maximum Glare Rating at 1.5m above ground at all standard observer positions and specifically in the directions viewing the wicket.
- Lamps used with corresponding Ra 8 CRI, Colour Temperature and Lumen Maintenance Curve.
- Basis for Dirt Depreciation Factor applied to the floodlight type(s).
- Spill lighting calculations to AS 4282 at each site property boundary to include the lighting technical parameters referenced in the standard.
- Luminous Intensity compliance to Aerodrome Standard MOS 139 and any other applicable aviation standards where the installation is within 6kms of an aerodrome.
LIGHTING FOR INDOOR CRICKET

This section of the Guidance Note refers to two specific and distinct elements of lighting for indoor cricket:

1. Indoor Cricket courts
2. Indoor practice nets

Indoor Cricket ‘Courts’

The lighting recommendations pertain to the Indoor Cricket ‘court’ play area described in Guidance Note 07 – Indoor Cricket.

The minimum play size is a rectangular space 28.0-30.0m long and 10.5-12.0m wide and roofed by flat netting 4.0-4.5m high.

The ball used is a modified softer ball making it lighter than a conventional outdoor cricket ball but otherwise has similar characteristics of size and stitching.

Indoor cricket ‘court’ play is designed to specifically appeal to a wide range of participants of mixed gender with a wide spectrum of abilities. It is a fast moving sport designed to maximise participation for all players.

Lighting standards and guideline recommendations

Australian Standard AS 2560.2.3 considers the Lighting for Multi-purpose Indoor Sports Centres and sets a recommendation for competitive play as a minimum maintained average illuminance of 500 Lux with a uniformity of 0.7 Minimum to Average at 1m above floor level.

There is however no Australian Standard specifically directed at the lighting for Indoor Cricket or the subdivision of the internal lit space into a series of ‘Courts’.

European Standard EN 12193 does considers Indoor Cricket but the reference area is a larger 32m x 20m open hall space rather than a ‘court’. It contains a range of illuminance recommendations being:

- **Class I** – 750 Lux; Uniformity Min to avg= 0.7
- **Class II** – 500 Lux; Uniformity Min to avg= 0.7
- **Class III** – 300 Lux; Uniformity Min to avg= 0.7

The measurement plane is taken as the ground level.

The ECB Indoor Cricket Facilities – Design Guidelines – TS7 (2011) specifically considers Indoor Cricket Courts and recommends a (minimum) average maintained illuminance level for Club Use to National Level of 500 Lux; Uniformity Minimum to Average = 0.8.

The measurement plane is not defined but is assumed as being at ground level.

**It is recommended that Indoor Cricket Courts used for competition comply with EN12193 Class II requirements (500 Lux) as a minimum which is consistent with current AS 2560.2.2 illuminance requirements that have directed multi-purpose indoor sports hall specifications.**

Where uniformity is further improved from 0.7 to 0.8 it will also permit compliance with the current ECB Indoor Cricket Facilities – Design Guidelines and uniformities specified for practice nets.
Indoor Cricket Practice ‘Nets’

Indoor cricket practice nets anticipate function as per outdoor cricket practice nets with a similar general size of 33m x 4m.

Lighting standards and guideline recommendations

A key differentiating factor between Indoor Cricket Practice Net lighting and Indoor Cricket Courts is the use of a standard hard cricket ball. As such, the lighting requirements will be set higher to improve batter and bowler safety from the ball as a small fast moving hard projectile.

European Standard EN 12193 considers Indoor ‘Cricket Nets’ at the reference area of 33m x 4m. It contains a range of illuminance recommendations being:

- **Class I** – 1500 Lux; Uniformity Min to avg= 0.8
- **Class II** – 1000 Lux; Uniformity Min to avg= 0.8
- **Class III** – 750 Lux; Uniformity Min to avg= 0.8

The measurement plane is taken as ground level.

The above lighting recommendations align with those contained in the ‘ECB Facilities Briefs and Guidance Notes for Indoor Sports Halls with Cricket provision – TS3’ in which:

- **Class I** equates to Low Level Club / Local Club
- **Class II** equates to Mid-Level Competition Regional / Club Level
- **Class III** equates to Top Level Competition International / National Level.

For an indoor sports facility intending to cater for cricket ‘practice nets’ as opposed to indoor cricket ‘courts’, hard ball use needs to be anticipated and the capacity to illuminate to the above standards is recommended in order to deliver the capacity to more safely assess the ball movement at high speed and mitigate the increased potential for injury.

Capacity to flexibility ‘convert down’ to ‘court’ style operation, where desired, could be accommodated with switch down or dimmed lighting controls.

As with outdoor cricket practice nets, take account of the lighting transmission loss due to nets.
Refer to AS 2560.2.2 for general lighting guidance on lighting matters such as:
- General design objectives
- Interior background colour and reflectance
- Glare control
- Daylighting
- Selection of lighting systems and equipment

Specific note is made of the following aspects.

**Independent operation**
Consider lighting of each indoor court or practice net on an individual basis such that lighting compliance of one court is not dependent on the operation of any adjacent net(s) or court(s).

**Background contrasts**
Light coloured walls are recommended for indoor cricket. The ECB Guidelines TS3 and TS7 recommend reflectances of 0.7 to be obtained notably with white painted walls and ceiling.

AS 1680.2.2 multi-purpose recommendations are similar for ceilings at 0.6 to 0.8 reflectance and 0.3 to 0.6 wall reflectance recommended range. Matt finishes will help avoid unwanted reflectances from daylight / artificial light sources back to participants.

**Glare control from luminaires**
To reduce glare to participants and spectators, positioning away from the normal lines of sight will help reduce potential for glare.

The pitch sets the preferred play orientation. Critical viewing along this axis will be aided by viewing rectangular luminaires endwise. That is running rows of luminaires aligned with the pitch axis instead of across it.

Luminaire designs which incorporate reflectors, lens or louvres designed to control the luminance and high angle light distribution will assist player comfort provided the spacings ensure an overlapping contribution from multiple light sources and a uniform lighting coverage of the play area.

**Daylight**
Maximise the use of daylight wherever possible with due consideration to shading of roof lights and windows to avoid daylight sky glare or glare due to beam sunlight penetration particularly at low sun angles.

**Multi-purpose sports capability**
Consider whether the venue is to cater for other sports use to maximise utility and factor any restriction on lighting placements and/or designs that pertain to the other sports use.

**Continuation of an event in case of lighting failure**
The requirements in the event of lighting failure need to be considered. At a community level the need to restage training or a match may be able to be managed where the likelihood of such occurrences are expected to be infrequent (ie. where mains supply is unusually interrupted).

In other locations where supply interruptions are more probable, consider the need for power supply backups and/or hot restrike lamp systems to permit restoration of sports lighting after an interruption.

**Safe movement**
Verify the spectator areas at the fringe of indoor cricket play spaces will be satisfactorily lit by the contributory light spill from the cricket play areas and provide ancillary lighting as necessary. Consider Australian Standard AS 1680.0:2009 sets 20 Lux as an indoor minimum for safe movement in publicly accessible spaces.

**Exit and emergency lighting**
Provide Exit and Emergency lighting in compliance with the relevant National Construction Code and AS 2293.

**Controls, operation and maintenance**
Lighting installations should be simply controlled and designed to allow flexibility of operation.

Simple zoning can avoid the need to operate courts or pitches not in use. Capacity to daylight link and/or use occupancy sensor lighting controls will help reduce energy and running costs when daylight levels are adequate or when a space is not in use.

Controls should be located in non-publically controlled areas such as reception / management offices accessible to duty staff.

Consider maintenance access to lighting placed above cricket nets.

Select lamps with long lifetimes to help reduce the need for frequent access. This is available with Fluorescent and Solid State Lighting (eg. LED).

Select also with regard to capacity to link with Intelligent Energy Management controls to minimise energy and maintenance burden.
### DEFINITIONS

The following definitions are derived from AS 2560.2.1, AS 3665, the IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 and Cricket Oval and Practice Wickets Floodlighting - Queensland Cricket Technical Guidelines.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circle</strong></td>
<td>The line dividing the infield from the outfield.</td>
</tr>
<tr>
<td><strong>Colour Rendering Index (CRI)</strong></td>
<td>The ability of a light source to faithfully reproduce colour in objects. The CRI is expressed on a scale from 0-100, where 100 is the best. Sometimes also referenced as Ra or Ra8, the latter denoting the CRI as evaluated with respect to 8 standardised colours.</td>
</tr>
<tr>
<td><strong>Colour Temperature</strong></td>
<td>The overall colour appearance of the light itself when referring to a source as either ‘warm’ or ‘cool’. Colour temperature is measured in Kelvin. Lower colour temperature (&lt; 4000K) represents ‘warm’ light; higher (&gt;4000K) represents ‘cool’ light. May be referred to as symbol ‘Tk’.</td>
</tr>
<tr>
<td><strong>Control Gear</strong></td>
<td>General term for the electrical equipment to start a High Intensity Discharge (HID) Metal Halide lamp when power is applied and then to limit the electrical current once it is running. Sometimes also called the “ballast”.</td>
</tr>
<tr>
<td><strong>Field of Play (FOP)</strong></td>
<td>The cricket field of play is typically an oval shaped area covered in grass or artificial turf contained within a defined boundary. There is no fixed dimension for the oval size and the diameter can vary. The playing area is demarcated by a line or rope called the boundary. Also called the Principal Playing Area (PPA).</td>
</tr>
<tr>
<td><strong>Glare</strong></td>
<td>Visual condition in which there is a discomfort or impairment of vision, or both, caused by an unsuitable distribution or range of illuminance, or due to extreme contrasts in the field of vision.</td>
</tr>
<tr>
<td><strong>Glare Rating (GR)</strong></td>
<td>A numerical rating on scale of 0 to 100 representing the degree of glare from a lighting system for given observer positions and viewing directions. Higher values correspond to greater glare from the lighting system. Refer CIE 112.</td>
</tr>
</tbody>
</table>
| **Illuminance**               | The intensity of light falling on a surface and is measured in lux. It is independent of surface colour or texture and simple to measure using an illuminance meter. Commonly represented by the symbol ‘E’. May be either the Initial or Maintenance Illuminance and may be commonly measured as ‘horizontal’ or ‘vertical’ where the following definitions apply:  
  - Initial Average Illuminance – that initially provided by the lighting system when it is new and by convention after lamps are aged 100 hrs. At this time there is taken to be no depreciation of light due to lamp, luminaire or dirt depreciation factors.  
  - Maintenance average Illuminance – The value below which the average illuminance on the specified surface is not allowed to fall. It is the minimum illuminance at which maintenance operations, such as replacing lamps and cleaning the luminaires are to be carried out.  
  - Horizontal Illuminance – The value calculated or measured incident on the flat playing field directly from above, that is the incident vertically at 90 degrees to it. Measured with an illuminance meter on the ground facing up.  
  - Vertical Illuminance – The value calculated or measured incident on a defined vertical plane at a specified height and facing in the specified direction. Measured with an illuminance meter flat to the said surface facing in the specified direction. |
| **Illuminance Meter**         | A device for measuring illuminance (E) in Lux. Sometimes also referred to as a Lux Meter. |
| **Infield**                   | An area 27.4m from the pitch centreline.                                                                                                  |
| **Lamp**                      | The light source – bulb, tube.                                                                                                            |
| **Louvre**                    | An external optical assembly used to control light distribution from a luminaire – typically a frame with several parallel blades.           |
| **Luminaire**                 | The international term for a light fitting into which a lamp is installed – also called a floodlight.                                      |
| **Lux**                       | The unit of measurement of Illuminance.                                                                                                   |
| **Obtrusive Light**           | Spill light which, because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information. |
| **Outfield**                  | The Outfield is the part of the field of play between the infield and the boundary.                                                        |
| **Pitch**                     | The pitch is a rectangular area of the field of play 20.12m in length and between 1.83m to 3.05m width (range depending on surface type and level of competition played), nominally in the centre of the field of play. Greater definitions of pitch types and dimensions is provided in Guidance Note 02 – Pitches and Playing Fields. |
| **Square**                    | The square is a specially prepared area of the field of play within which the match pitch is situated.                                      |
| **Uniformity**                | Uniformity is expressed as a ratio. U1 is the minimum illuminance divided by average illuminance taken across the calculation / measurement area. U2 is the minimum illuminance divided by maximum illuminance taken across the calculation / measurement area. |
| **Uniformity Gradient**       | The rate of change of illuminance over a defined area. Determined, usually from calculated illuminance figures, as a portion relating the illuminance at a nominated grid point and the illuminance at the eight immediately adjacent surrounding grid points (eg. 20% for 5m signifies a change of 20% using a 5m grid). (Note: The convention of specifying U1 and U2 this way in Australia is opposite to that commonly found in overseas publications). |
Target Audience – Community facilities only

This Guidance Note is directed at community level cricket facilities and not elite levels of play. They do not cover television broadcast requirements for cricket. Note that in the event a venue requires design to cater for elite levels of play and/or colour television coverage, specialist advice is recommended at an early stage. References may also include IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 for outdoor cricket venues and relevant publications of ‘Free TV Australia’.

Further project specifications are needed

This Guidance Note is not intended to substitute the project specifications that will be necessary to take account of the unique set of circumstances pertaining to each individual project. Be aware that some aspects will likely arise that are not considered in this Guidance Note as a consequence.

Other regulations need consideration

Consider the further requirements of local authorities and changes in regulations and standards that will occur from time to time. This Guidance Note is intended to co-exist with the regulatory framework in which each facility will be developed.

Subject to change

As an area not specifically standardised in Australia, upgrade and amendment to the Floodlighting Guidance Note may occur from time to time without notice to reflect experience and practices considered worth inclusion or necessitating amendment to the information in this Guidance Note.

Ancillary lighting considerations

Lighting guidance is focussed on competitive play and training for Cricket. This Guidance Note does not seek to address lighting needs for other sports codes, public lighting, safety lighting, emergency lighting or interior lighting requirements for building services compliance including spectator areas.

Risk assessment and insurer requirements

The intended lighting of a community cricket facility, and the selection of a particular lighting for standard, or Class, needs to be discussed and agreed on an individual venue basis at the outset by the body responsible for its development. This should be in consultation with the relevant Cricket Association, competition administrator and the venue’s insurers to ensure lighting provided is to a satisfactory standard for the level of risk assessed as associated with the levels of play it is intended will occur under floodlighting.

Conditions of use

Every care has been taken but this Guidance Note is not intended as a substitute for professional oversight and consideration of the lighting particulars of a specific project and Cricket Australia accepts no liability for harm or damage which may be incurred by club or person as a result of implementing these guidelines.

Sample designs, case studies and costing examples

This Guidance Note does not include sample designs or specific lighting case studies at this time. Some sample outdoor Cricket designs may be found in the Cricket Oval and Practice Wickets Floodlighting - Queensland Cricket Technical Guidelines.

With the development of night cricket venues, consideration will be given at a future time to production of Cricket Floodlighting Case Studies, sample designs and budgetary costings as a means of providing further implementation guidance.
Reference documents

Guidance has been drawn from the following publications.

1. IESANZ Lighting Guideline Series LG-4.01 Sports Lighting Cricket
2. Cricket Oval and Practice Wickets Floodlighting - Queensland Cricket Technical Guidelines; - Queensland Cricket & DMA Professional Engineers
5. Australian Standard AS 2560.2.2 – 1986, Sports Lighting – Lighting of multipurpose indoor sports centres
6. Australian Standard AS 2560.2.3 – 2007 Sports Lighting for football (all codes)
10. Australian Standard AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting
13. Civil Aviation Authority MOS139 – Manual of Operating Standards Part 139 – Aerodromes
14. Department of Sport & Recreation Western Australia, Sports Dimensions Guide
15. ECB Facilities Briefs and Guidance Notes for Indoor Sports Halls with Cricket provision – TS3