



Pitch Illuminance Test Procedure

In accordance with the regulations and requirements of the UEFA, an assessment of the pitch illuminance system of a venue which could potentially host a match for television broadcast is required.

It is required that the illuminance test is conducted within the guidelines as provided by UEFA. This will allow for a consistent and objective analysis of the illuminance conditions at all relevant stadiums.

The illuminance test procedure and requirements are listed below.

Inspection Equipment

The illuminance meter used during the illuminance test should be suitable for a floodlighting environment with a wide angle receptive light sensor. The meter must be calibrated yearly.

Test procedure

The playing surface of a football pitch is 68m x 105m. This surface is split into a grid containing 96 points. On each grid point an illuminance test is made to measure the horizontal illuminance and the vertical illuminance at four different angles. The test will require 480 illuminance tests in total. Please ensure that the correct orientation is used when marking the grid plan positions. The orientation may be seen in the 'pitch orientation plan'.

Care should be taken while recording illuminance readings. The illuminance meter should be positioned consistently at the correct angle for the intended measurement. The testing personnel must not create any shadows that may impinge upon the test instrument. The illuminance test instrument should be at a level of 1m above the playing surface.

The illuminance reading at each grid point should be recorded on the relevant illuminance grid plan.

Horizontal test: the test instrument is positioned facing up, 1m above the playing surface parallel to the pitch at every grid point.

Vertical test: the test instrument is positioned 1m above the playing surface perpendicular to the pitch at every grid point. The test instrument should then be adjusted for each of the four test positions. The test positions are indicated on the 'vertical illuminance grid plan' and are at 0/360° , 90° , 180° , 270°. This procedure should be repeated at all 96 grid points.

Colour test: the playing surface should be tested at 3 points to measure the illuminance colour temperature and illuminance colour rendering. The three positions are indicated on the 'horizontal grid plan' at position X , Y (centre pitch) and Z.

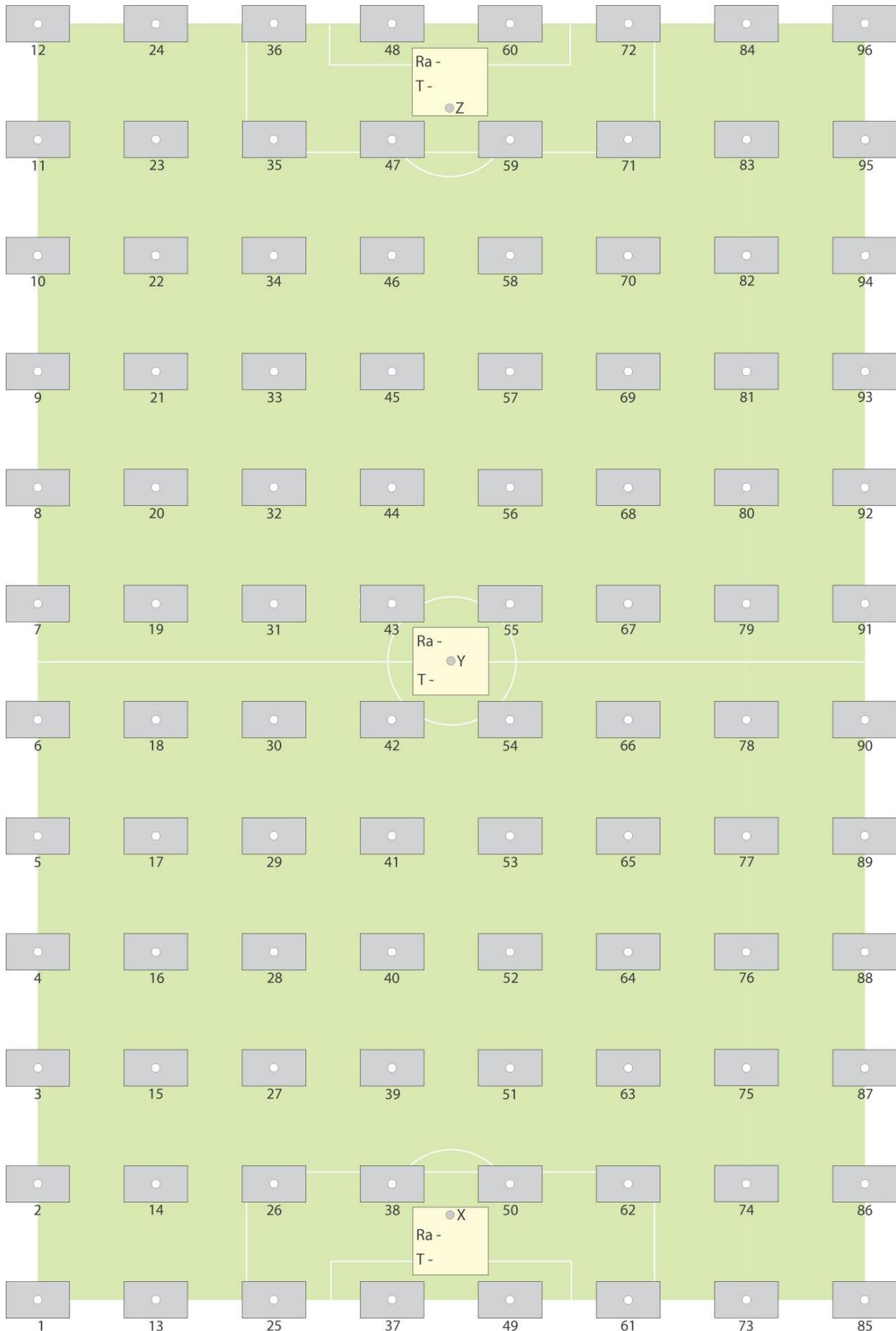
Test Analysis

Please submit the pitch illuminance test to UEFA for analysis. The report data sheets are required with all information complete. UEFA will use the information supplied to evaluate the illuminance conditions at the stadium.

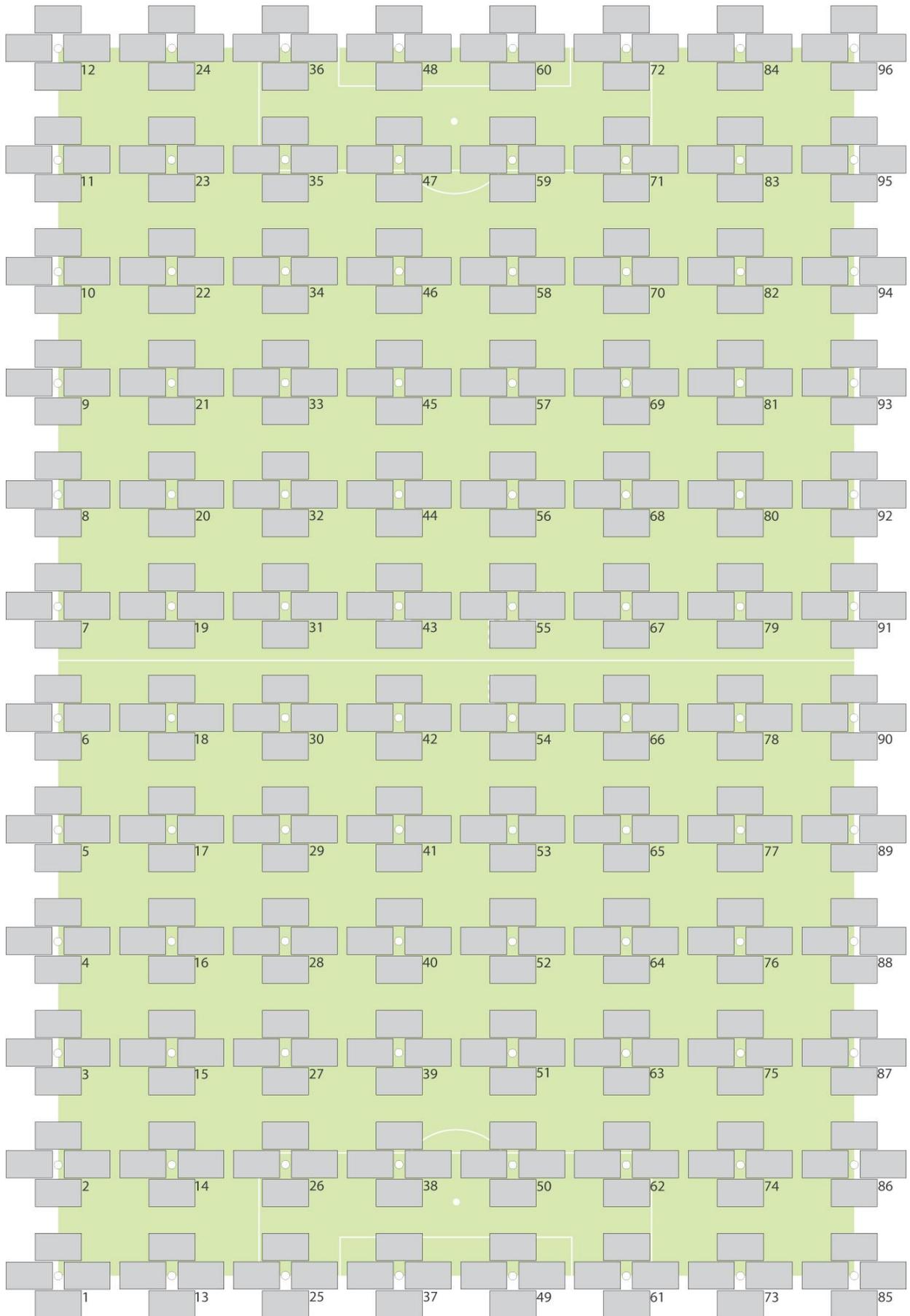
Report Information

Name of stadium:	<input type="text"/>	
Name of club:	<input type="text"/>	
Date of inspection:	<input type="text"/>	
Time:	<input type="text"/>	
	Luminaire 1:	Luminaire 2:
Manufacturer:	<input type="text"/>	<input type="text"/>
Model:	<input type="text"/>	<input type="text"/>
Lamp:	<input type="text"/>	<input type="text"/>
Illuminance Meter:	<input type="text"/>	
Serial Number:	<input type="text"/>	
Calibration Date:	<input type="text"/>	
Colour Meter:	<input type="text"/>	
Serial Number:	<input type="text"/>	
Calibration Date:	<input type="text"/>	
Pitch measurements:	<input type="text"/>	
Weather conditions:	<input type="text"/>	
Illuminance Test Company:	<input type="text"/>	
Address:	<input type="text"/>	
Phone / email:	<input type="text"/>	
Inspection by:	<input type="text"/>	
Signature:	<input type="text"/>	

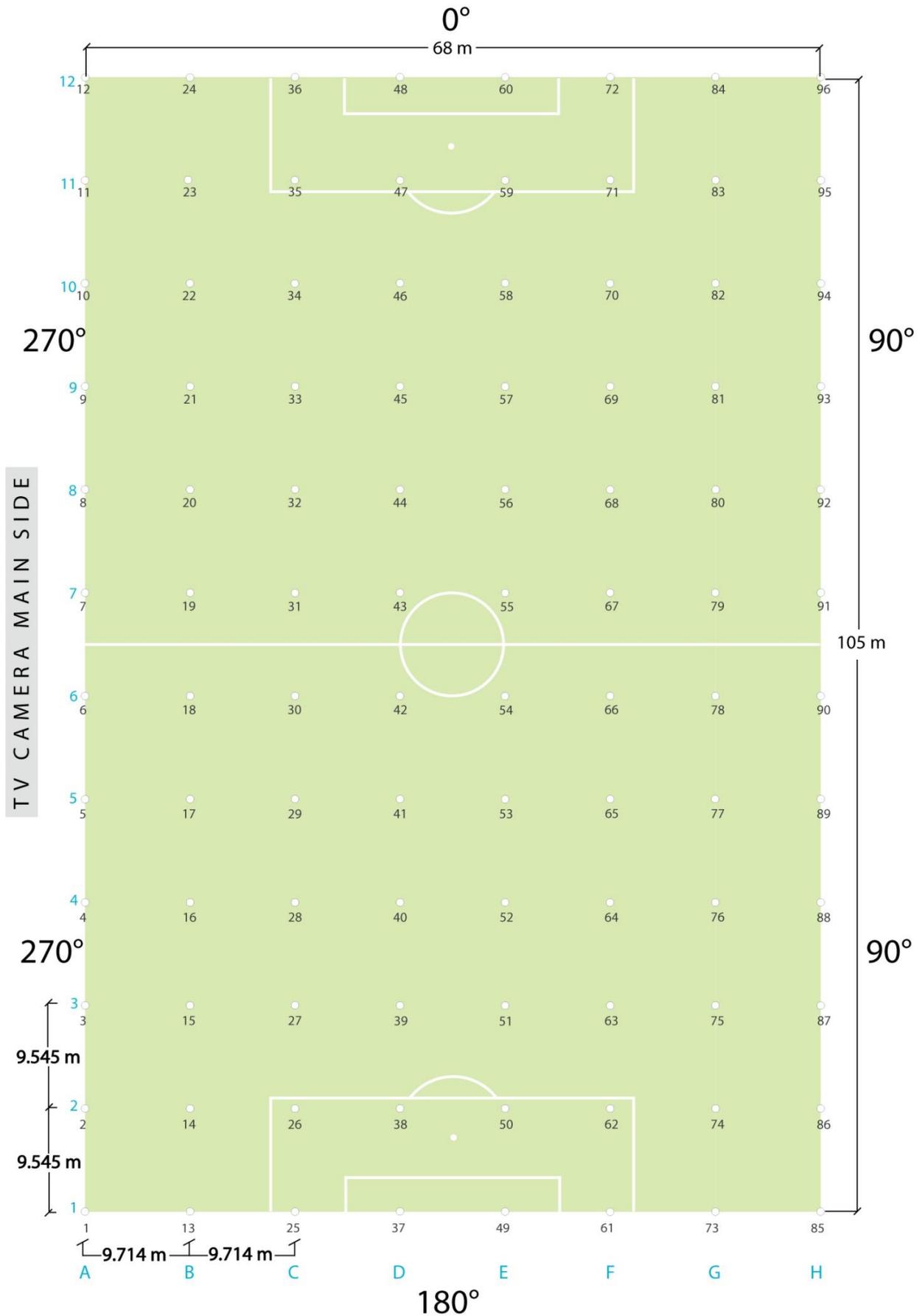
Horizontal Illuminance Grid Plan



Vertical Illuminance Grid Plan



Illuminance Test – pitch orientation plan



Summary of Report Data

Values of test measurements	Stadium Reading
Eh ave average horizontal lux value	
Eh max maximum horizontal lux value	
Eh min minimum horizontal lux value	
Uniformity U1h	
Uniformity U2h	
Ev ave-0° average illuminance on 0° vertical plane	
Uniformity U1v-0°	
Uniformity U2v-0°	
Ev ave-90° average illuminance on 90° vertical plane	
Uniformity U1v-90°	
Uniformity U2v-90°	
Ev ave-180° average illuminance on 180° vertical plane	
Uniformity U1v-180°	
Uniformity U2v-180°	
Ev ave-270° average illuminance on 270° vertical plane	
Uniformity U1v-270°	
Uniformity U2v-270°	
Glare Ratings (GR)	
Colour rendering (Ra)	
Colour temperature (Tk)	

Pitch Illuminance Power Supply

Power Supply Evaluation

It is essential that the power supply for the pitch illuminance system is reliable to ensure football match and television broadcast continuity without disruption. A suitable and alternative secondary power supply in the case of power failure by any means to the primary source is also required.

Please provide the power supply facility and operational details as listed below.

Name of stadium:

Grid power supply

No. of feeder lines+transformers/kV/MW:

Supply design (e.g. open half-ring):

Back-up power supply (Second grid source / Generator / UPS batteries)

Type: Grid Generator (no/MW) UPS (no/kW)

Switching between grid and back-up power supplies

Back-up operation (parallel/standby/standby running):

Is the switchover process (grid to back-up) automatic: Yes No

Please describe the process of back-up operation in case of a grid power failure:

Is a UPS battery system installed in the stadium illuminance system? Yes /No

What percentages of lights are connected to the UPS battery system?%

What is the operations time at full load of the UPS system? minutes

Type of lights

Cold re-strike % overall / % on uninterrupted back-up:

Hot re-strike % overall / % on uninterrupted back-up:

Please provide an electrical overview diagram of the stadium power system from mid-voltage/0.4kV transformers, including main switch boards and back-up systems towards the illuminance system. The diagram needs to show the operation process for the illuminance system in case of a grid power failure.

Illuminance measurement



HORIZONTAL ILLUMINANCE TEST

The Receptor Head is mounted parallel to the pitch 1m above the pitch surface. An illuminance reading should be taken at all 96 points.

Ensure the meter is consistently aligned and level. This may be achieved with the use of a spirit level or other levelling devices.



VERTICAL ILLUMINANCE TEST

The Receptor Head is mounted perpendicular to the pitch 1m above the pitch surface. An illuminance reading should be taken for each vertical plane of 0° , 90° , 180° and 270° on all 96 points.

Ensure the meter is consistently aligned and level. This may be achieved with the use of a spirit level or other alignment or levelling devices.

Glossary of terms

E	the quantity of light upon a surface at a given point, measured in Lux.
E_{h ave}	the average illuminance on the horizontal plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{h max}	the maximum illuminance level on the horizontal plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{h min}	the minimum illuminance level on the horizontal plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{v ave}	the average illuminance on the vertical plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{v 270°}	the illuminance value on the given vertical plane of the specified reference test point 1.0m above the pitch surface, measured in Lux
E_{v4 (4 point ave)}	the average illuminance of the 4 vertical planes at a given point on the vertical plane 1.0m above the pitch surface, measured in Lux.
E_{v4-96 min(4 point min)}	the minimum illuminance value of E_{v4 (4 point ave)} at any of the 96 reference points.
E_{v4-96 max(4 point max)}	the maximum illuminance value of E_{v4 (4 point ave)} at any of the 96 reference points.
E_{v4-96 ave(4 point ave)}	the average illuminance value of E_{v4(4 point ave)} of the 96 reference points. Calculated by making the sum of the E_{v4 (4 point ave)} for all 96 reference points and dividing by 96, measured in Lux.
E_{v 270°ave}	the average illuminance in the given vertical plane (in this case 270°) of the specified reference test points 1.0m above the pitch surface, measured in Lux. Calculated by making the sum of the E_{v270°} for all 96 reference points and dividing by 96.
E_{v 0°max}	the maximum illuminance level in the given vertical plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{v 180° min}	the minimum illuminance level in the given vertical plane of the specified reference test points 1.0m above the pitch surface, measured in Lux.
E_{cam ave}	the average illuminance towards the main camera of the specified reference test points 1.0m above the pitch, measured in Lux.
Lux	the unit of illuminance in lumen/m ² . 1 Lux = 1 lumen/m ²
Lumen	the luminous flux of a light source, measured in Lumens (symbol lm).

Ra	the colour rendering index. The quality of colour reproduction produced by a light source as compared to natural daylight conditions, on a scale of Ra0 to Ra100.
Tk	the colour temperature of a light source measured in kelvins (K).
FF	the modulation of luminance on a given plane during a complete cycle expressed as a percentage of the relation between the maximum luminance value and minimum luminance value during a full cycle.
GR	the glare rating, the degree of discomfort caused by the illuminance system to a person on the pitch. The glare rating is calculated at 1.75m above the pitch level.
U1h	a measure of horizontal illuminance uniformity. The ratio of minimum illuminance to maximum illuminance of all 96 horizontal illuminance points.
U2h	a measure of horizontal illuminance uniformity. The ratio of minimum illuminance to average illuminance of all 96 horizontal illuminance points.
U1v	a measure of vertical illuminance uniformity. The ratio of minimum illuminance to maximum illuminance in the given plane of all 96 vertical illuminance points.
U2v	a measure of vertical illuminance uniformity. The ratio of minimum illuminance to average illuminance in the given plane of all 96 vertical illuminance points.
U1v (4-96 point)	a measure of vertical illuminance and illuminance modelling uniformity. The ratio of Ev4 (4 point min) minimum illuminance to Ev4 (4 point max) maximum illuminance of all 96 reference points vertical illuminance points.
U2v (4-96 point)	a measure of vertical illuminance and illuminance modelling uniformity. The ratio of Ev4 (4 point min) minimum illuminance to Ev4 (4 point ave) average illuminance of all 96 reference points vertical illuminance points.
U1v-270°	a measure of vertical illuminance uniformity on the 270° plane. The ratio of minimum illuminance to maximum illuminance in all 96 vertical illuminance points.
U2v-270°	a measure of vertical illuminance uniformity on the 270° plane. The ratio of minimum illuminance to average illuminance in all 96 vertical illuminance points.
MAUR	Minimum Adjacent Uniformity Ratio. Any two adjacent points on any given plane in any direction should have a difference no greater than the maximum permitted ratio between the two points as stated in the relevant UEFA Illuminance category using the MAUR reference.
MF	Maintenance Factor. A factor used to calculate the depreciation in a lamp and luminaire performance.
UPS	Uninterruptible Power Supply. A power system to provide instantaneous power by means of energy normally stored in batteries in the case of failure to the primary power source.

Main Camera Side

This indicates the plane of the main camera position for a television broadcast. The main TV camera will be positioned on the TV camera gantry. This location is used within the report to ensure the pitch orientation is correct and consistent for all stadiums. The Main Camera Side is also referred to as the 270° plane when looking at the orientation of the plans and referring to the data.

Main Camera Position

This indicates the position of the main camera for a television broadcast. The main TV camera will be positioned on the TV camera gantry. This location is used within the report to ensure the pitch orientation is correct and consistent for all stadiums.