SPORT | VOLLEYBALL

PERFORMANCE iN LIGHTING

PERFORMANCE iN LIGHTING is specialised in professional lighting for indoor and outdoor, in several countries around the world. Thanks to decades of experience in the field, obtained through dedicated luminaires for both new sports centres and renovation work on existing centres.

PERFORMANCE iN LIGHTING provides right attention to overall design systems, to comply with regulations for all sports, and to assure total glare control in both indoor and outdoor settings.

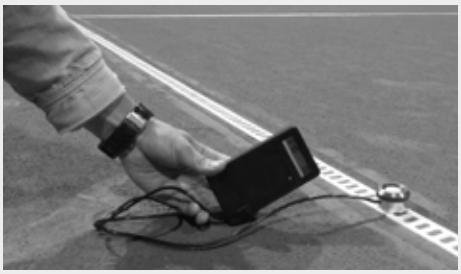
Constant improvement in applications linked with competitive and professional sports environments, with the use of more efficient technical solutions, allow PERFORMANCE iN LIGHTING to offer solutions with high energy savings, resulting in significant reductions in running costs, for safe, comfortable and efficient facilities, available to athletes and spectators alike.

The purpose of this monograph is to provide examples of lighting calculations that involve only horizontal lighting values that usually represents about ninety per cent of all lighting engineering design work.

Therefore, we will not provide examples here of lighting verification that requires vertical values or vertical values in the direction of TV cameras. For this kind of professional applications, please consult the pre-sales support of PERFORMANCE iN LIGHTING.

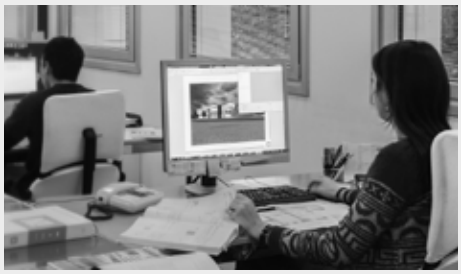
PRE-AFTER SALES SERVICES

The PERFORMANCE iN LIGHTING sales service includes direct and personal project management consultancy at 360 degrees, from the study of the lighting concept and technical feasibility to the evaluation of the financial return of investments to the support on-site during the installation phase through the sampling service.



ON-SITE TECHNICAL OVERWATCHES AND LIGHTING RELIEFS

PERFORMANCE iN LIGHTING provides a team of qualified specialists during all phases of the project: from the design stage, trough on-site technical overwatch and lighting reliefs, verification and lighting calculation. Our professional support team is available for essential projects to ensure not to lose even detail in compliance with current regulations providing certainty to all those who choose PERFORMANCE iN LIGHTING as a technical partner.

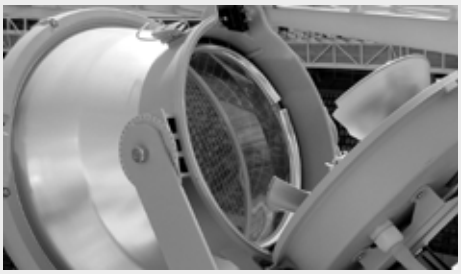


DESIGN AND LIGHTING PLANNING AIDS

The culture of light and lighting planning is being diffused more and more worldwide, and the sensibility of both public administrations and private users is growing to enhance urban areas, artistic and architectural assets, sports and recreational areas, in respect of the place and the environment. PERFORMANCE iN LIGHTING offers accurate advice and assist with lighting verification to grant the best solution possible through the analysis of all our solutions for every peculiar design. PERFORMANCE iN LIGHTING provides lighting solutions for "the space for people", worldwide, and not only as a necessary instrument for life but also as a powerful expressive means for the quality of the environment.

INSTALLATION AIMING AND SETTING SERVICES

PERFORMANCE iN LIGHTING provides a team of qualified specialists to design and elaborate the calculations on-site during the installation phase. The team joints the installation phase for the product aiming, light level testing and settings for big plants, arenas, industries, airports, and large infrastructures to ensure compliance with the current regulations. Choosing these paid services, all actors will have an extra certainty of having chosen PERFORMANCE iN LIGHTING as the right technical partner.



AFTER-SALES SERVICES

The warranty extension proposed by PERFORMANCE iN LIGHTING comes into practice thanks to continuous investments aimed at customer satisfaction. A team of specialised post-sales technicians is always present for an immediate solution to any problem. They are available for issues related to spare parts and after-sales assistance, where there were the conditions dictated by the group policy, to honour the promise made at the time of purchase and set in to solve the problem immediately. Our customers know that whenever they need a replacement part or service, both come directly from PERFORMANCE iN LIGHTING —ensuring compatibility, performance, timeliness, and the highest level of expertise.

BESPOKEN LIGHTING SOLUTIONS

One of the significant values that PERFORMANCE iN LIGHTING provides to customers is the ability to design and develop tailor-made products and lighting solutions, based on the needs of a specific project. Products variants such as un-standard painting colour finishes, different LED light colour temperature, un-catalogued electrical options, custom-made accessories for a peculiar installation are some typical examples. To suit the specific needs of professionals, PERFORMANCE iN LIGHTING can develop product solutions "Ex-Novo" (from scratch in Latin) not included in the standard portfolio. This capability allows PERFORMANCE iN LIGHTING luminaires to achieve a total integration of light in the context of use.

PROJECT LEASING

Sometimes, the initial investment cost for a lighting system frightens off, but, several sports facilities and large municipalities pay substantial electricity fees monthly. The habit that these amounts are being paid nevertheless does not spur people to analyse the subject correctly. The LED technology is an outstanding investment that allows in the short-to-medium time to amortise the initial investment, to save significantly on electric energy and to improve the usability of the installations. Furthermore, outstanding agreements are underway with credit institutions specialised in financial operations to support essential investments of big lighting plants in the most important countries of the European Union. In some countries, PERFORMANCE iN LIGHTING provides the option of an Operating Rental Service (subject to the approval of the Lending Body).

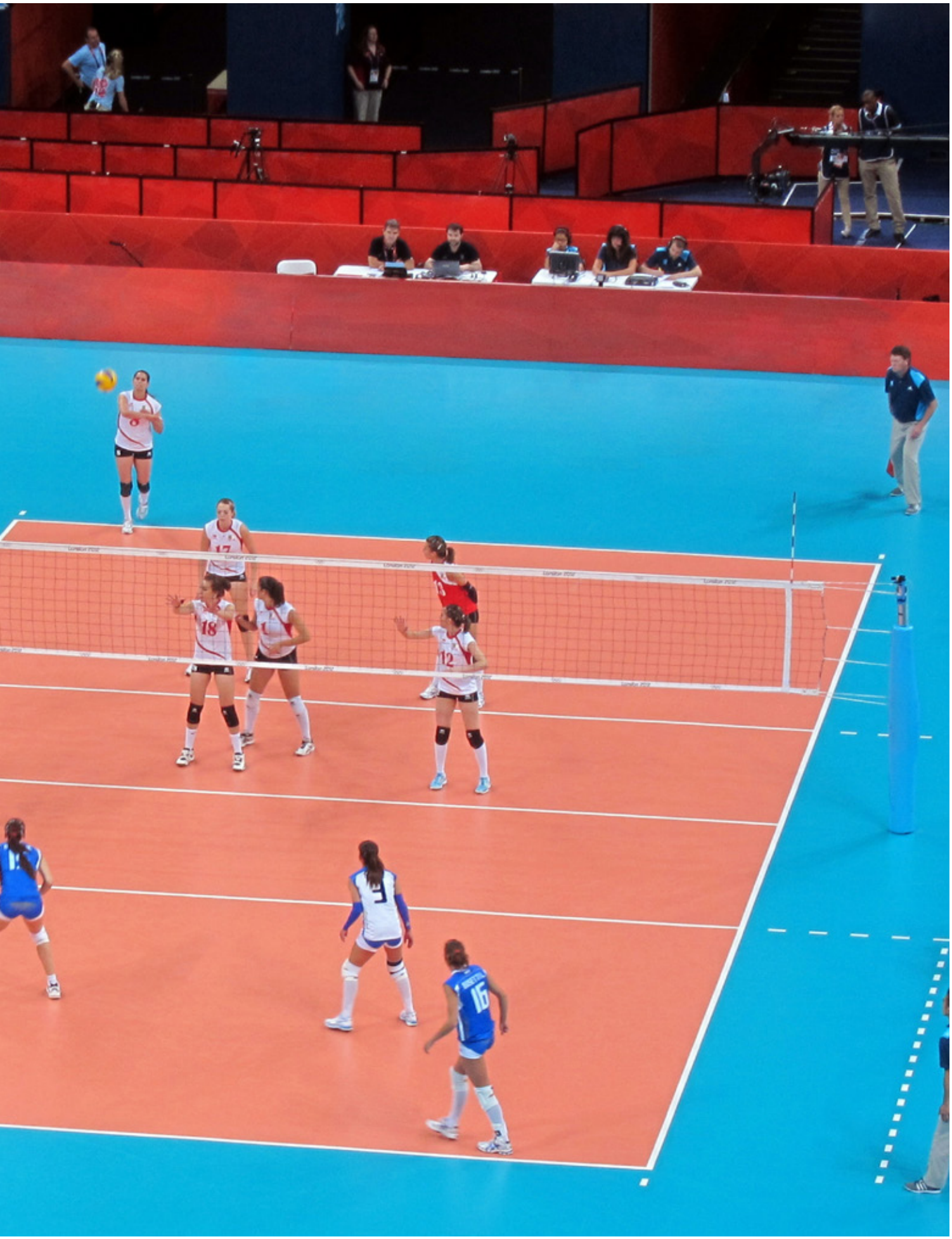

norda
TERMIGAS
Marienplatz
AUTOROTA
SAMSUNG
FERCASSI
FRECCIAROSSA
FOPPAPEDRETTI
TIM
MASTER GROUP SPORT
ENJOY THE ART OF SPORT
Salumi
LORENZI
ReCapital
Advisors&RealEstate
emmecinque
AUTOTORINO
PERREL
MAGONI S.P.A.

VOLLEYBALL

VOLLEYBALL

Volleyball is one of the most popular and widely played sports in the world. Like all ball games, its origins can be traced back to Ancient Greece and Rome when balls were synonymous for recreation and fun. A similar game called "Faustball" (fistball) appeared in Germany in 1893, but volleyball was officially invented in 1895 by William Morgan, a PE teacher at a college belonging to the YMCA (Young Men's Christian Association), an ecumenical organisation that supports youth and their activities, in Holyoke, Massachusetts (USA). Seeking to emulate the success enjoyed by basketball as an indoor sport, on February 9 Morgan gathered together some teachers at Springfield college for a practical demonstration of the new game, initially known as "Mintonette".

It was only on March 10, 1896, that Alfred F. Halstead changed the name of the game from Mintonette to Volleyball. He also managed to introduce it to YMCA colleges all over the US, before it also spread to Canada and later the rest of the American continent. It was brought to Europe during the First World War by American servicemen while in Asia it became prevalent after the 1913 Olympics.
Volleyball spread quickly all over the world requires the creation of an international body that could coordinate the national federations. As such, in 1947 representatives of fifteen federations met in Paris to create the FIVB (Fédération Internationale de Volleyball) to govern, promote and spread the sports of volleyball and beach volleyball across the world.



VOLLEYBALL in the world

IOC - The International Olympic Committee, also known as CIO (from the initials of the original French name: Comite International Olympique), is a Swiss non-governmental organization created by Pierre de Coubertin in 1894 to revive the Olympic Games of ancient Greece through a four-year sporting event where athletes from all countries could compete against each other. It's the highest world sports organism comprises three main constituents: the IOC itself is the supreme authority of the Movement; the International Federations (IFs) and the National Olympic Committees (NOCs). The first two are international non-governmental organisations administering one or several sports at world level and encompassing organisations regulating such sports on a national level. Their mission is to develop, promote and protect the Olympic Movement in their respective countries.

GAISF - Global Association of International Sports Federations includes all sixty-nine CIO recognized federations (twenty-eight from ASOIF, seven from AIOWF and thirty-four from ARISF).

FIVB - The Fédération Internationale de Volleyball, known as FIVB, is the international federation that governs the sport of volleyball and beach volleyball. Founded in 1947 in Paris, it has its headquarters in Lausanne, Switzerland since 1984. The FIVB is an association of national federations, with two-hundred twenty affiliates.

The FIVB is headed by five different confederations that are responsible for running and supervising volleyball activities in the various continents of the world:
CAVB (Confédération Africaine de Volleyball),
NORCECA (North, Central America and Caribbean Volleyball Confederation),
CSV (Confederación Sudamericana de Voleibol),
AVC (Asian Volleyball Confederation),
CEV (Confédération européenne de volleyball).


20:08

VOLLEYBALL in Europe

CEV - The European Volleyball Confederation (Confédération Européenne de Volleyball in French) is the governing body for European volleyball and beach volleyball; based in Luxembourg and currently brings fifty-four national federations together.

CEN - The European Committee for Standardization (Comite European de Normalisation in French), better known by the acronym CEN, is a regulatory body that aims to harmonise and produce technical standards (EN) in Europe in collaboration with national and supranational regulatory agencies such as ISO.

The CEN seeks to facilitate the exchange of goods and services between member countries, harmonising the respective national standards and cooperating with European political, economic and scientific organisations interested in standardisation.

The European standards produced by CEN are usually harmonized and adapted by the individual countries that receive them, such as the UNI in Italy.

EUROPEAN LIGHTING STANDARDS

At international level FIVB and the ECS (European Committee for Standardisation) laid down lighting guidelines and principal rules. The guidelines mainly provide indications of how should be light up volleyball competitions organised by the FIVB at the world or international level. The lighting information are limited, and for this reason, lighting parameters must always be defined and established with the customer in advance.

Consistent with the goals stated at the start of this monograph, the lighting examples that follow are all compliant with the EN 12193:2018 standard. The examples are provided solely for the evaluation of horizontal lighting elements and are divided into INDOOR and OUTDOOR solutions in order to highlight the differences between the two types of tennis lighting systems.

In force by CEN members national standards bodies of Austria, Belgium, Bulgaria,Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary,Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway,Poland,Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

The Lighting Class describes the lighting parameters for the best possible illumination of a playing area. The following table establishes the level of competition and technical parameters.

EN 12193:2018 (indoor - outdoor)

Competition level	Lighting class		
	I	II	III
Local Competition and Training			✓
Regional Competition		✓	
International an National Competition	✓		

EN 12193:2018 (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 24x15 m	III	**200 lux**	0,50	-	-	40	60
	II	**500 lux**	0,70	-	-	40	60
PA 34x19 m	I	**750 lux**	0,70	-	-	35	80

EN 12193:2018 (outdoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 24x15 m	III	**75 lux**	0,50	-	-	55	60
	II	**200 lux**	0,60	-	-	55	60
PA 34x19 m	I	**500 lux**	0,70	-	-	55	70

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
	p. 14				p. 14		
		p. 15					
			p. 15				

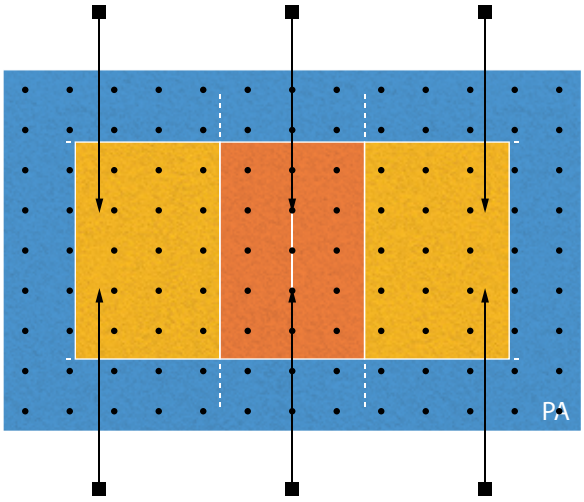
GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
p. 16							
	p. 16						
		p. 17					

EN 12193 | 200 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	13 x 9
Eave (PA)	200 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	60	Glare Rating (Rg)	40



SPD 10 kV

GUELL 2.5

1,43 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306202	A40/W	4000	238 W	6

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

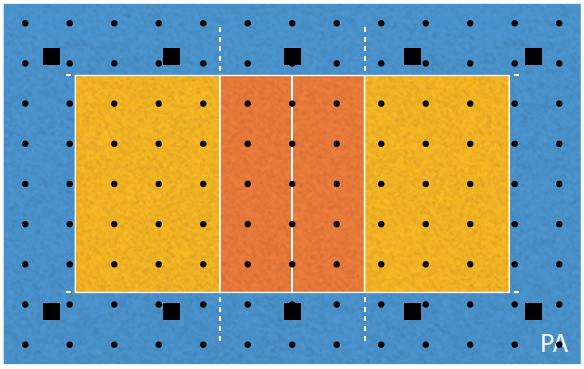
Eave (PA)	205 lux
Uniformity Emin/Eave (PA)	0,68
Glare Rating (Rg)	33

EN 12193 | 200 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	13 x 9
Eave (PA)	200 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	60	Glare Rating (Rg)	40



LAMA+ MINI

1,01 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
3101188	S/EW	4000	101 W	10

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

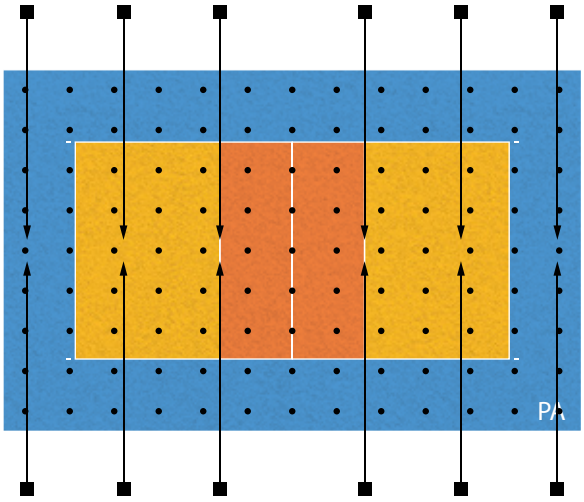
Eave (PA)	210 lux
Uniformity Emin/Eave (PA)	0,69
Glare Rating (Rg)	18

EN 12193 | 500 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	13 x 9
Eave (PA)	500 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	60	Glare Rating (Rg)	40



SPD 10 kV

GUELL 3

3,66 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	12

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

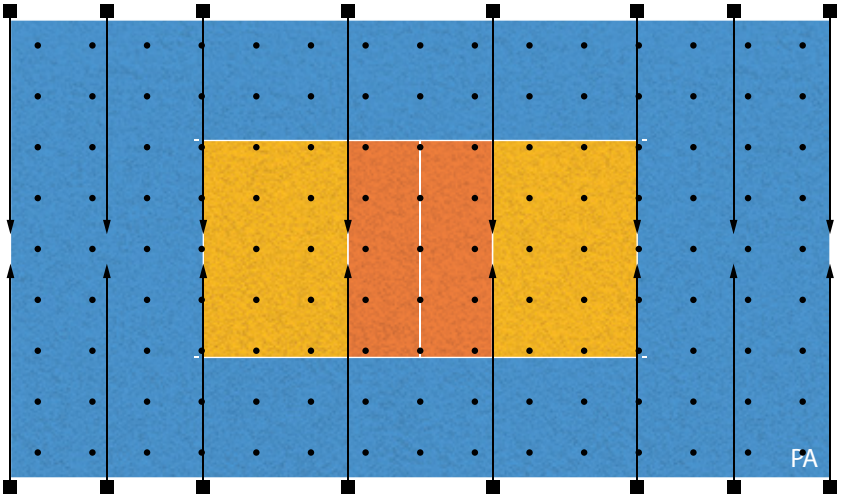
Eave (PA)	506 lux
Uniformity Emin/Eave (PA)	0,76
Glare Rating (Rg)	34

EN 12193 | 750 lux

CLASS I

REQUIREMENTS:

PLAY AREA (PA)	34 x 19 m	Grid Points (PA)	15 x 9
Eave (PA)	750 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	80	Glare Rating (Rg)	35



SPD 10 kV

GUELL 4

7,17 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306128	A50/W	4000	448 W	16

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

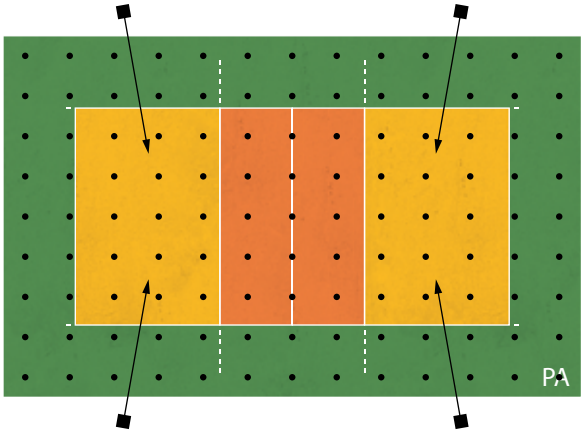
Eave (PA)	786 lux
Uniformity Emin/Eave (PA)	0,79
Glare Rating (Rg)	33

EN 12193 | 75 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	13 x 9
Eave (PA)	75 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	60	Glare Rating (Rg)	55



Lighting calculation at zero light pollution.

GUELL 2

0,53 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
3100129	A40/W	4000	133 W	4

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

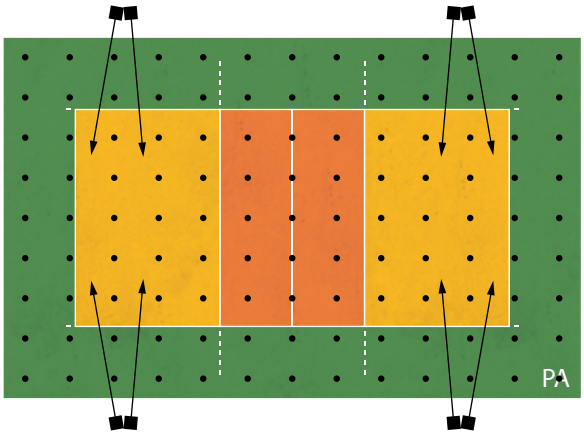
Eave (PA)	78 lux
Uniformity Emin/Eave (PA)	0,68
Glare Rating (Rg)	27

EN 12193 | 200 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	13 x 9
Eave (PA)	200 lux	Emin/Eave (PA)	0,60
Colour Rendering Index (CRI)	60	Glare Rating (Rg)	55



Lighting calculation at zero light pollution.

SPD 10 kV

GUELL 2.5

1,25 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306204	A50/W	4000	156 W	8

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

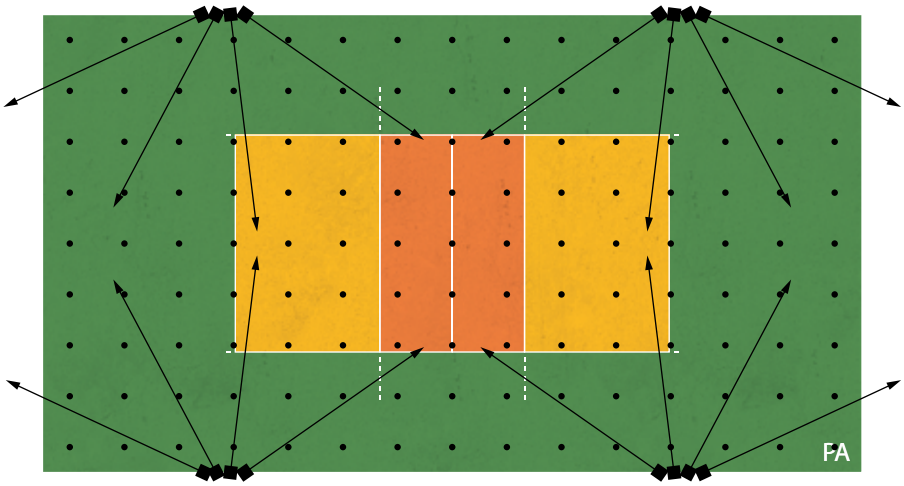
Eave (PA)	219 lux
Uniformity Emin/Eave (PA)	0,72
Glare Rating (Rg)	31

EN 12193 | 500 lux

CLASS I

REQUIREMENTS:

PLAY AREA (PA)	34 x 19 m	Grid Points (PA)	15 x 9
Eave (PA)	500 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	70	Glare Rating (Rg)	55



Lighting calculation at zero light pollution.

SPD 10 kV

GUELL 3

4,88 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	16

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

Eave (PA)	501 lux
Uniformity Emin/Eave (PA)	0,70
Glare Rating (Rg)	34

VOLLEYBALL in Italy

CONI - issue of the International Olympic Committee (IOC), is the authority for regulating and managing territorial sports activities. The Italian National Olympic Committee, a public body responsible for organizing and strengthening national sport, promotes the maximum diffusion of sporting practice.

CONI *- emanazione del Comitato Olimpico Internazionale (CIO), è autorità di disciplina regolazione e gestione delle attività sportive nazionali. Il Comitato Olimpico Nazionale Italiano, Ente pubblico cui è demandata l'organizzazione e il potenziamento dello sport nazionale, promuove la massima diffusione della pratica sportiva.*

FIVAP - The Italian Volleyball Federation (FIPAV), also known as Federvolley, is a sports' organisation affiliated with CONI and has the task of promoting volleyball and beach volleyball and coordinating amateur and competitive activities in Italy.

FIVAP *- La Federazione Italiana Pallavolo (FIPAV), nota anche come Federvolley, è un organismo sportivo affiliato al CONI e ha il compito di promuovere la pratica della pallavolo e del beach volley e coordinarne le attività dilettantistiche e agonistiche in Italia.*

The Lighting Class describes the lighting parameters for the best possible illumination of a playing area. The following table establishes the level of competition and technical parameters.

Le classi di illuminamento descrivono i parametri illuminotecnici per la migliore illuminazione possibile dell'area da gioco. Le seguenti tavole stabiliscono i parametri tecnici richiesti per i vari livelli di competizione.

CONI:2008 (indoor - outdoor)

Competition level	Lighting class		
	I	II	III
Local Competition and Training	✓		
Regional Competition		✓	
International an National Competition			✓

FIPAV (indoor)

Competition level	Lighting class			
	I	II	III	IV
FIPAV Attività agonistica di Vertice Tornei di prima categoria e Campionato degli affiliati – divisioni nazionali di serie A1, maschile e femminile				✓
FIPAV Attività agonistica di Vertice Tornei di prima categoria e Campionato degli affiliati – divisioni nazionali di serie A1, maschile e femminile			✓	
FIPAV Attività agonistica di Vertice Tornei di prima categoria e Campionato degli affiliati – divisioni nazionali di serie A1, maschile e femminile		✓		
FIVB Attività Internazionale con riprese Televisive	✓			

CONI:2008 (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 24x15 m	I	200 lux	0,50	-	-	(40)	(60)
	II	500 lux	0,70	-	-	(40)	(60)
PA 34x19 m	III	750 lux	0,70	-	-	(35)	(80)

CONI:2008 (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 24x15 m	I	100 lux	0,50	-	-	(55)	(60)
	II	200 lux	0,60	-	-	(55)	(60)
PA 34x19 m	III	500 lux	0,70	-	-	(55)	(70)

FIPAV (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 24x15 m	IV	500 lux	0,70	-	-	(55)	(70)
	III	1000 lux	0,70	-	-	-	-
	II	1500 lux	0,70	-	-	-	-
PA 31x19 m	I	1000-1500 lux	0,70	-	-	-	-

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
	p. 22				p. 22		
		p. 23					
			p. 23				

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
	p. 24						
	p. 24						
		p. 25					

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
		p. 26					
							✓
							✓
							✓

The lighting values in brackets are taken by PERFORMANCE iN LIGHTING as a reference from other regulations in case the rule in question does not expressly declare them.

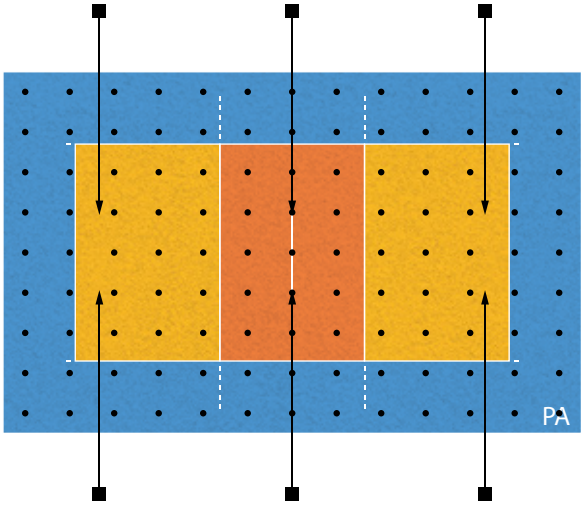
PERFORMANCE iN LIGHTING prende come riferimento da altre normative i valori illuminotecnici espressi tra parentesi qualora non espressamente dichiarati dalla normativa in esame.

CONI | 200 lux

CLASS I

REQUIREMENTS:

PLAY AREA (PA)	(24 x 15) m	Grid Points (PA)	(13 x 9)
Eave (PA)	200 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 2.5

1,43 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306202	A40/W	4000	238 W	6

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

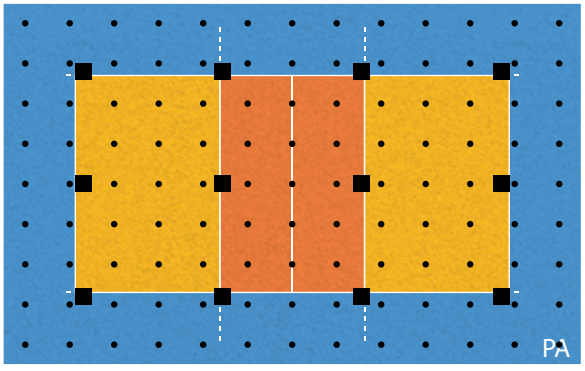
Eave (PA)	105 lux
Uniformity Emin/Eave (PA)	0,68
Glare Rating (Rg)	33

CONI | 200 lux

CLASS I

REQUIREMENTS:

PLAY AREA (PA)	(24 x 15) m	Grid Points (PA)	(13 x 9)
Eave (PA)	200 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



LAMA+ MINI

1,01 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
3101188	S/EW	4000	101 W	10

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

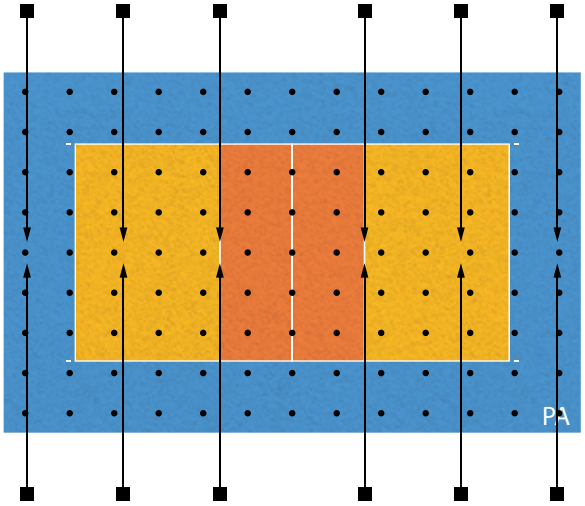
Eave (PA)	210 lux
Uniformity Emin/Eave (PA)	0,69
Glare Rating (Rg)	18

CONI | 500 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	(13 x 9)
Eave (PA)	500 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

3,66 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	12

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

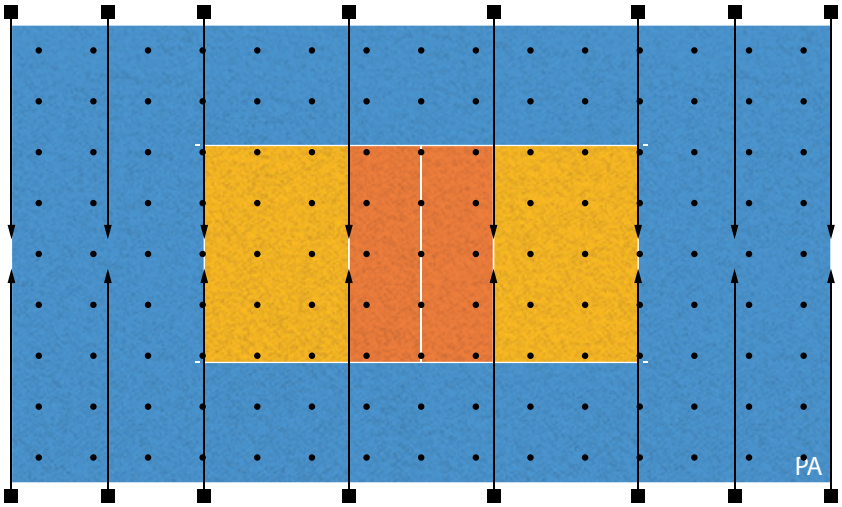
Eave (PA)	506 lux
Uniformity Emin/Eave (PA)	0,76
Glare Rating (Rg)	34

CONI | 750 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	(34 x 19) m	Grid Points (PA)	(15 x 9)
Eave (PA)	750 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	(80)	Glare Rating (Rg)	(35)



SPD 10 kV

GUELL 4

7,17 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306128	A50/W	4000	448 W	16

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

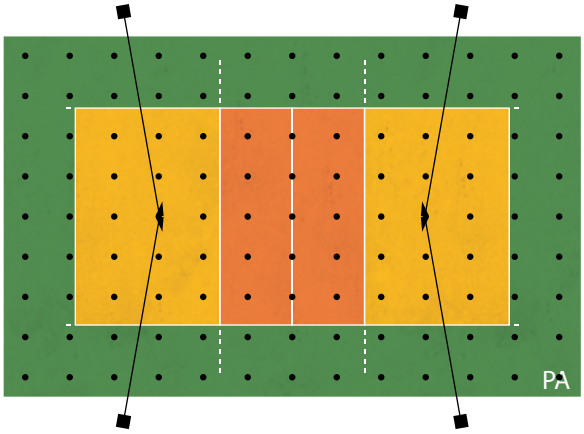
Eave (PA)	786 lux
Uniformity Emin/Eave (PA)	0,79
Glare Rating (Rg)	33

CONI | 100 lux

CLASS I

REQUIREMENTS:

PLAY AREA (PA)	(24 x 15) m	Grid Points (PA)	(13 x 9)
Eave (PA)	100 lux	Emin/Eave (PA)	0,50
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(55)



Lighting calculation at zero light pollution.

SPD 10 kV

GUELL 2.5

0,62 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306204	A50/W	4000	156 W	4

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

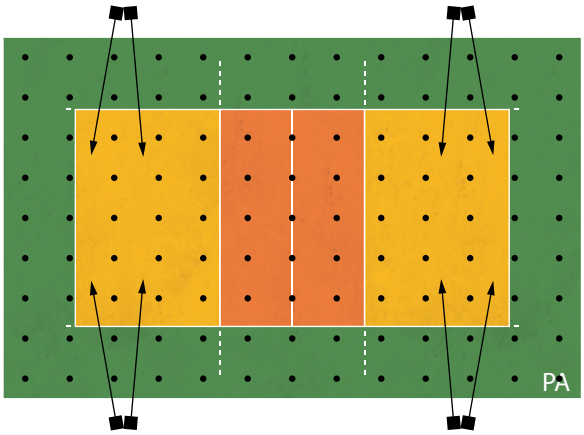
Eave (PA)	115 lux
Uniformity Emin/Eave (PA)	0,69
Glare Rating (Rg)	29

CONI | 200 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	(24 x 15) m	Grid Points (PA)	(13 x 9)
Eave (PA)	200 lux	Emin/Eave (PA)	0,60
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(55)



Lighting calculation at zero light pollution.

SPD 10 kV

GUELL 2.5

1,25 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306204	A50/W	4000	156 W	8

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

Eave (PA)	219 lux
Uniformity Emin/Eave (PA)	0,72
Glare Rating (Rg)	31

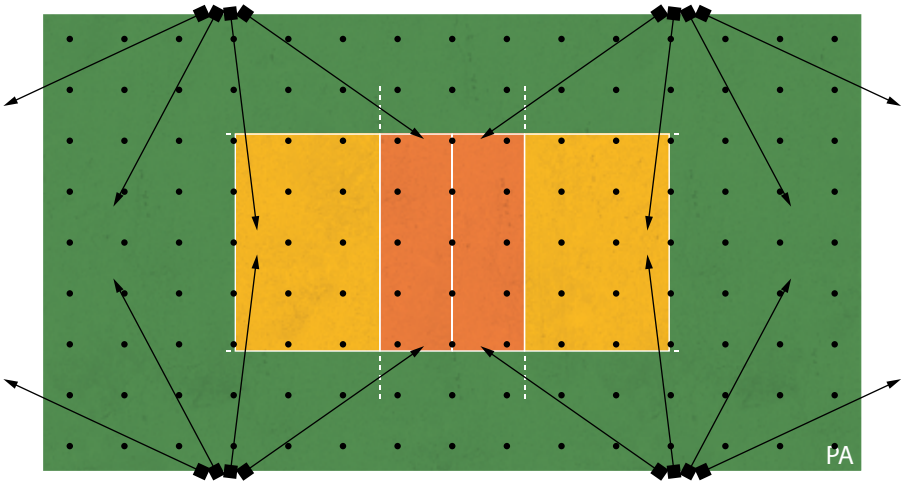
CONI | 500 lux

CLASS III

SPD 10 kV

REQUIREMENTS:

PLAY AREA (PA)	(34 x 19) m	Grid Points (PA)	(15 x 9)
Eave (PA)	500 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	(70)	Glare Rating (Rg)	(55)



Lighting calculation at zero light pollution.

GUELL 3

4,88 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	16

INSTALLATION SUMMARY:

Poles / Lines	4
Installation height	8 m
Maintenance factor	0,90

RESULTS OVERVIEW:

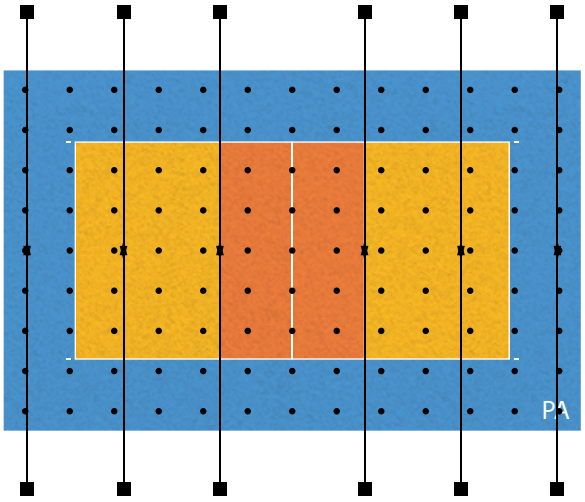
Eave (PA)	501 lux
Uniformity Emin/Eave (PA)	0,70
Glare Rating (Rg)	34

FIPAV | 500 lux

CLASS IV

REQUIREMENTS:

PLAY AREA (PA)	24 x 15 m	Grid Points (PA)	(13 x 9)
Eave (PA)	500 lux	Emin/Eave (PA)	0,70
Colour Rendering Index (CRI)	(70)	Glare Rating (Rg)	(55)



SPD 10 kV

GUELL 3

3,66 kW total power consumption

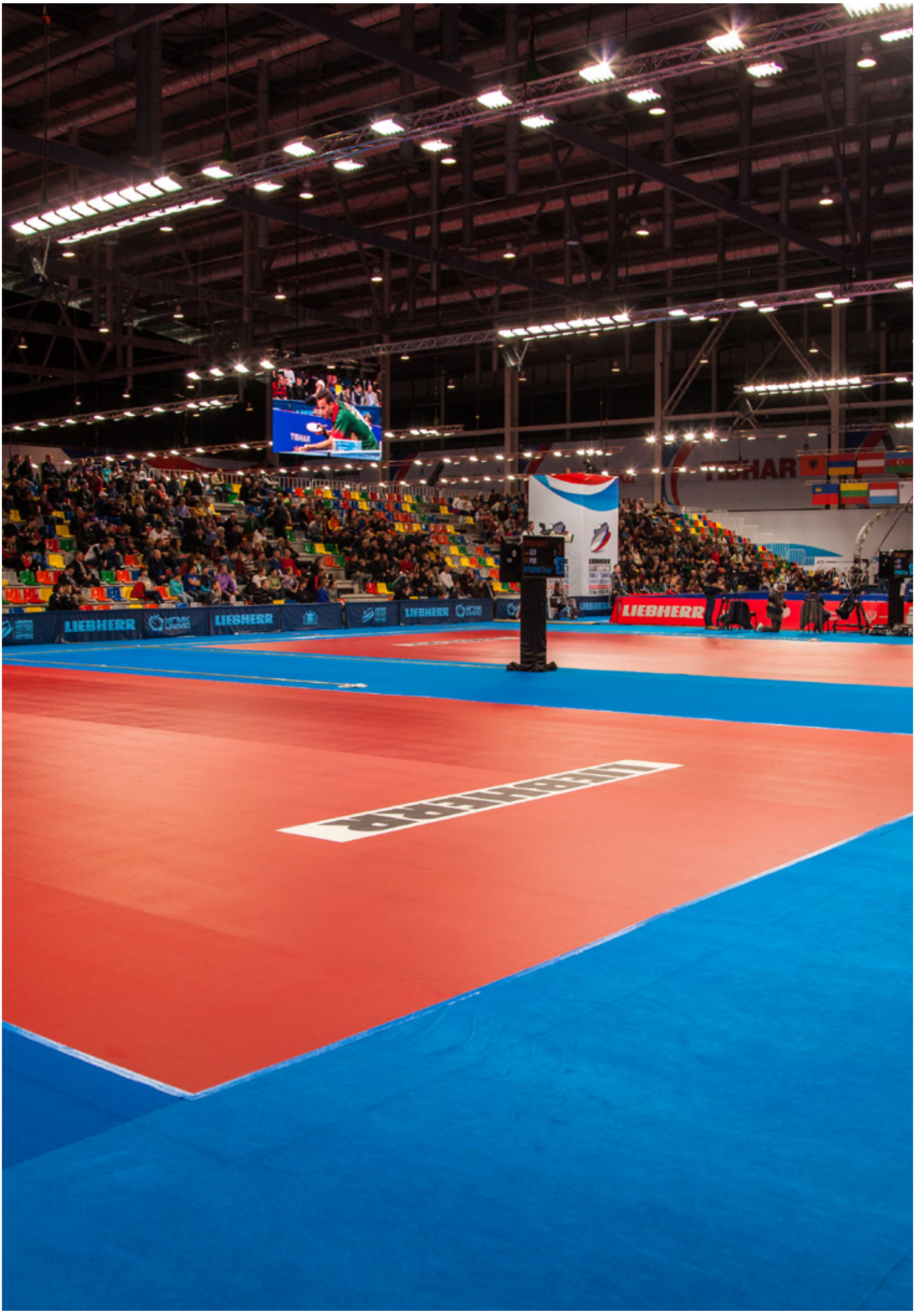
PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	12

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

Eave (PA)	501 lux
Uniformity Emin/Eave (PA)	0,70
Glare Rating (Rg)	34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VOLLEYBALL in Belgium

VOLLEY BELGIUM - formerly called Royal Belgian Volleyball Association (KBVBV), founded on August 21, 1945. Volley Belgium is composed of the Fédération Volley Wallonie-Bruxelles (FVWB) and Volley Vlaanderen. Volley Belgium organises national competitions and cups in volleyball and beach volleyball.

VOLLEY BELGIUM - voorheen genaamd Koninklijk Belgisch Volleybal Verbond (KBVBV), gesticht op 21 augustus 1945. Volley Belgium is samengesteld uit de Fédération Volley Wallonie-Bruxelles (FVWB) en Volley Vlaanderen. Volley Belgium organiseert de nationale competities en bekers in het volleybal en het beachvolleybal.

VOLLEY BELGIUM - anciennement Association royale belge de volley-ball (KBVB), fondée le 21 août 1945. Volley Belgium est composée de la Fédération Volley Wallonie-Bruxelles (FVWB) et de Volley Vlaanderen. Volley Belgium organise des compétitions nationales et des coupes de volleyball et de beach volley.

VOLLEY FLANDERS - formerly known as the Flemish Volleyball Association (VVB), is a Belgian sports federation for volleyball in Flanders. It is established on January 1, 2009, as the Flemish wing of the KBVBV, under the name Vlaamse Volleybalbond (VVB). In 2017 the name was changed to Volley Vlaanderen.

VOLLEY FLANDEREN - vroeger bekend als de Vlaamse Volleybalbond (VVB), is een Belgische sportfederatie voor volleybal in Vlaanderen. De organisatie werd opgericht op 1 januari 2009 als de Vlaamse vleugel van het KBVBV, onder de naam Vlaamse Volleybalbond (VVB). In 2017 werd de naam gewijzigd naar Volley Vlaanderen.

VOLLEY FLANDERS - anciennement connue sous le nom d'association flamande de volleyball (VVB), est une fédération sportive belge de volleyball en Flandre. L'organisation a été créée le 1er janvier 2009 sous le nom de Vlaamse Volleybalbond (VVB), l'aile flamande de la RBFA. En 2017, le nom a été changé pour Volley Vlaanderen.

FVWB - the Association Volleyball Federation of Wallonia-Brussels is the reference sports federation that organises and promotes volleyball at the level of the French Community moreover, contributes to its development at the national and international levels.

FVWB – De Volleyball Federatie Wallonië–Brussel (Fédération Volleyball Wallonie-Bruxelles) is de referentiesportfederatie die volleybal organiseert en promoot op het niveau van de Franse Gemeenschap en bijdraag tot haar ontwikkeling op nationaal en internationaal niveau.

FVWB - l'ASBL Fédération de Volley-ball de Wallonie-Bruxelles est la fédération sportive de référence qui organise et promeut la pratique du volleyball au niveau de la Communauté française et contribue à son développement aux niveaux national et international.

INFRASPORTS - Since 1 January 1994, the SPW (Service Public Wallonie) has seen its competences expand by transferring the responsibility for the subsidized sports infrastructure that has operated from the French Community to the Walloon and Brussels Regions.

INFRASPORTS - Sinds 1 januari 1994 heeft de SPW (Service Public de Wallonie) haar competenties zien groeien door de verantwoordelijkheid voor de gesubsidieerde sportinfrastructuur beheerd vanuit de Franse Gemeenschap over te dragen naar het Waalse en het Brusselse Gewest.

INFRASPORTS - Depuis le 1er janvier 1994, le SPW (Service Pubblic Wallonie) a vu ses compétences s'élargir par le transfert de la responsabilité des infrastructures sportives subsidiées qui s'est opéré de la Communauté française aux Régions wallonne et bruxelloise.

The Lighting Class describes the lighting parameters for the best possible illumination of a playing area. The following table establishes the level of competition and technical parameters.

De verlichtingsparameters voor de best mogelijke verlichting van een speelruimte worden beschreven door de verlichtingsklasse. Elk niveau van competitie (regionaal, provinciaal) wordt door een passende verlichtingsklasse en specifieke na te komen verlichtingswaarden beheerd overeenkomend met de volgende tabel.

Les paramètres d'éclairage qui permettent d'obtenir le meilleur éclairage possible d'une zone de jeu sont décrits par la Classe Éclairage. Chaque niveau de compétition (régional, provincial) est géré par une classe d'éclairage et des valeurs d'éclairage spécifiques à respecter selon le tableau suivant.

VOLLEY VLAANDEREN (indoor)

Competition level	Lighting class					
	I	II	III	IV	V	VI
MINIMUM (CODE F)						✓
COMPETITION (CODE E)					✓	
LIGA B (CODE D)				✓		
LIGA A FEMME (CODE C)			✓			
LIGA A HOMME (CODE B)		✓				
INTERNATIONAL (CODE A)	✓					

INFRASPORTS (indoor)

Competition level	Lighting class			
	I	II	III	IV
NATIONALE 2 et PROMOTION				✓
LIGUE B - NATIONALE 1			✓	
LIGUE A		✓		
INTERNATIONAL	✓			

VOLLEY VLAANDEREN (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
PA 18x9 m TA 20x11 m	VI	-	-	**250 lux**	0,80	(40)	(60)
PA 18x9 m TA 21x12 m	V	-	-	**300 lux**	0,80	(40)	(60)
PA 18x9 m TA 22x13 m	IV	-	-	**400 lux**	0,80	(40)	(60)
PA 18x9 m TA 24x15 m	III	-	-	**500 lux**	0,80	(40)	(60)
PA 18x9 m TA 28x15 m	II	-	-	**750 lux**	0,80	(35)	(80)
PA 18x9 m TA 31x19 m	I	-	-	**1000 lux**	0,80	-	-

INFRASPORTS (indoor)

Reference Area	Class	Lighting Horizontal PA		Lighting Horizontal TA		Gr	Colour Rendering
		Eave	Uniformity Emin/Eave	Eave	Uniformity Emin/Eave		CRI
TA 21x12 m	IV	-	-	**300 lux**	0,70	(40)	(60)
TA 24x15 m	III	-	-	**400 lux**	0,70	(40)	(60)
	II	-	-	**750 lux**	0,70	(35)	(80)
TA 34x19 m	I	-	-	**1000-1500 lux**	0,70	-	-

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
	p. 32				p. 32		
		p. 33				p. 33	
		p. 34					
		p. 34					
			p. 35				
							✓

GUELL 2	GUELL 2.5	GUELL 3	GUELL 4	SQUARE PRO	LAMA+ MINI	LAMA+	consult factory
							
		p. 36				p. 36	
		p. 37					
			p. 37				
							✓

The lighting values in brackets are taken by PERFORMANCE iN LIGHTING as a reference from other regulations in case the rule in question does not expressly declare them.

De verlichtingswaarden tussen haakjes zijn waarden die PERFORMANCE iN LIGHTINiG als referenties overneemt van andere reglementen in het geval zij niet uitdrukkelijk aangehaald worden door het reglement in kwestie.

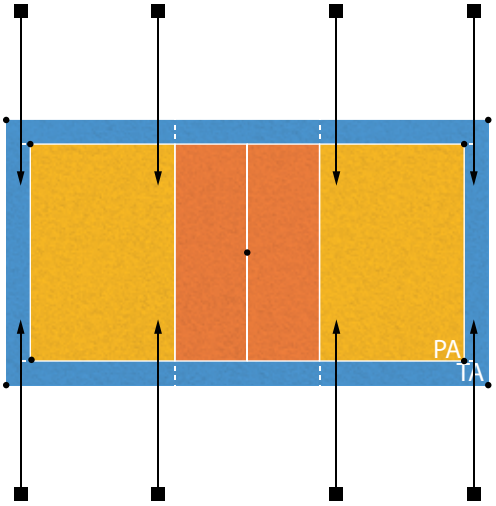
Les valeurs d'éclairage entre parenthèses sont prises par PERFORMANCE iN LGHTING comme référence à partir d'autres règlements au cas où elles n'étaient pas expressément déclarées par le règlement en question.

KBVB | 250 lux

CLASS VI

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	20 x 11 m	Grid Points (TA)	9 points
Eave (TA)	250 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 2.5

1,90 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306202	A40/W	4000	238 W	8

INSTALLATION SUMMARY:

Poles / Lines	1
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

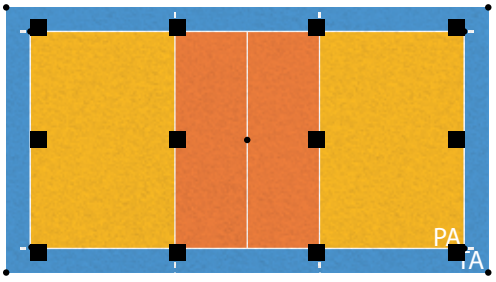
Eave (TA)	252 lux
Uniformity Emin/Eave (TA)	0,82
Glare Rating (Rg)	32

KBVB | 250 lux

CLASS VI

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	20 x 11 m	Grid Points (TA)	9 points
Eave (TA)	250 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



LAMA+ MINI

1,21 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
3101188	S/EW	4000	101 W	12

INSTALLATION SUMMARY:

Poles / Lines	3
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

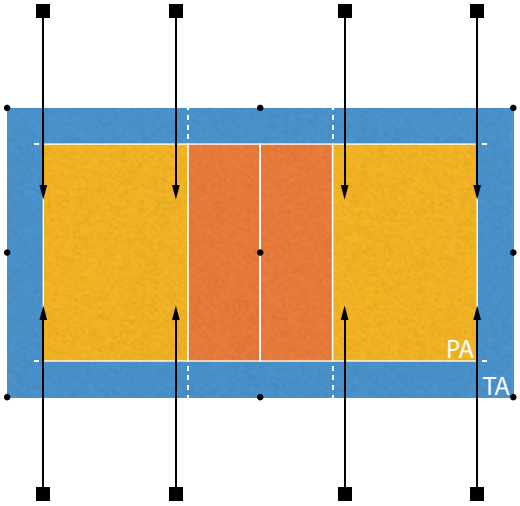
Eave (TA)	266 lux
Uniformity Emin/Eave (TA)	0,79
Glare Rating (Rg)	15

KBVB | 300 lux

CLASS V

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	21 x 12 m	Grid Points (TA)	9 points
Eave (TA)	300 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

2,44 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	8

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

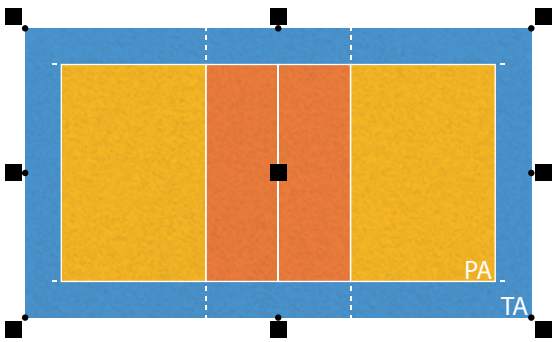
Eave (TA)	320 lux
Uniformity Emin/Eave (TA)	0,85
Glare Rating (Rg)	34

KBVB | 300 lux

CLASS V

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	21 x 12 m	Grid Points (TA)	9 points
Eave (TA)	300 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



LAMA+

1,33 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
06280087	S/EW	4000	148 W	9

INSTALLATION SUMMARY:

Poles / Lines	3
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

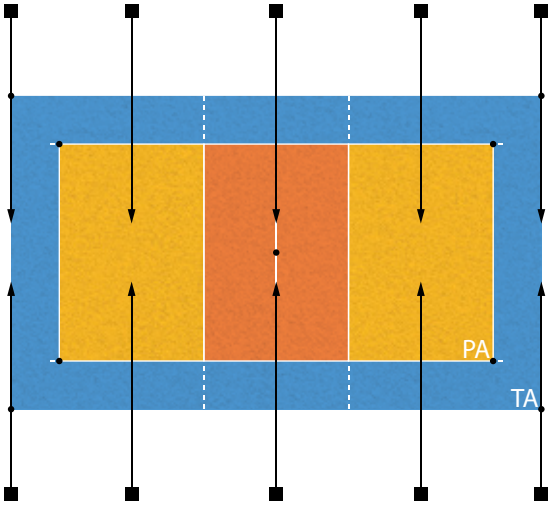
Eave (TA)	338 lux
Uniformity Emin/Eave (TA)	0,97
Glare Rating (Rg)	19

KBVB | 400 lux

CLASS IV

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	22 x 13 m	Grid Points (TA)	9 points
Eave (TA)	400 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

3,05 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	10

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

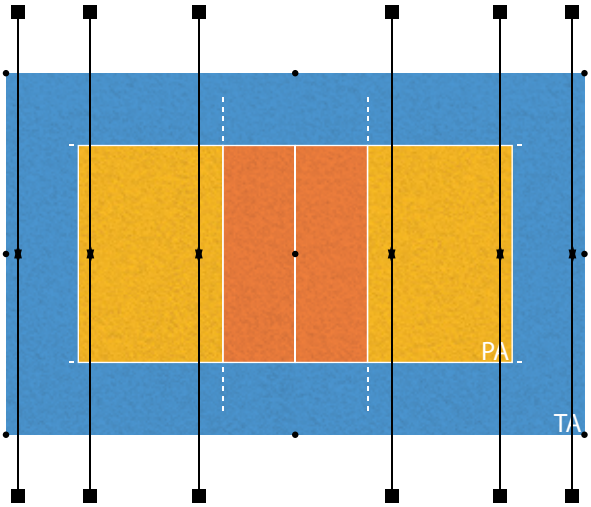
Eave (TA)	404 lux
Uniformity Emin/Eave (TA)	0,73
Glare Rating (Rg)	34

KBVB | 500 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	24 x 15 m	Grid Points (TA)	9 points
Eave (TA)	500 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

3,66 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	12

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

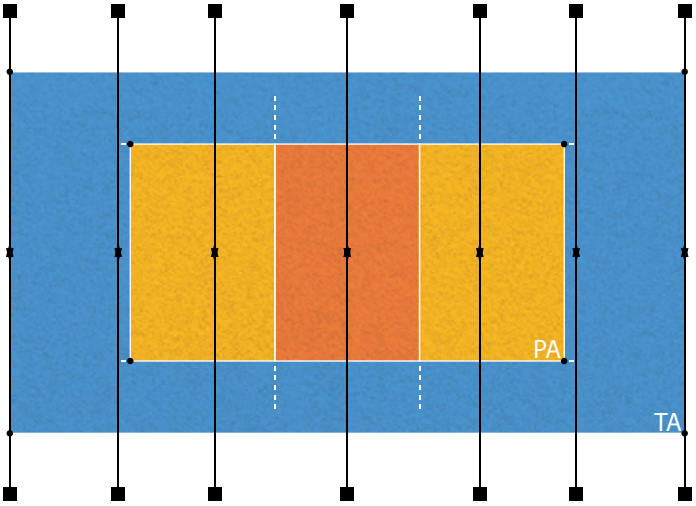
Eave (TA)	500 lux
Uniformity Emin/Eave (TA)	0,84
Glare Rating (Rg)	33

KBVB | 750 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	28 x 15 m	Grid Points (TA)	9 points
Eave (TA)	750 lux	Emin/Eave (TA)	0,80
Colour Rendering Index (CRI)	(80)	Glare Rating (Rg)	(35)



SPD 10 kV

GUELL 4

6,27 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306128	A50/W	4000	448 W	14

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

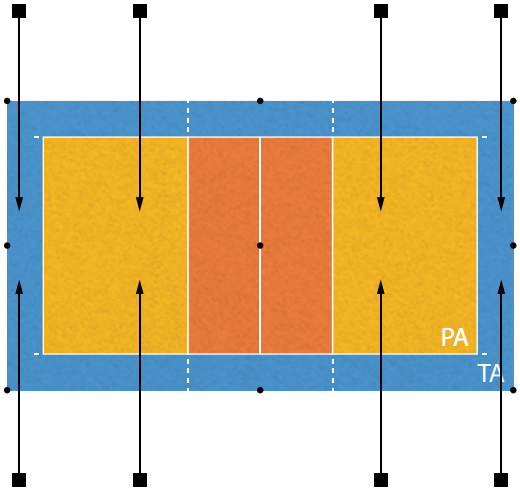
Eave (TA)	762 lux
Uniformity Emin/Eave (TA)	0,89
Glare Rating (Rg)	33

INFRASPORTS | 300 lux

CLASS IV

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	21 x 12 m	Grid Points (TA)	9 points
Eave (TA)	300 lux	Emin/Eave (TA)	0,70
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

2,44 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	8

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

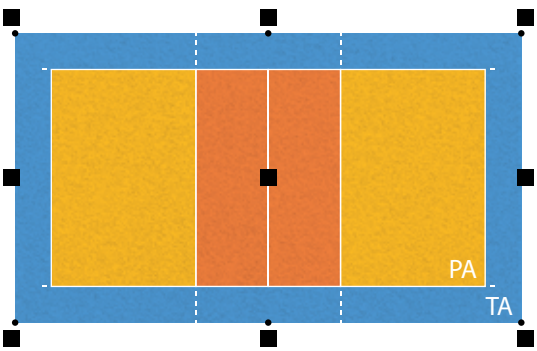
Eave (TA)	312 lux
Uniformity Emin/Eave (TA)	0,70
Glare Rating (Rg)	33

INFRASPORTS | 300 lux

CLASS IV

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	21 x 12 m	Grid Points (TA)	9 points
Eave (TA)	300 lux	Emin/Eave (TA)	0,70
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



LAMA+

1,33 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
06280087	S/EW	4000	148 W	9

INSTALLATION SUMMARY:

Poles / Lines	3
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

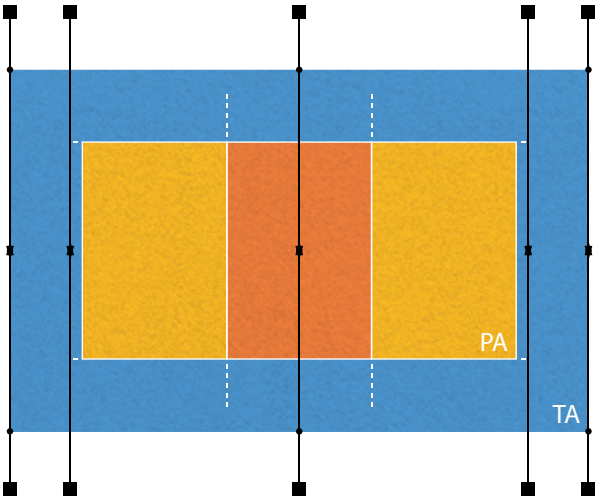
Eave (TA)	335 lux
Uniformity Emin/Eave (TA)	0,98
Glare Rating (Rg)	11

INFRASPORTS | 400 lux

CLASS III

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	24 x 15 m	Grid Points (TA)	9 points
Eave (TA)	400 lux	Emin/Eave (TA)	0,70
Colour Rendering Index (CRI)	(60)	Glare Rating (Rg)	(40)



SPD 10 kV

GUELL 3

3,05 kW total power consumption

PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306114	A50/W	4000	305 W	10

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

RESULTS OVERVIEW:

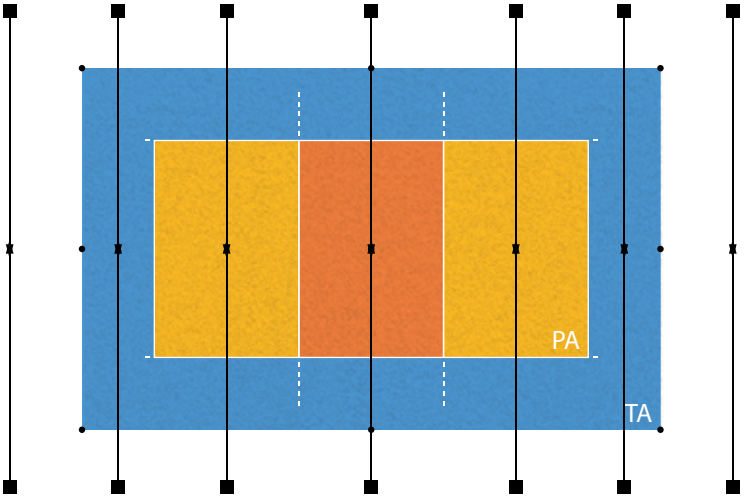
Eave (TA)	400 lux
Uniformity Emin/Eave (TA)	0,72
Glare Rating (Rg)	34

INFRASPORTS | 750 lux

CLASS II

REQUIREMENTS:

PLAY AREA (PA)	18 x 9 m	Grid Points (PA)	-
TOTAL AREA (TA)	24 x 15 m	Grid Points (TA)	9 points
Eave (TA)	750 lux	Emin/Eave (TA)	0,70
Colour Rendering Index (CRI)	(80)	Glare Rating (Rg)	(35)



SPD 10 kV

GUELL 4

6,27 kW total power consumption

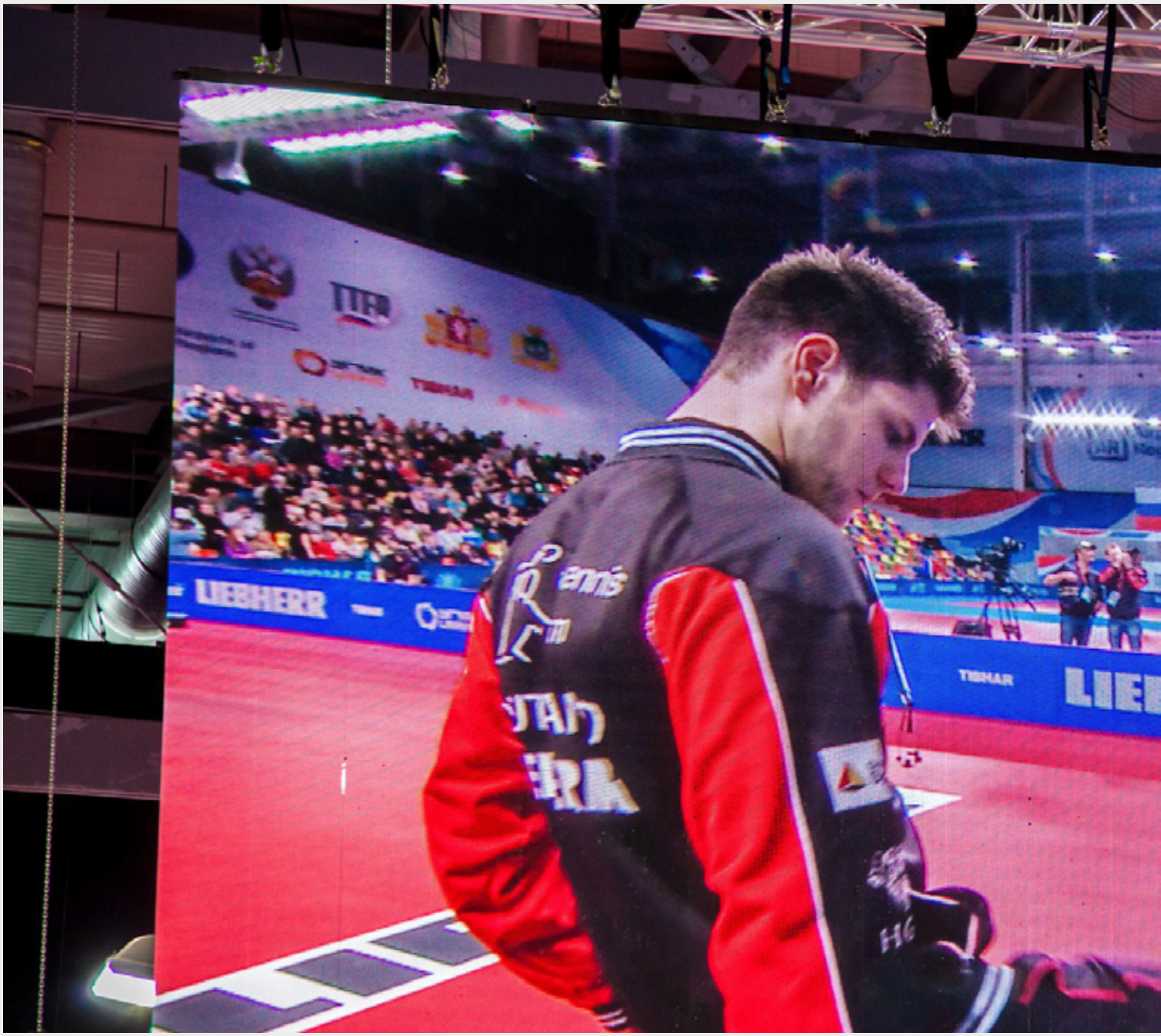
PART NUMBER	OPTIC	KELVIN	WATTAGE	Q.TY
306128	A50/W	4000	448 W	14

INSTALLATION SUMMARY:

Poles / Lines	2
Installation height	7 m
Maintenance factor	0,90

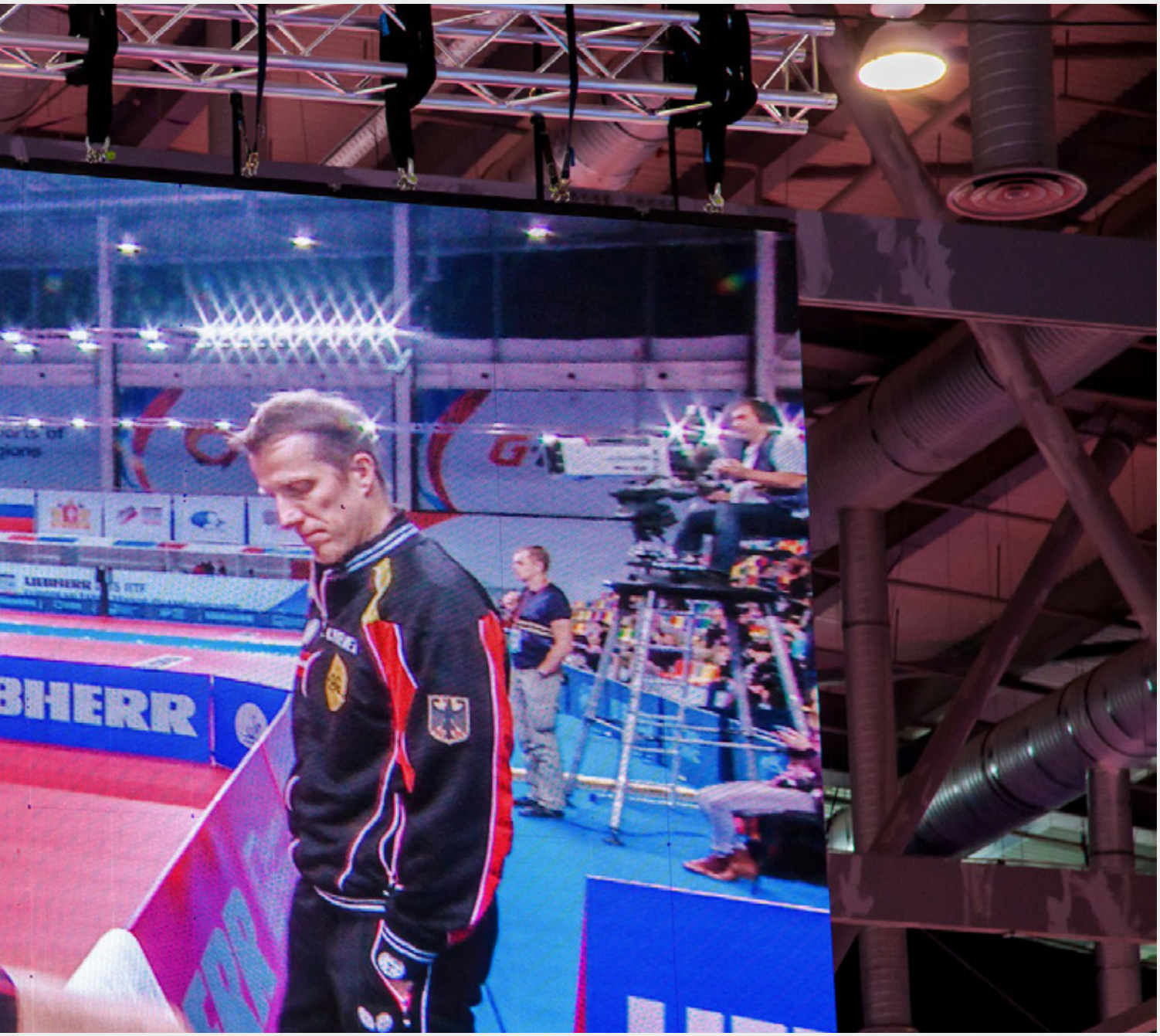
RESULTS OVERVIEW:

Eave (TA)	778 lux
Uniformity Emin/Eave (TA)	0,72
Glare Rating (Rg)	34

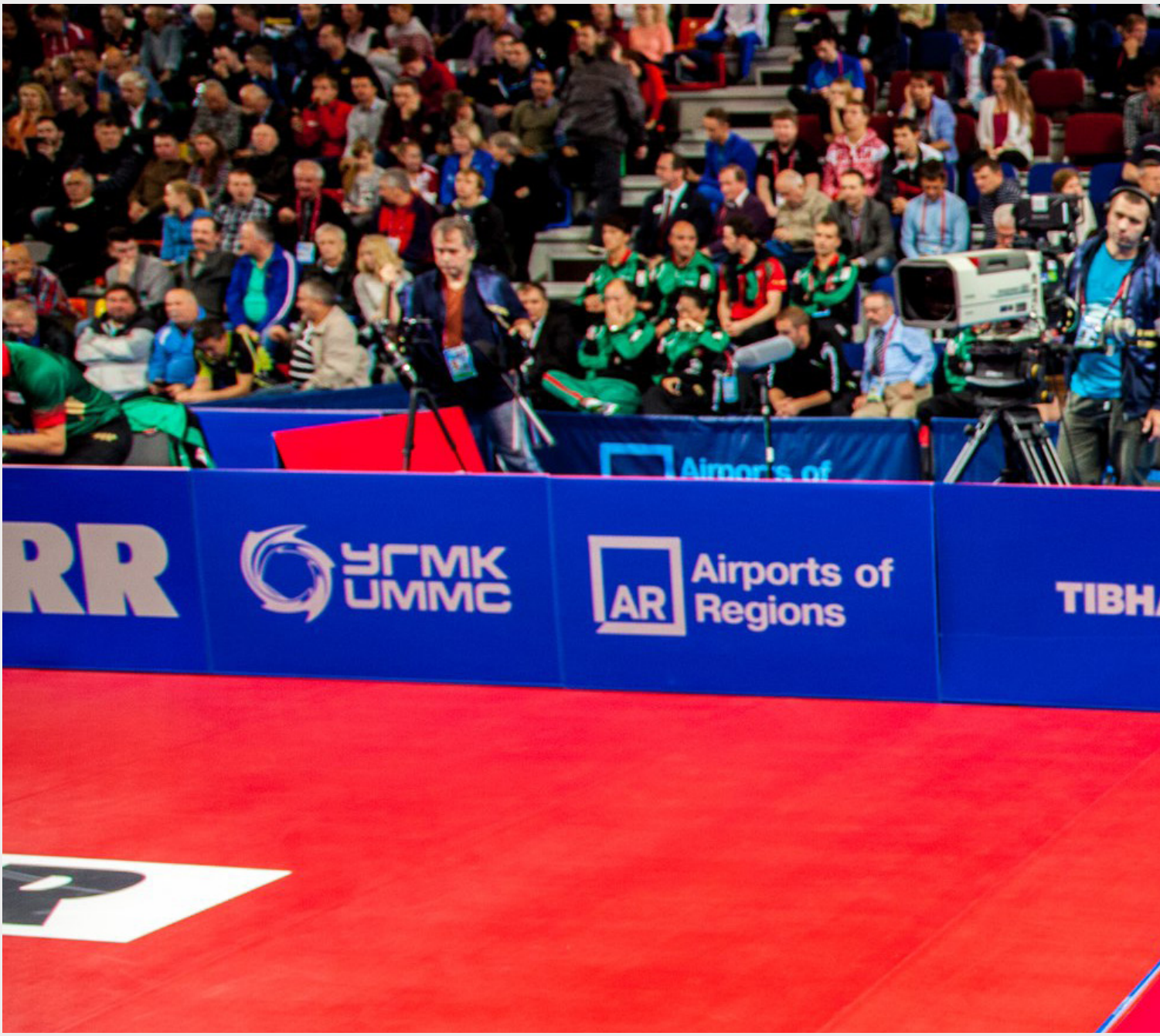


TLCI - TLMF

For many years the Color Rendering Index (also called CRI, colour rendering index, or Ra, average rendering) has been used to describe the ability of a light source to faithfully return the colours of an object concerning a reference source. Several measurement systems are available today, under definition or already approved internationally: Color Render Index (CRI), Color Quality Scale (CQS), Gamut Area Index (GAI), TM-30, American method of IES (Illuminating Engineering Society), CIE 224: 2017 Color Fidelity Index. All these metric systems speak about the human



perceptive system directly and no through a television camera. The Television Lighting Consistency Index (TLCI) tries to solve these problems by providing a specific colour rendering metric for video cameras like how the CRI or TM-30 works with human vision. Alongside the positive aspects of long life and energy savings, LED light sources, due to their spectral emission, can produce a different representation of the colours for the reality of the cameras, thus forcing the television producers to devote a lot of time and money in post-production. In 2012 EBU (European Broadcasting Union) released TLCI-2012 protocol which, although not yet an international standard, has already been adopted and used by all the primary video camera and display manufacturers and by the significant producers of film and television content in the world. The TLCI is a useful tool for lighting equipment manufacturers who want to design luminaires compatible with television demands. The Television Luminaire Matching Factor (TLMF) is instead a valid tool for professionals who wish to understand how different sources mate and mix before they even carry out lighting designs when it would be too late to remedy any problems. The EBU guidelines define, in the TLMF-2013 protocol, a single scale of evaluation of the chromatic quality of cinematographic images, to which a different weight is attributed depending on whether it is material intended for a television production. Consult PERFORMANCE iN LIGHTING pre-sales service for specific information on your project.



FLICKER FACTOR (FF)

The circumstances that produce the "flicker" phenomenon vary according to the modulations of the light source and derivatives, the frequency of alternating voltage and the frame rate of the camera. The flicker distracts and damages the viewer's experience. Therefore, it needs to be eliminated where possible. Many institutions try to understand and synthesise this concept. Today in the definition of the TEMPORAL LIGHTING ARTIFACTS (TLA) in which they are defined, through CIE TN (Technical Note) IEC / TR 61547-1 he concept of

flicker, stroboscopic and "phantom array". Accordingly, the flicker effect is a visible optical stimulus in the absence of eye movement in a static environment. The Flicker Factor (FF) refers specifically to the number of light modulations expressed as a percentage deriving as a ratio multiplied by 100 per cent between the maximum illumination (Emax) subtracted from the minimum illuminance (Emin) and the sum between the same Emax and Emin. Therefore, FF is a percentage number derived from a real measurement on the lighting system. UEFA 2016 standards define FF in three levels of competition to be verified at a standardised height and degrees plan. When testing professional illumination for stadiums and arenas, it is necessary to establish the type of operating lighting system. Especially LED lighting devices, where FF depends on the type of LED power supply used, not intrinsically produce FF but reproduce faithfully the shape of the wave that arrives from the supply compartment which in this case derives from the type of current driving. A Light Flicker Meter, available on the market, is necessary to measure this parameter after luminaires installation and aiming.

To meet the customer's needs, PERFORMANCE iN LIGHTING has over the years established a vast and structured commercial network through subsidiary companies and distributors.

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