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ATEX  LED LIGHTING FOR PAINTING BOOTHS





## || SERIE EX

ATEX LED lighting for spray booths

# EX. LED revolution for spray booths

C.C.E.A. was the first company in the world to design LED lighting devices for spray booths thanks to its collaboration with major European manufacturers.

We have designed a lamp with diffused, uniform lighting, which is resistant to the high temperatures of the workplace. The average life of this light source, 60.000 hours, means that no maintenance or replacements is required throughout the booth's lifetime.

Furthermore, this technology guarantees a minimum energy saving of 50% compared with traditional fluorescent lighting and, unlike neon tubes, it provides a constant luminous flux over time, maintaining the same luminous efficiency. Our lamps offer the perfect solution for anyone looking for cutting-edge solutions for their own installations.

*"The EX technology ensures a minimum 50% energy saving compared to fluorescent lighting and, unlike fluorescent tubes, ensures a constant light output over the time"*

## Why Atex?

An explosive atmosphere is defined as a mixture of flammable substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the flammable mixture. In order to form potentially explosive, the flammable substance must exist in a given concentration; if the concentration is too low (lean mixture) or too high (rich mixture) no explosion occurs, it only produces a combustion reaction, if not even no reaction. The explosion may thus occurs only in the presence of a source of ignition and when the concentration is within the explosive range of substances between the minimum limit (LEL) and upper (UEL) explosion. The explosion limits depend on the ambient pressure and the proportion of oxygen in the air. ATEX is the conventional name which includes two European Union directives:

The 2014/34 / EU for the regulation of equipment intended for use in potentially explosive atmospheres; The Directive is aimed at manufacturers of equipment for use in areas with potentially explosive atmospheres and is manifested by the obligation of certification of these products; Directive 94/9 / EC is to be abrogated with effect from April 20, 2016;

The 99/92 / EC norm for the safety and health of workers in explosive atmospheres; it applies to hazardous environments, where certified facilities and equipment are ready for use and thus relates to the users.

The name comes from ATmosphères and EXplosibles words.

Gas	I	Mines (methane)
Gas	II	Surface industries
Gas	IIA	Propane
Gas	IIB	Ethylene
Gas	IIC	hydrogen acetylene
Dust	IIA	explosive dust
Dust	IIB	non-conductive dust
Dust	IIC	conductive dust

Tab.1 Esplosion groups dust/gas



## Zones and categories

Directive 99/92 / EC of the hazardous places are classified into zones based on the frequency and duration of the presence of explosive atmospheres:

### Zone 0

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is present continuously or for long periods or frequently

### Zone 1

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is likely to occur in normal operation occasionally.

### Zone 2

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

### Zone 20

A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.

### Zone 21

A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.

### Zone 22

A place in which an explosive atmosphere in the form or a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

For liquid spray booths, zone 2 is defined as the internal volume of the booth (including the air recirculation ducts) and the external volume around the booth up to 1 m from the permanent openings if the concentration is under 25% of the LEL (low explosion level).

For powder spray booths, zone 22 is defined as the internal volume of the booth (including the air recirculation ducts and the open powder recovery systems) where the standard requires that concentrations of flammable substances are kept below 50% of the LEL for powders through forced ventilation.

Danger	Risk	Zone	Category	Protection level
Gas, mist	Always, often or for long periods	0	II 1G	very high
Gas, mist	Likely, it may occur during operation	1	II 2 G	high
Gas, mist	Limited possibilities and for a short period	2	II 3 G	normal
Dust	Always, often or for long periods	20	II 1 D	very high
Dust	Likely, it may occur during operation	21	II 2 D	high
Dust	Limited possibilities and for a short period	22	3D	normal

Tab.2 Classification of areas and protection levels

		Code	Norm EN	Category
Gas	General requirements	/	60079-0	
Gas	Oil immersion	o	60079-6	M2-2G
Gas	Pressurized apparatus	p	60079-2	M2-2G
Gas	powdery filling	q	60079-5	M2-2G
Gas	Explosion-proof enclosures	d	60079-1	M2-2G
Gas	increased safety	e	60079-7	M2-2G
Gas	intrinsically safe	ia	60079-11	M1-1G
Gas	intrinsically safe	ib	60079-11	M2-2G
Gas	encapsulation	m	60079-18	M2-2G
Gas	Type of protection "n"	nA-nC-nR	60079-15	3G
Gas	category 1G	/	60079-26	1G
Gas	category M1	/	50303	M1
Dust	Protection by enclosures	Ex tD	61241-1	
Dust	Protection by pressurization	Ex pD	61241-4	
Dust	Protection by intrinsic safety	Ex iD	61241-11	
Dust	Protection with encapsulation	Ex mD	61241-18	

Tab.3 Norms and type of protection

CLASS	Max surface temperature [°C]
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Tab.4 Temperature class.  
Room temperature: -20°C ÷ 40°C





# EX series - C.C.E.A.

## Monocromatic, natural and eco-friendly. The perfect light.

ATEX EX lighting systems comply with the requirements laid down for Group II, categories 3G and 3D of Directive 94/9/EC. They are therefore designed to function in conformity with the operational parameters established by the manufacturer and to ensure a normal level of protection.

The equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists, or air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only. The EX devices therefore can be installed in the following ATEX zones: II3G Ex nA IIC T5 Gc e II3D Ex t IIIC T90°C Dc.

The painted aluminium structure with screws in stainless steel can be installed flush-fitted. The structure is IP67, according to EN-60529 standard and ensures protection against dust. It is also treated with fully fireproof dyeing products.

A protective tempered glass covers the special prismatic cone diffuser which optimises its anti-glare effect, but still maintains a constant flow of light. The polycarbonate cover ensures a IK08 level of protection from impacts.

- Degree of protection IP67, according to EN-60529 standard that provides protection against dust and the effects of immersion

- Daylight CRI75, to optimise the colour rendering and provide the best quality control solution, which will identify spray defects as best as possible.

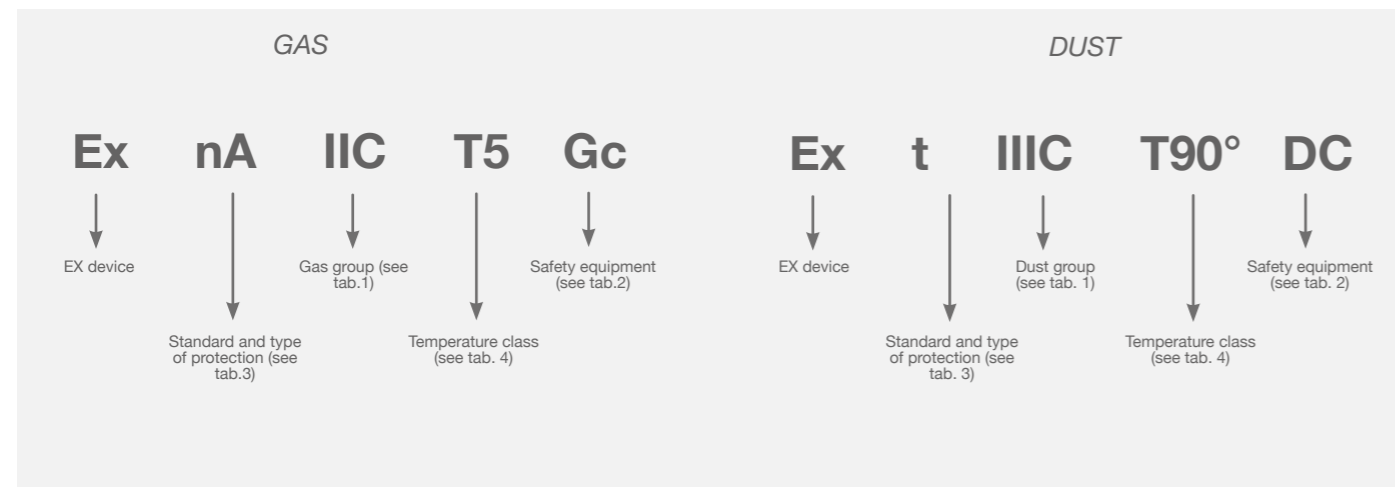
- Tempered protection glass with de-glaring diffuser for homogenous light diffusion.

- Filters and optics make the EX series photobiological risk-free according to EN 62471:2009, creating a safe environment for the eyes of the operators.

- The Power LED technology ensures a minimum 50% energy saving compared to fluorescent lighting and guarantees 60.000 av. life

- The I.D.S. system (Integrated Driver System) allows the direct connection to 24 Vdc, without additional components, in compliance with international standards on low voltage.

- Customized color



Tab.5 Code explanation- Atex EX C.C.E.A.





## The perfect solution: long-lasting and cost-efficient

When we realized the EX series, we thought about what could be the best lighting for this type of application.

We chose lighting circuits with a mini Power latest generation LED to optimize the color rendering and provide the best solution for the quality control and better detection of coating defects. The EX series offers numerous advantages over traditional fluorescent lighting:

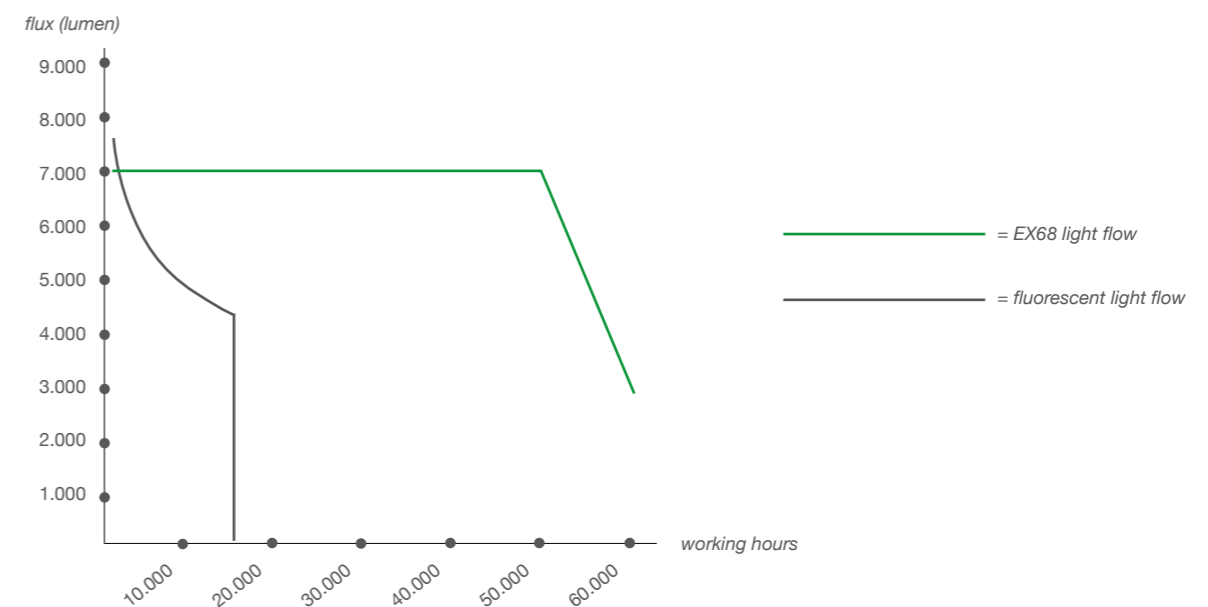
- Duration and consistency over time: the LED light source keeps its properties unchanged during the whole of its useful life, while the neon tubes gradually consume the gas inside generating a progressive loss of efficiency. The Power LED technology ensures a minimum 50% energy saving compared to fluorescent lighting and, unlike fluorescent tubes, ensures a constant light output over the time, while keeping the same luminous efficiency (see Tab.6)

- User safe : Filters and optics make the EX series photobiological risk-free according to EN 62471:2009, creating a safe environment for the eyes of the operators.

- Low tension: The I.D.S. system (Integrated Driver System) allows the direct connection to 24 Vdc, without additional components, in compliance with international standards on low voltage. You can connect the lamp also with a 230V external switch.

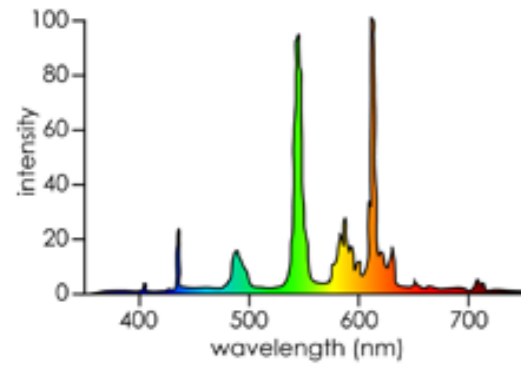
- Energy saving: The Power LED technology ensures a 50% energy saving compared to fluorescent lighting

- Flicker-free: the light emitted by fluorescence lamps is not constant, but is the result of several fast frequency discharges that are not perceived by the human eye, due to the phenomenon of persistence of vision, but that can cause an unpleasant flickering. Unlike fluorescent tubes, LED lamps have no stroboscopic effect and does not tire the eyes, increasing the feeling of well-being and preventing visual disturbances. Proper lighting helps to increase productivity by up to 8% and improves performance during the activity.

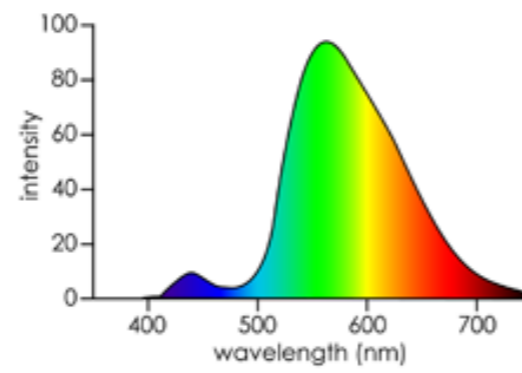


Tab.6 Comparison of the performance over time of the luminous flux between EX68.I.P and the equivalent of a 4x36W fluorescence 6500K ceiling light

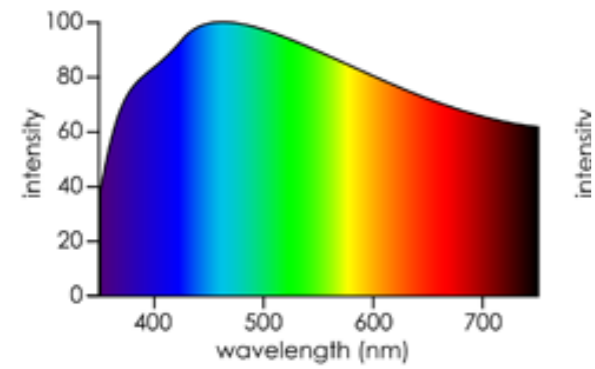




Light spectrum of a fluorescent lamp



Light spectrum of a LED lamp



Light spectrum of Daylight sun

*"Lo spettro del LED copre le frequenze dello spettro solare e quindi permette una resa delle vernici molto più simile a quella reale"*

• Monochromatic light, excellent color rendering: object color might vary depending on the characteristics of the light. For a perfect color rendering of any polychrome object, the light has to be composed by all the radiation of the visible spectrum. The apparent color of an object depends on two distinct phenomena: its spectral reflectance (or transmission), which characterizes the property of reflectance according to the wavelength and the spectral composition of the light that hits the object. The color of an object may vary depending on the characteristics of the light that illuminates it: for a perfect color rendering of a polychrome any object, it is necessary that the light is composed of all the radiation of the visible spectrum. The word light refers to the portion of the electromagnetic spectrum visible to the human eye, approximately between 400 and 700 nanometers in wavelength, or between 790 and 435 THz frequency. The LED spectrum covers the frequencies of the solar spectrum and thus allows a paint color rendering much more similar to the real one

and therefore better detection of spraying defects. Also in this way the operator sight doesn't need to make efforts to adapt to an artificial light, thus avoiding disturbance to vision such as redness, burning and fatigue.

• Installation: Thanks to its structure, installation time decreases up by five times compared to traditional fluorescent lamps, ensuring a huge save of time and money.

## Lighting projects

The lighting design is very important both in retrofitting projects and new lighting fixtures installation. Especially in complex structures with a substantial diversity of events and locations, the lighting study is a critical step in the selection of the most suitable products to ensure the correct lighting of each area. The purpose of planning is to propose different solutions and alternatives through 3D rendering preparation, highlighting the final result in a

direct and immediate way. The advice is also to propose solutions that have great value for the price always in compliance with current regulations, which regulate the lighting parameters. We perform lighting projects of industrial environments and in-depth analysis of the environment by developing strategies to achieve the client's goals. The study of a good Lighting Concept allows to reduce money and energy waste.



## Tests and checks

EX series LED lamps by C.C.E.A. have been designed and developed for installation and lighting inside industrial booths used for powder spray painting metal sheets and bodywork.

The choice of components and materials used has taken into account the environmental, working and plant conditions of these work stations.

More specifically, it has been taken into account that powder spray booths are generally made from metal structures with an interior coating so the powder cannot stick to the walls. They are also fitted with a forced ventilation system for any evaporated particles and/or solvents that do not stick to the item to be painted. It has also been taken into account that operating cycles essentially involve three phases: spraying, curing and firing.

The interior lighting in these environments must be as uniform as possible and prevent areas of shadow and reflections that would otherwise annoy spray painters.

C.C.E.A. has a testing room equipped with a climatic chamber for temperature tests, a chamber for dust proofing tests, as well as equipment for liquid proofing tests and resistance tests against mechanical shocks.

C.C.E.A. EX series ATEX lamps regularly undergo the following tests:

- Climatic chamber ageing

To simulate the ageing process, C.C.E.A. EX lamps are placed inside a climatic chamber under the following conditions and for the times indicated in tab.

- EN50102 mechanical shock resistance test

At the end of the ageing process, C.C.E.A. lamps undergo a mechanical shock resistance test in accordance with standard IEC EN 50102.

The lamps are attached to a support and then a hammer is dropped on them from a certain height. The drop height and mass of the hammer changes depending on the IK rating to be tested. 5 impacts are made, and never more than three strikes at the same point, for each rating.

- Dust test IP 6X

C.C.E.A. EX lamps are placed inside the test chamber. The pressure inside the casing of each lamp is kept below atmospheric pressure.

The test involves using suitable pressure to make a quantity 80 times the volume of the casing flow through the casing, without exceeding a flow rate of 60 volumes per hour. Maximum duration of the test: 8 hours.

The lamp locking system and the sealed gaskets ensure that no dust deposits form inside the casing.

- Water test IP X7

C.C.E.A. EX lamps are submerged for 30 minutes in water so that for EX96 and EX110 the highest point of the casing, in a vertical position, is placed 150mm below the surface of the water, while for EX68 the lowest point of the casing, in a vertical position, is placed 1000mm below the surface of the water.

The lamp locking system and the sealed gaskets ensure that no water penetrates inside the casing.



Test	EX68.I.P	EX96.I.P	EX110.I.P
Accelerated climatic chamber ageing 15 days 90°C/90% humidity	X	X	X
Accelerated climatic chamber ageing 15 days 90°C/10% humidity	X	X	X
Accelerated climatic chamber ageing 24h -30°C	X	X	X
IEC EN 50102 certified mechanical shock resistance test	X	X	X
IEC EN 60529 certified IP6X dust proofing test	X	X	X
IEC EN 60529 certified IPX7 liquid proofing test	X	X	X

Tab.7 List of EX lamp tests

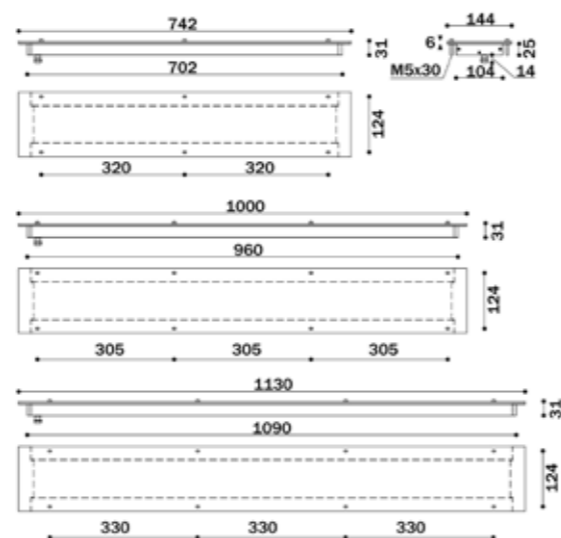


# EX

## Technical datasheet



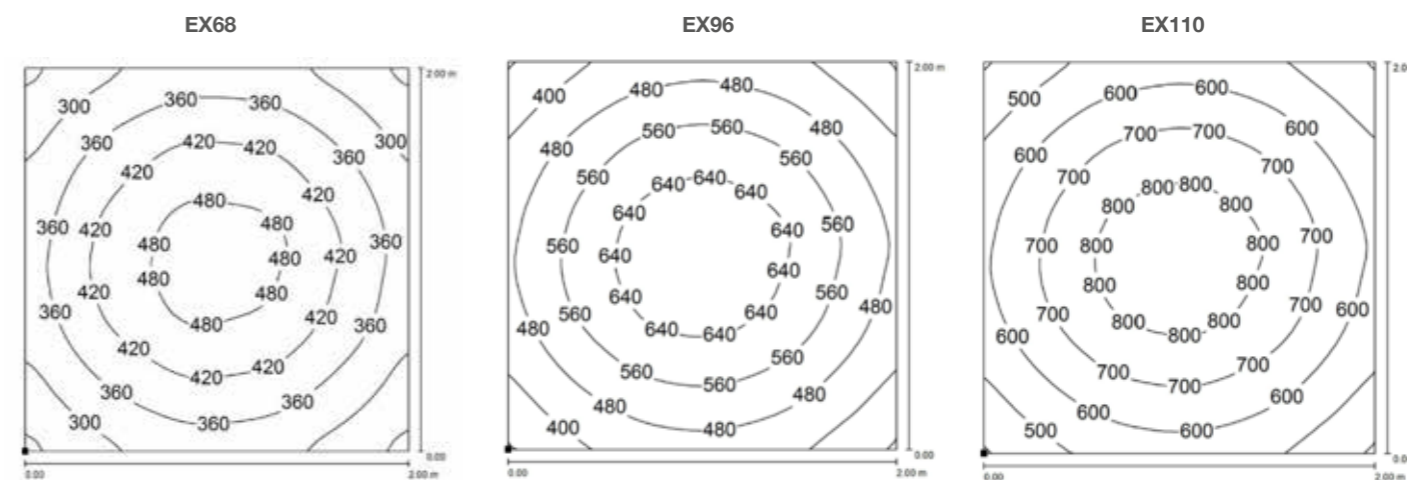
- Exceptionally powerful luminous flux
- Up to 50% energy saving compared with traditional lighting
- 5 times faster installation time compared with traditional fluorescent ceiling lights
- No maintenance required throughout the booth's entire life cycle



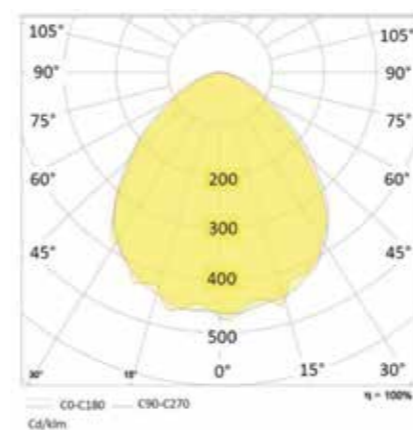
### TECHNICAL FEATURES

	EX68	EX96	EX110
Power supply	24Vdc	24Vdc	24Vdc
Power	68W	96W	110W
Current	2,9 A	4 A	4,9 A
IP degree	IP67	IP67	IP67
LED type	mini Power LED	mini Power LED	mini Power LED
LED lifespan	50.000 hours	50.000 hours	50.000 hours
Lumen LED	7000 lum - 120°	9800 lum - 120°	11200 lum - 120°
Light color	6500K -CRI80	6500K -CRI80	6500K -CRI80
Structure	painted aluminium	painted aluminium	painted aluminium
Glass	tempered 4 mm	tempered 4 mm	tempered 4 mm
Diffuser	prismatic in PMMA	prismatic in PMMA	prismatic in PMMA
Coverage	polycarbonate	polycarbonate	polycarbonate
IK degree	IK08	IK08	IK08
Connection	cable in PUR	cable in PUR	cable in PUR

### LUMINANCE DIAGRAMS



### PHOTOMETRIC DATA



### ORDER CODES

<b>EX68.I.P</b>	68W - cable 1,5 m	<b>EX96.I.P</b>	96W - cable 1,5 m	<b>EX110.I.P</b>	110W - cable 1,5 m
<b>EX68.I.P.C3</b>	68W - cable 3 m	<b>EX96.I.P.C3</b>	96W - cable 3 m	<b>EX110.I.P.C3</b>	110W - cable 3 m
<b>EX68.I.P.C5</b>	68W - cable 5 m	<b>EX96.I.P.C5</b>	96W - cable 5 m	<b>EX110.I.P.C5</b>	110W - cable 5 m
<b>EX68.I.P.C10</b>	68W - cable 10 m	<b>EX96.I.P.C10</b>	96W - cable 10 m	<b>EX110.I.P.C10</b>	110W - cable 10 m

ACCESSORIES



Power supply AC/CD  
110/230V-24Vdc – 100W

**Cod.A0371005061023D**



Power supply AC/CD  
110/230V-24Vdc – 120W

**Cod.A0381005061124B**





||||| **C.C.E.A. srl**  
Via Piave, 2  
36077 - Altavilla Vicentina (VI) - Italy  
  
Tel. +39 0444 572083  
Fax +39 0444 572337  
  
ccea@ccealights.com  
www.ccealights.com