Zone Classification
(acc. to the standards 1999/92/EG)

Hazardous areas are classified into the following zones in accordance with the probability of the existance of an explosive atmosphere:

Gases, vapours or mists

Zone 0 An area in which an explosive atmosphere is present either or over long periods or frequently as a mixture of air and combustible gases, vapours or mists.

Zone 1 An area where under normal operating conditions an explosive atmosphere may occasionally be present as a mixture of air and combustible gases, vapours or mists.

Zone 2 An area where an explosive atmosphere is not likely to be present under normal operation but if it should occur for some reason it would normally only exist for a short time as a mixture of air and combustible gases, vapours or mists.

Dusts

Zone 20 An area in which an explosive atmosphere is present either continuously or over a long time or frequently as a cloud of combustible dust in the air.

Zone 21 An area where under normal operating conditions an explosive atmosphere may occasionally be present as a cloud of combustible dust in the air.

Zone 22 An area where an explosive atmosphere is not likely to be present under normal operation but if it should occur for some reason it would normally only exist for a short time as a cloud of combustible dust in the air.

ATEX Equipment
Temperature classes acc. to IEC 60079-0

An important parameter for the subdivision of the gases is the ignition temperature.

The ignition temperature is the lowest surface temperature value which ignites an explosive atmosphere. The maximum surface temperature must always be lower than the ignition temperatures of the gas-air or vapour-air mixture in which the product is applied.

Temperature classification	Maximum permissible surface temperatures of equipment [°C]	Ignition temperatures of inflammable substances [°C]
T1	450	> 450
T2	300	> 300 ≤ 450
T3	200	> 200 ≤ 300
T4	135	> 135 ≤ 200
T5	100	> 100 ≤ 135
T6	85	> 85 ≤ 100

Classification of Gases and Vapours into Explosion Groups and Temperature Classes

Explosion group	Classification of gases and vapours into temperature classes					
	T1	T2	T3	T4	T5	T6
IIA	Acetone Ethane Ethyl acetate Ammonia Ethyl chloride Benzol Acetic acid Carbon monoxide Methanol Methyl chloride Naphtalene Phenol Propane Toluol	i-amyl acetate n-butane n-butyl alcohol Cyclohexane 1,2-dichlorethane Acetic anhydride	Gasoline Diesel fuel Aviation fuel Heating oils n-hexane	Acetaldehyde	-	
IIB	Town gas	Ethylene Ethyl alcohol	Hydrogen sulphide	Ethyl ether	-	
IIC	Hydrogen	Acetylene			-	Carbon disphide
I	Methane					

Catagories of appliances

Acc. to the ATEX standards (94/9/EG) the appliances for application in their relative zones are classified into catagories. Similar to the different zones there are three different catagories for group II of the equipment. Consequently, the explosion protected products can be allocated to the ex-zones existing in the production area.

Catagory 1 comprises appliances which have been designed in such a way that they may be operated in compliance with the characteristic sizes given by the manufacturer and which ensure a high degree of safety. Appliances of this catagory may be used in ZONES 0 and 20 as per their certification.

Catagory 2 comprises appliances which have been designed in such a way that they may be operated in compliance with the characteristic sizes given by the manufacturer and which ensure a high degree of safety. Appliances of this catagory may be used in ZONES 1 and 21 as per their certification.

Catagory 3 comprises appliances which have been designed in such a way that they can be operated in compliance with the characteristic sizes given by the manufacturer and which ensure a standard level of safety. Appliances of this catagory may be used in ZONES 1 and 21 as per their certification.

Appliances of this category may be used in ZONES 2 and 22 as per their certification. DIN EN 61241-14 make a difference between conductive and non-conductive dusts. For conductive dusts of ZONE 22 appliances of catagory 2 D must be used.

Modes of Protection

according to European/IEC Standards

In areas where explosive atmospheres may occur despite the explosion protection measures employed, only explosion protected electrical equipment must be used.

EN 60079-7	- stands for: „Increased safety"	- code: „**e**"
EN 60079-1	- stands for: „Flameproof enclosure"	- code: „**d**"
EN 60079-5	- stands for: „Sand filling"	- code: „**q**"
EN 60079-2	- stands for: „Pressurised apparatus"	- code: „**p**"
EN 60079-11	- stands for: „Intrinsic safety"	- code: „**i**"
EN 60079-18	- stands for: „Moulding"	- code: „**m**"
EN 60079-15	- stands for: „Zone 2"	- code: „**n**"
EN 60079-28	- stands for: „Limitation of optical radiation"	- code: „**op is**"
EN 60079-31	- stands for: „Protection by enclosure"	- code: „**t**"

Table of ingress protection

	1st CHARACTERISTIC NUMERAL	2nd CHARACTERSTIC NUMERAL	
RATING	**PROTECTION AGAINST FOREIGN BODIES**	**PROTECTION AGAINST HARMFUL ENTRY OF WATER**	**Symbol**
IP 20	solid objects > 12 mm	non-protected	
IP 23	solid objects > 12 mm	protected against spraying water	
IP 40	solid objects > 1 mm	non-protected	
IP 43	solid objects > 1 mm	protected against spraying water	
IP 44	solid objects > 1 mm	protected against splashing water	
IP 54	dust protected	protected against spraying water	
IP 55	dust protected	protected against water jets	
IP 65	dust tight	protected against water jets	
IP 66	dust tight	protected against heavy seas	
IP 67	dust tight	protected against effects of immersion in water between 15cm and 1m for 30 minutes	
IP 68	dust tight	protected against effects of immersion in water under pressure for long periods	
IPx9k	dust tight	protected against effects of high pressure water jets	

Plastics in SCHUCH luminaires

Plastics in SCHUCH luminaires

The bodies of most SCHUCH luminaires are made of glass fibre reinforced polyester. This material is heat resistant, mechanically stable, electrically insulating, weather-resistant and chemically resistant.

The covers of the luminaires is made of the following materials: silicate glass, polycarbonate(PC) or polymethyl methacrylate (PMMA).

Based on the current state of the art and the information provided by the respective material manufacturers, the following table shows the resistance of PMMA and PC against various chemicals. Experience shows that the temperature of chemical (aggression) substances often plays a significant role.

Parts made of PC are impact resistant and more resistant to heat than parts made of PMMA. PC is not resistant against all chemical agents. For cleaning, we recommend warm water with a mild detergent. Subsequently the material should be thoroughly rinsed with clean water. The PH value must be less than 7.5.

Due to this no soap or similar must be used.

Material	**Polymethylacrylat (PMMA)**	**Polycarbonat (PC)**	**Thermoplastic polyester (PBT)**
Acetone	–	–	–
Ethylalcohol (to 30 %)	o	o 96% [1]	+
Battery acid	+	+	k.A.
Ammoniac	+	–	+ up to 10% [1]
Boric acid 3 %	+	+	k.A.
Sodium Hypochlorite	+	–	k.A.
Chlorine (moist)	–	–	k.A.
Chromium acid 10 %	o	+	k.A.
Acetic acid concentrated	–	–	–
Acetic acid (up to 10%)	+	+ < 10% [1]	+
Formaldehyde (up to 10%)	o	+	k.A.
Glycerin	+	o	+
Uric acid (up to 20%)	+	k.A.	k.A.
Potassium (20-25°C)	+	–	–
Kerosene (aviation gasoline)	o/–	–	+
Sea water	+	+	+
Methyl alcohol (up to 23°C)	o/–	–	+
Lactic acid < 4%	+	+	k.A.
Sodium chloride	+	+	+ up to 10% [1]
Sodium hydroxide Solution 20-25 °C	+	–	+
Petroleum	o	o	+
Phosphoric acid Concentrated	–	+ 10 up to 30% [1]	+ 25% [1]
Soap liquor (at 23 °c)	+	o	up to 10% OK
Sulfuric acid H2S04	–	–	–
Sulfuric acid up to 30%	+	+	+ bis 10% [1]
Sulphur dioxide dry (at 23 °C)	–	o	k.A.
Turpentine (at 23 °C)	+/o	–	+
Toluene	–	–	–
Acidity of wine	+ up to 50% [1]	+ up to 10% [1]	k.A.
Citric acid up to 20 %	+	+	+ up to 10% [1]

Legend: + = resistant, O = limited resistent – = volaltile (unstably) [1] = concentration

Yellowing of glasses made of PC

Polycarbonate (PC) is a plastic that turns brown when exposed to UV radiation. When installing the light fittings in outdoor areas the material is exposed to UV-radiation, but also bulbs may emit UV light (eg fluorescent lamps).

To delay the discoloration of the PC we are using so-called UV stabilizers in the respective materials. These stabilizers slow down the process significantly, but do not prevent it. The time course of the discoloration is dependent on the degree of exposure to UV radiation. The discoloration is not a product defect.

Corrosion resistance of sheet steel luminaires

Our steel sheet luminaires are powder coated with a high quality polyester paint. In addition to the corrosion protection, the coating offers a very good scratch resistance. Depending on the conditions of use at the installation site, however, corrosion may still occur.

Examples are applications with permanent humidity, mounting locations close to the sea, under canopies or areas with aggressive media / chemicals. For such conditions we offer, depending on the requirement, modified versions with KTL coating, aluminum or stainless steel housing.

Properties of LED luminaires

Rated values as specified in data-sheets
All tolerances of rated values of luminaire input power, luminous flux and efficacy are in accordance with IEC 62722-2-1. Luminaire luminous flux is no more than 10% less than rated luminous flux. Luminaire input power is no more than 10% higher than rated input power. If not specified otherwise all rated values refer to an ambient temperature of Ta = 25°C. If LED luminaires are operated at higher temperatures luminous flux decreases by about 1.5% per 10K.

Rated life
Data-sheets provide values of rated life Lx. Lx is the time after which luminous flux has dropped to x% of initial luminous flux. At rated life Lx luminous flux equals x% of rated value. Typical values for "x" are 70 (L70) or 80 (L80). Life time metrics are based on defined test procedures. Figures given in data-sheets are expected values. Thus, the indicated rated life is not a guaranteed luminaire feature. E.g. L80B10 ≥ 50,000h means that, according to statistics, 90% (100-10) of luminaires maintain at least 80% of initial luminous flux after 50,000. In so doing failures of control gear and soiled glass covers are not considered.

Switching cycles
Frequent switching may cause an increased LED-module failure rate. In accordance with IEC rules outdoor luminaires are designed for one cycle per day. While for indoor luminaires up to three cycles per day are assumed. If it is required to switch luminaires more frequent it is recommended to employ corridor mode (DIMC). Corridor mode allows unlimited switching of luminaires.

Use of LED luminaires in corrosive environments
Corrosive gases and other corrosive substances (e.g. ammonia, sulfuric or chlorine compounds) may damage LED light fittings. Depending on substance, concentration, temperature and exposure time, the damage may result in total failure of light fitting.
Even luminaires with high degree of ingress protection can be affected since corrosive atmospheres can penetrate into all light fittings. Suitability of light fittings for particular purposes can be assessed e.g. by means of a field test.
We recommend the use light fittings out of our product range, which are especially designed for the use in corrosive atmospheres. Version ER: Increased protection against corrosive atmospheres. Light fittings of type ER are approved e. g. for the use in production and storage areas for car wheels.
Version HR: High Protection against corrosive atmospheres. Light fittings of type AUS HR are approved e. g. for use in outdoor areas of wastewater treatment plants.

Mounting of protection class II LED outdoor luminaires to fixing devices with electrical insulation against earth potential.
When mounting protection class II LED light fittings to fixing devices with electrical insulation against earth potential, electrostatic charges could appear (for example, due to weather conditions) which may cause damage of control gear and/or LED modules.
None-Grounded fixing devices are, for example, wooden, concrete or plastic poles, electrically insulated mounted steel poles, wall fixations or rope suspensions.
Using protection class I light fittings is recommended in these cases. These allow electric charges to discharge via protective earth (PE) conductor.
If protection class II light fittings should be installed, such light fittings should be of special design equipped with equipotential compensation. In that case, the yellow/green conductor inside the connecting cable should not make any connection between terminal box and the equipotential terminal inside light fitting.

Overvoltage protection of LED outdoor luminaires
LED outdoor luminaires and light fittings with electronic control gear for conventional lamps are much more sensitive to surge voltages than luminaires equipped with magnetic ballasts.
Due to switching events and load changes voltages of up to 6 kV may occur in outdoor power grids.
Lightning strikes in the surroundings of outdoor installations can lead to voltages of up to many times higher than 10 kV depending on distance to light fitting and conductivity of soil.
Lightning that strikes directly into a luminaire will cause such high pulses that no cost-efficient measure can prevent failure of luminaire.
Control gear utilized by SCHUCH is having an enhanced overvoltage protection.
By installing an additional overvoltage protection device into a luminaire or into a terminal box protection level can be further increased.
Protective device that disconnects luminaire from power supply when it fails does further enhance overvoltage protection.
Regulative provisions limit higher protection levels of protection class II light fittings. It is not permitted to connect protective earth conductor to protection class II fittings. However a comprehensive overvoltage protection is only feasible if an earth conductor would be available and housing of luminaire and pole are connected via protective earth conductor.
We further recommend to install surge arresters into electrical distribution. Thus absorbing direct and indirect lightning strikes into power grids.
Probability of lightning strikes varies very much locally. Should LED outdoor luminaires or conventional light fittings with electronic control gear be installed in regions with high likelihood for lightning strikes we highly recommend to utilize protection class I luminaires with additional protective measures employed in the luminaire, terminal box and electrical distribution.

Operating restrictions for LED outdoor light fittings with power reduction
Very rarely, leakage currents may occur between the phases or between phase and neutral conductor. This may cause a false switching behavior of luminaires with power reduction via control phase. Then, the light fittings fail to switch on power reduction.
Leakage currents occur due to old or damaged cables with improper isolation or due to the high capacity coupling.
In these cases, one should install a "shunting-box" between control phase and neutral conductor (available on request). The shunting box may be installed in the terminal box or inside the electrical distribution.
When changing single luminaires in existing installations with elder light fittings or when extending installations, one could face a problem related to power reduction. For these cases, one should mount additional relays at control phase entry in the already installed light fittings. In such cases, it is more cost-effective to add light fittings with stand-alone power reduction (LA => reduction without control phase).

Inrush currents of LED light fittings – limited capacity of automatic circuit breakers
Contrary to light fittings with magnetic ballasts, LED light fittings start all at the same time (as well as in case of ECGs with conventional lamps).
Inside the storage capacitor of the above ECGs, a high charging current occurs when switching on. The number of light fittings per automatic circuit breaker is limited by the inrush current rather than by the operating current. Because inrush current peak of electronic operating devices depends on the used components and on the circuit itself, it is impossible to make a general assertion about the starting current intensity.
The maximum number of light fittings per automatic circuit breaker can be found online on the respetcive product data sheet of the light fitting.

Photobiological Safety
Photobiological safety of luminaires is treated in IEC 62471:2006. This standard provides information on safety limits and risk groups for irradiation as well as measurement methods for UV-, visible and IR- spectral range. The protective goal is to prevent human eye and skin from thermal and photochemical hazards.
Almost all luminaires of SCHUCH are within risk groups 0 and 1. Thus they are harmless since they cannot cause any photibiological impairment to human skin or eye. Luminaires that fall under risk group 2 are marked by a pictogram "do not stare at operating light source". In addition mounting instructions provide information on minimum distance required for safe view into light fitting. Due to installation site any hazard can be ruled out for most class 2 technical luminaires since view from short distance is not possible. Duplicating distance reduces irradiation to one quarter (inverse-square law). Therefore in most cases caution may only be required during maintenance work.
Risk group 3 luminaires disqualify for approval since they would imply a non neglectable risk.