HAZARDOUS LOCATION GUIDE

BeLuce

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HAZARDOUS LOCATIONS

WHAT IS A HAZARDOUS LOCATION?

A “hazardous location” is defined as an area that consists of any concentration of flammable gases, vapours, mists or combustible dusts. In these environments, a fire or explosion is possible when the three basic conditions for a combustion reaction are met. These conditions are often referred to as the “fire” or “combustion” triangle and are outlined below:

1. Fuel — fuel needs to be present to produce an exothermic reaction (a combustion).
2. Oxidizing agent — must be present in sufficient quantity in combination with heat to produce a rapid oxidation. In most cases, the oxygen from the atmosphere acts as an oxidizing agent.
3. Source of ignition — a spark or high heat must be present to initiate the combustion reaction.

FUEL

- → Flammable gas
  - ↳ Often compounds of hydrogen and carbon.
  - ↳ Can ignite under regular working temperatures.
- → Flammable liquids/vapors/mists
  - ↳ Even at room temperature, sufficient quantities of these hydrocarbons can evaporate to form a potentially explosive atmosphere at their surface.
  - ↳ Flammable liquids with a high flash point are less hazardous than liquids with a low flash point.
- → Flammable solids
  - ↳ A typical dust explosion starts with the ignition of a cloud of dust/fibres or flyings.
  - ↳ A dust cloud can settle on nearby surfaces if not ignited. Unless removed, layers of dust can build up and will serve as fuel for subsequent ignition.

OXIDIZER

A sufficient amount of oxidizing agent is required in a combustion reaction. Typically, this is provided by the oxygen in the atmosphere. The severity of a combustion reaction can be attributed to the concentration and feed rate of the three elements in the combustion triangle, and the surface area of the fuel.

IGNITION SOURCE

- → Open flames
- → Hot gas
- → Static electricity
- → Ionizing radiation
- → Lightning
- → Chemical reactions which occur spontaneously at certain oxygen levels or temperatures
- → Intense electromagnetic radiation
- → Adiabatic compression and shock waves
- → Sparks or arcs from electrical equipment or wiring
- → Hot surfaces of electrical equipment or wiring

CODES & STANDARDS

WHAT ARE THE HAZARDOUS CLASSES?

Class I: locations are categorized by the flammable gases and vapors present in industries such as natural gas, petroleum and chemical

Class II: locations containing combustible dusts. Combustible dusts are found inside plastic, pharmaceutical, coal and agricultural processing locations

Class III: locations contain the ignitable fibers and flyings that are produced in the wood, cotton, and textile industries.

Note: Fibres and flyings are not likely to be suspended in the air but can collect around machinery or on lighting fixtures and be ignited with a spark or hot metal.

WHAT ARE THE HAZARDOUS DIVISIONS?

Divisions define the probability of the presence of the hazard being present during normal or abnormal conditions:

Division I: hazardous atmospheres in which the flammable gas or vapor or combustible dust is present during normal operations or routine maintenance.

Division II: locations are where hazards are encountered only during an abnormal situation, such as equipment failure or a spill.

WHAT IS A HAZARDOUS ZONES & GROUPS?

The IEC classification system varies from the Division system, in that it recognizes three levels of probability that an ignitable concentration of material might be present. Both Zones and Divisions are accepted by the CEC.

- → Zones 0, 1 and 2 are Explosive gas atmospheres (reserved for gases, vapors and mists).
- → Zones 20, 21 and 22 are Combustible dust atmospheres (refer to dusts, fibers or flyings).

Zones	Definition
0	A location in which explosive gas atmospheres are present continuously or for long periods of time.
1	A location in which explosive gas atmospheres are likely to occur during normal operation, or which is adjacent to a Zone 0 location.
2	A location in which explosive gas atmospheres are not likely to occur in normal operation, and if they do occur will last for only a short time.

Zones	Definition
20	A location where combustible dusts or ignitable fibres and flyings are present continuously or for long periods of time.
21	A location where combustible dusts or ignitable fibres and flyings are likely to occur under normal operating conditions.
22	A location where combustible dusts or ignitable fibres and flyings are not likely to occur under normal operating conditions and do so only for a short period of time.

Groups classify the exact type and nature of the hazardous material. There are two systems that classify these groups, one by the CEC and one by the International Electrical Code (IEC). Both systems are accepted by the CEC.

CEC Division Groups	IEC Zone Groups	Definition
A	IIC	Acetylene
B		Butadiene, hydrogen, manufactured gases containing more than 30% hydrogen (by volume), propylene oxide
C	IIB	Acetaldehyde, cyclopropane, ether, ethylene, unsymmetrical dimethyl hydrazine (UDMH 1, 1-dimethyl hydrazine), hydrogen sulfide
D	IIA	Acetone, acrylonitrile, alcohol, ammonia, benzene, benzine, benzol, butane, ethylene dichloride, gasoline, hexanes, isoprene, lacquer solvent vapurs, naphtha, natural gas, propane, propylene, styrene, vinyl acetate, vinyl chloride, xylenes, or other gasses or vapour of equivalent hazard
E	IIIC	Aluminum, magnesium and their commercial alloys, and other metals of similarly hazardous characteristics
F	IIIB	Carbon black, coal or coke dust
G		Flour, starch, or grain dust or other dusts of similarly hazardous characteristics
NONE	IIIA	Ignitible fibers/flyings, such as cotton lint, flax & rayon

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CODES & STANDARDS

MINES

CEC standards do not define mining in their standards, however the IEC denotes Group I a sub classification of electrical equipment intended for use in mines susceptible to firedamp. Firedamp is a flammable mixture of gases naturally occurring in a mine.

GASES, VAPOURS, MISTS

Canadian Electrical Code (CEC)	
Class I	Division Groups
Division 1	A
	B
Division 2	C
	D

International Electrical Code (IEC)	
Zone classifictions	Group II
Zone 0	IIC
Zone 1	IIB
Zone 2	IIA

DUSTS

Canadian Electrical Code (CEC)	
Class II	Division Groups
Division 1	E
	F
Division 2	G

International Electrical Code (IEC)	
Zone classifictions	Group III
Zone 20	IIC
Zone 21	IIB
Zone 22	

FIBERS, FLYINGS

Canadian Electrical Code (CEC)	
Class III	Division Groups
Division 1	NONE
Division 2	

International Electrical Code (IEC)	
Zone classifictions	Group III
Zone 20	IIA
Zone 21	
Zone 22	

TEMPERATURE CLASS

Temperature classes are used to designate the maximum operating temperature on the surface of the equipment. It should not exceed the ignition temperature of the surrounding atmosphere.

Surface Temperature of Electrical Equipment		Temperature Class
450°C	842°F	T1
300°C	572°F	T2
280°C	536°F	T2A
260°C	500°F	T2B
230°C	446°F	T2C
215°C	419°F	T2D
200°C	392°F	T3
180°C	356°F	T3A
165°C	329°F	T3B
160°C	320°F	T3C
135°C	275°F	T4
120°C	248°F	T4A
100°C	212°F	T5
85°C	185°F	T6

NEMA & IP RATINGS

WHAT ARE NEMA RATINGS?

NEMA uses a standard rating system that defines the types of environments in which an electrical enclosure can be used, and signifies a fixed enclosure's ability to withstand certain environmental conditions.

COMPARISON OF SPECIAL APPLICATIONS OF ENCLOSURES FOR NON-HAZARDOUS LOCATIONS

Provides a degree of protection against the following environmental conditions	Types of Enclosures									
	1*	2*	4	4X	5	6	6P	12	12K	13
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of solid falling objects (falling dirt)	X	X	X	X	X	X	X	X	X	X
Ingress of water (drip and light splashing)	-	X	X	X	X	X	X	X	X	X
**Ingress of solid foreign objects (circulating dust, lint, fibers and flyings)	-	-	X	X	-	X	X	X	X	X
**Ingress of solid foreign objects (settling airborne dust, lint, fibers & flyings)	-	-	X	X	X	X	X	X	X	X
Ingress of water (hose down and splashing water)	-	-	X	X	-	X	X	-	-	-
Oil and coolant seepage	-	-	-	-	-	-	-	X	X	X
Oil or coolant spraying and splashing	-	-	-	-	-	-	-	-	-	X
Corrosive agents	-	-	-	X	-	-	X	-	-	-
Ingress of water (occasional temporary submersion)	-	-	-	-	-	X	X	-	-	-
Ingress of water (occasional prolonged submersion)	-	-	-	-	-	-	X	-	-	-
*Rain, snow and sleet	-	X	X	X	-	X	X	-	-	-
Windblown dust	-	X	X	X	-	X	X	-	-	-

NOTE: *External operating mechanisms are not required to be operable when the enclosure is ice covered
**External operating mechanisms are operable when the enclosure is ice covered

WHAT ARE IP RATINGS?

Ingress protection ratings (also known as IP ratings), refer to the level of protection offered by an electrical enclosure against solids and liquids. The International Electrotechnical Commission (IEC) has established an enclosure grading system that produces an IP rating. Many BeLuce products are rated in accordance with the IEC standards and display the IP rating they have achieved. Provided below are IP / NEMA rating charts. These are designed to show the correlation of the IP and NEMA rating systems. Because the NEMA rating meets or exceeds the corresponding IP rating, you can only translate NEMA to IP, not IP to NEMA. The following table outlines the IP system of enclosure ratings:

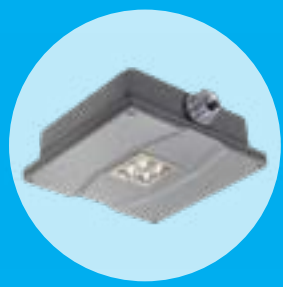
EMERGENCY LIGHTING


BRAVADO HAZARDOUS


BRAVADO HAZARDOUS REMOTE


MAXIMA RUNNING MAN


PHOTOLUMINESCENT RUNNING MAN

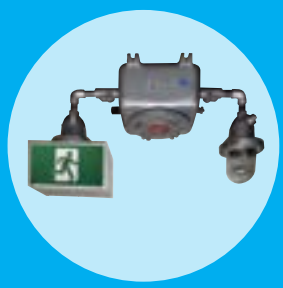

PLURALUCE HZ REMOTE


PLURALUCE HZ UNIT


ROBUSTO UNIT


ROBUSTO COMBO RUNNING MAN


ROBUSTO RUNNING MAN


SICURA RUNNING MAN COMBO

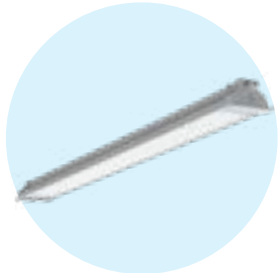

SICURA RUNNING MAN


SICURA REMOTE


SICURA UNIT

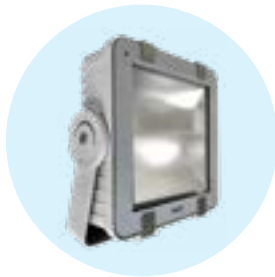
LUCE


ACCIAIO® ECO LED


ACCIAIO® LED


BOXLED®

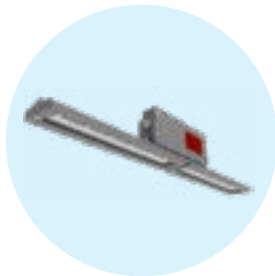

BOXLED® FLOOD


BOXLED® MIDI


BOXLED® MINI


BS100LX


CASTEX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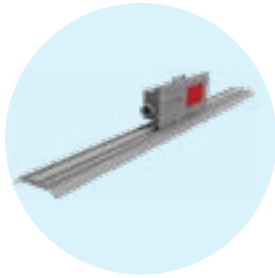
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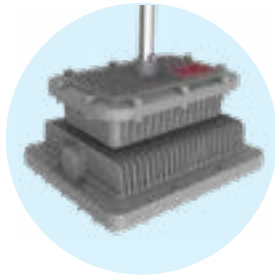
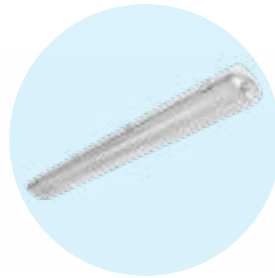
CASTEX-3


CASTEX-4


CASTEX 400


HZ100

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