

# WHITE PAPER

By Pozeen Lighting University



## INGRESS PROTECTION

Introducing ingress protection standards of light fixtures

## **EXECUTIVE SUMMARY**

- Specification standards for classifying the degrees of protection provided by the enclosures of electrical equipment against the intrusion into the equipment of foreign bodies
- North America market and Europe market use different testing standards
- This document describes the classes of protection, and the standards and certification
- Independent certification is important when customers require an objective classification and comparison of devices

## **UL LITINGS: DRY, DAMP & WET**

UL marking guides and standards are used in a number of industries for rating product performance and safety. Known in full as Underwriters Laboratories, this independent organization has more than 60 laboratories around the world which do testing and certification for more than 100 countries. In addition to electrical safety, they also do testing for water quality, fire safety, food safety and other fields.

- **UL Listed for Dry Locations**

The “Dry Locations Only” rating is the most frequent one you will see when shopping for lighting. In fact, it is so ubiquitous that it is often referred to as just “UL Listed”. A dry rating is the right one for a luminaire in a location that rarely, if ever, is at risk of dampness or moisture. This means they are typically used indoors in above-ground rooms. This can include kitchens, dining rooms, hallways, offices, conference rooms, and reception areas.

- **UL Listed for Damp Locations**

Luminaires that are “Suitable for Damp Locations” are approved for areas that are regularly exposed to moisture and condensation. These fixtures can safely handle limited amounts of

moisture on, in, and around their electrical components. This rating also encompasses areas that are partially protected from water. However, it does not cover direct water contact.

Damp location listed LED lights are frequently used indoors for laundry rooms, over showers and bathtubs, utility rooms, unfinished basements, and similar areas. They can be used outdoors in areas that are protected, such as covered patios or porches, as these locations are usually not at risk of direct rain or snow exposure. These lights typically cost more than dry location lights because more advanced construction is required to meet the higher safety standards.

- **UL Listed for Wet Locations**

Fixtures and lamps that are “Suitable for Wet Locations” can be installed anywhere that liquids might come in direct contact with the electronics. It could be a slow drip, a strong flow or anything in-between. They are typically used outdoors for things such as site lighting, wall packs, open-air decks, walkway lights, gazebos, signs, and holiday lights. Indoor uses range from enclosed showers and pool areas to refrigerators or freezers as a safeguard in case of power failure.

*There are also three sub-markings associated with wet location luminaires:*

- *Covered Ceiling Mount Only* — these luminaires are only approved for water contact on the front side and not the backside. They should only be installed in a place where any water exposure happens beneath the mounting location, such as vehicle washing areas.
- *Suitable for Mounting within 1.2 M (4 Feet) of Ground* — this indicates that a light is designed for intermittent splashing and exposure, such as that from a lawn sprinkler. However, it is not safe for below ground where it may be fully immersed.

- *Suitable for Ground-Mounted Recessed* — a fixture with this marking is approved for use below ground level and can safely be immersed periodically by precipitation.

## **IEC STANDARD: IPxx**

IEC/EN 60529 is an international set of test specification standards for classifying the degrees of protection provided by the enclosures of electrical equipments against the intrusion into the equipment of foreign bodies (i.e. tools, dust, fingers, etc) and moisture. This classification system utilizes the letters “IP” (“Ingress Protection”) followed by two or three digits. (A third digit is sometimes used. An “x” is used for one of the digits if there is only one class of protection; i.e. IPX4 which addresses moisture resistance only.)

- **Degrees of Protection Against Solid Objects - First Digit**

The first digit of the IP code indicates the degree that persons are protected against contact with moving parts (other than smooth rotating shafts, etc.) and the degree that equipment is protected against solid foreign bodies intruding into an enclosure.

- **Degrees of Protection Against Moisture - Second Digit**

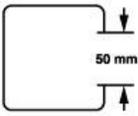
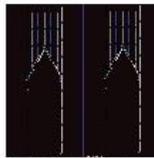
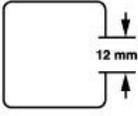
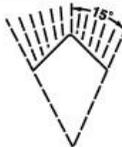
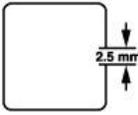
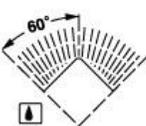
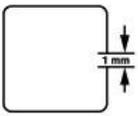
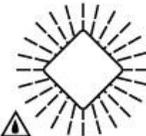
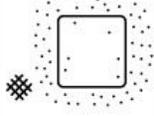
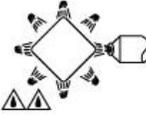
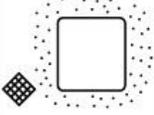
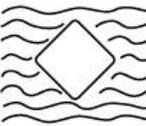
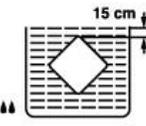
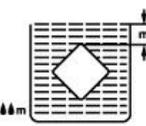
The second digit indicates the degree of protection of the equipment inside the enclosure against the harmful entry of various forms of moisture (e.g. dripping, spraying, submersion, etc.)

- **Optional IP Code Symbols**

The chart illustrates the use of special symbols in the IP classification system. In the “1st digit” column, not the grid-like symbols net to numbers 5 and 6. In the “2nd digit” column numbers 3-8 are symbolized by teardrop shaped symbols, sometimes enclosed in a box or a triangle,

sometimes unenclosed (#7-8). These symbols can be placed on equipment to illustrate the IP protection provided.

Note: IEC/EN 60529 does not specify sealing effectiveness against the following; mechanical damage of equipment; the risk of explosions; certain types of moisture conditions, e.g. those that are produced by condensation, corrosive vapors, fungus, vermin etc.

1st Digit	Protection from solid objects	2nd Digit	Protection from moisture
0	Non protected	0	Non protected
1	 <p>Protected against solid objects greater than 50mm</p>	1	 <p>Protected against vertically dripping water</p>
2	 <p>Protected against solid objects greater than 12.5mm</p>	2	 <p>Protected against dripping water when tilted up to 15°</p>
3	 <p>Protected against solid objects greater than 2.5mm</p>	3	 <p>Protected against spraying water</p>
4	 <p>Protected against solid objects greater than 1.0mm</p>	4	 <p>Protected against splashing water</p>
5	 <p>Dust protected</p>	5	 <p>Protected against jetting water</p>
6	 <p>Dust tight</p>	6	 <p>Protected against powerfully jetting water</p>
		7	 <p>Protected against the temporary effects of immersion</p>
		8	 <p>Protected against continuous submersion</p>