In Ground Buried Uplights

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Guidance notes for the specification and application of in ground buried uplights.

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In Ground Buried Uplights

General Specification Hints
(What to look for)

If your reading this, then you have a project or interest in installing In Ground Buried uplights. The following is more of a guide based on personal experiences from a number of manufacturers, but independent from any one manufacturers product or point of view. (This is as best as I can do given that I work for a Lighting Supplier)

INTRO

The light performance characteristics , beam and lumen output are project specific and can be dealt with easily, the issues then arise as to how you evaluate a product and how you minimise post installation issues.
This document seeks to assist with those issues specifically.

THE ENVIRONMENT AND IP RATING

In ground installations are hard on luminaires as the luminaire construction retains heat, it is under stress from chemical degradation from a combination of soil and concrete or sand / ballast properties in which it is mounted.

The important elements to consider are as follows which will then be dealt with in detail.

Drainage, IP Rating, Luminaire MPP (Materials/ protection/Pressures), glass surface temps, glands and cabling.

DRAINAGE

Singularly, by far this is THE most common cause for complete loss of faith in any one product, the reasons this is the single cause is down to miss conception and poor planning.

In this element you may need to refer to the IP Rating section, but basically, for the larger majority of in ground products at IP67, there is a time limit of 30mins beyond which it is not permissible for the luminaire to remain in standing water, For IP68, the depth and time is by agreement, or specified by the manufacturer. (EN60529).

This above, in conjunction with the Wiring Regs BS7671 which states that luminaires to be used in constant submersion must be SELV, means that no such mains voltage luminaire should be specified when in continuous contact with water.

Generally, those designed for submersion, will be either SELV luminaires and likely use the water itself to act as a cooling substrate on the luminaire itself, therefore not suitable for out of water use.

If this is accepted, then the selection of the luminaire becomes more important when specifying.

Due to pressure of a vacuum despite finite attention by the manufacturer on sealing the luminaire, as it cools from being in operation, the pressure seeks to pull in moisture past the seals to the internal workings. The seals have to operate within the time pressures tested.

So how do you test if the drainage is sufficient?

Once the power is isolated and cables protected, fill the hole and sleeve with water under time measurement to ensure that water drains away within the time limits set by the standard.

IP RATINGS (Ingress Protection)

Just to clarify, Ingress protection is applied by 2 digits.
The first is related to Dust
The Second to Water E.G IP60- Dust tight No protection against Water

The significance of each IP Rating digit is well publicised in manufacturers literature but also in the Wiring Regs BS7671, and very clearly in BS7671 Guidance Note 1 Selection and Erection.

The guidance notes exceed popular publications by also making mention of the suffixes to the IP ratings referring to increase protection barriers. E.G. IP65W.

'W' meaning 'Suitable for use under specified weather conditions and provided with additional protective features or processes'

Details of the protective tests are dealt with in BS EN60529.

It is a common miss conception that IP67 may be applicable to continuously immersed in ground luminaires. As stated previously this is not the case.

The criteria for IP67 is Immersion in a tank with 150mm of water above, and 1M below the enclosure (Luminaire) for a duration of 30Mins Only.

The luminaire internal operating temperatures can be very high and on cooling may cause a vacuum. The presence of water may incur it to be pulled in to the luminaire. Over long periods of time, the luminaire is unlikely to withstand these pressures unless it was designed to do so.

The criteria for IP68 doesn't help much either. These criteria states that, time and pressure is by agreement. The luminaire / component manufacturer may then state to what time and pressure was applied to meet the standard.

It is the case therefore for luminaire conformity each test criteria should be applied to achieve compliance with each IP66, IP67.IP68 test.

In relation to in ground recessed specifications, one should assume that if water is constantly present, and the luminaire would be immersed for long periods, ditch the recessed idea and seek an alternative method of illumination.

MATERIALS, PROTECTION AND PRESSURES

The environment in which these luminaires are to be installed can be very corrosive and harmful to metals.

It is not recommended that the soil / concrete covering should be in contact with the metal luminaire housing directly because, not only of the reasons above, but should maintenance be required, it is important to be able to reach the terminations even if it is resin connectors.

In general most of these luminaires now come with a Polypropylene or ABS external casing holding the luminaires providing a void in which the metal housing can be accommodated. The metal housing typically acts as a heat sink to reduce thermal temperatures within the housing.

More expensive products may use Grade 316 Stainless steel to give real durability the majority, at time of writing, are probably die-cast aluminium.

Aluminium will still corrode to a white powder, so it should be verified that an additional protective process such as 'Allochrome' would be applied to the housing before painting / powder coating.

The ground works wiring according to the wiring regs BS7671 will likely be steel Wire Armoured XLPE SWA. This is not compatible with the luminaire . SWA cable does not bend easily. This inflexibility may strain normal cable glands allowing an access for water into the luminaire. Wiring to the luminaire will vary by manufacturer, typically harmonised cable H07-RNF or SI-HF (For very high temperature luminaires) should be used.

Some luminaire manufacturers use plastic glands to IP68. I would not recommend these personally, Generally because on site, these can be over tightened by contractors trying to ensure a good seal, and therefore damaging the thread which protects the seal. I would recommend the use of Stainless Steel IP68 glands, being metal, will be more resilient.

The protection extends to area's within the product. It still amazes me that with all the knowledge available, sales of untimed ignitors still outweigh the sales of timed versions.

It is common knowledge that rectifying effects within a halide lamp at end of life can cause the lamp to fail catastrophically. Following a lamp failure an untimed ignotor will continue to attempt strikes until such time as the lamp is changed or the ingnitor component itself fails.

For inground products, no matter how good maintenance claims to be, you will be lucky to catch it in time.

Timed ignitors monitor the strike rate and failure condition of the lamp and pause for a period before re-starting the strike process. These however, have improved versions with a shutdown circuit such as Tridonic ZRM***ES/CT. It is this that should be specified.

MATERIALS, PROTECTION AND PRESSURES

Although Electronic / HF gear is generally preferable, this type of gear is more susceptible to increased thermal temperatures such that commonly integral control gear is generally wire wound. .
Although integral gear may sometimes be preferred, it is not without it's issues.

For electronic transformers and HID ignitors, the circuits will contain capacitors.

For luminaires with integral wire wound control gear, should componentry become stressed, the capacitors will be the first to highlight this. At the extreme end, it is possible that catastrophic failure of capacitors can occur. In the case of separate ignitor circuits and capacitors, this can eject material from the capacitor and pressurise the sealed luminaire.

From experience, the pressure can be such that it can crack and break a 4mm thick aluminium casting. There is on the market remote IP rated control gear with resin injected components, however, it's use will depend on the design associated with the product.

Cabling from supply or remote unit should be done in such a way that independently protects the space between the conductors and insulating sleeve within the cable itself.

Should water be allowed to get inside the outer sheath of the cable, the vacuum formed as a luminaire cools can effectively suck water into the luminaire housing through this space.

Depending on the design, some luminaires have anti-syphon sections within the casing.

This will consist of a resin well where an outer sheath section has been removed and sealed in resin so that any moisture ingress cannot proceed into the luminaire.

Finally, the latest version of EN 60598-2-13 looks at the surface glass temperature.

This is already known in consultancy circles, but any supplying manufacturer should know the glass temperatures and release these details depending on the location of the luminaire within the project and it's accessibility to those using the space

SUMMARY

- Drainage Make sure no water is present
- Use a decent grade housing with an outer liner.
- Use ignitors with timed and shut down functionality
- Use the correct cable and Stainless Steel glands
- Use cool glass temp products where possible.

Look for high IP ratings and note location of the componentry within the luminaire.

In some cases there may be compromise required here, but if all these elements can be considered and accepted, the overall design will provide good service and durability.

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