



## Application Focus: Lighting for Offshore Environments



Raytec is a world leader in LED lighting for hazardous area environments and industrial applications. We specialise in lighting designed for use in some of the most challenging environments.

SPARTAN is our range of globally certified Ex LED luminaires, designed for use in some of the most demanding hazardous area environments and to deliver outstanding performance, reliability and durability. WARRIOR is our range of heavy industrial LED luminaires, featuring the same levels of performance and durability as SPARTAN, but for use in safe area applications.

Luminaires from both the SPARTAN and WARRIOR range are ideally suited for offshore applications. In this Application Focus, we explore some of the challenges with specifying a luminaire to be used in an offshore environment and identify key features to consider.

### Lighting Requirements for Offshore Environments

Offshore environments represent one of the most challenging locations in which lighting fixtures are used. There are many different types of offshore applications which may require lighting. Let's take a brief look at some common examples.

- **Oil and Gas** – the applications that perhaps come to mind first when you think 'offshore' are likely to be those linked to the oil and gas industry. While there may be an increasing focus on renewable energy, global oil production amounts to around 90 million barrels per day and around 1/3 of that comes from offshore production. Ensuring a drilling rig or platform is well illuminated at all times is important to both the efficiency of operations and the safety of workers. Lighting used in offshore oil and gas applications will generally need to be certified for use in hazardous areas.



- **Maritime Vessels** – any vessel used at sea will require some form of illumination on board. The type of lighting required will depend on the vessel and its operations, but for this article, we will focus on luminaires required for outdoor use where the conditions are most challenging.
- **Renewable Energy** – with increasing demand for renewable energy, we're seeing more and more wind turbines and wind farms being installed offshore. Lighting for these applications is generally required to support access and maintenance operations.
- **Coastal Locations** – the challenges we will discuss during this article will primarily focus on offshore applications, but they can also be applied to any coastal application that is exposed to similar environmental conditions.



## The Challenges

### Hazardous Area Classification



While not all offshore environments are classified as hazardous areas, the nature of the activities taking place in offshore applications (especially those within the oil and gas industry) means equipment may be exposed to hazardous substances which could present the risk of explosion if not used in conjunction with the correct equipment. As a result, many offshore applications are classified as a hazardous area and any luminaires installed must comply with the relevant certification requirements.

### Sea Water and Saline Environments

A saline environment (exposure to seawater spray and salt water-saturated air) presents a higher risk of corrosion compared to inland applications. Any luminaire installed in an offshore location needs to withstand these aggressive conditions. Once evaporated, salt water can also leave a thin salty film on the luminaire which may interfere with the performance by reducing light intensity.

### Harsh Weather Conditions

High wind speeds and other harsh weather conditions such as sleet, hail and heavy rains are a regular occurrence for offshore applications. Luminaires installed offshore often have little to no protection against the elements which means they are likely to encounter the full force of the environmental conditions.

The sun and prolonged exposure to its UV (ultraviolet) rays, presents another challenge for equipment being used in offshore locations. In applications such as wind turbines and oil platforms, any lighting installed in external areas may have to contend with continuous exposure to UV which can degrade certain materials.

## Remote Locations

Sometimes located hundreds of miles from the coast, gaining access to an offshore rig or wind farm is difficult, slow and expensive when compared to land-based applications. The location of where lighting is installed offshore provides an additional complication; if maintenance does need to be carried out it may require the use of specialist equipment or labour such as rope access.



## Exposure to Chemicals

Thinking about offshore applications in the oil and gas industry, and in particular drilling rigs, luminaires installed here may also have to withstand exposure to chemical substances. Heavy-grade cleaning chemicals are often used to clean surfaces where lighting fixtures may be installed. Furthermore, drilling fluid (or drilling mud) is used to aid drilling of the boreholes, but has a tendency to overflow and splash onto other areas. Containing a mixture of different chemicals, this also provides a risk to any lighting installed within its proximity.



## Vibration

The machines and equipment used for producing oil and gas including engines, motors, generators, pumps, drill rigs, and piping all result in very high levels of shock and vibrations. While drilling companies will look for solutions to reduce vibration to protect workers, the same levels of precaution may not be taken for other equipment used onboard a drilling rig, so luminaires must be able to withstand high levels of vibration.

## Unstable Power

The nature of offshore locations means many applications will rely on the use of generator-powered systems, which may not be as reliable as inland applications supplied by the grid. As a result, offshore applications are more susceptible to power outages, and more frequently experience voltage drops which may interfere with lighting and other electrical equipment on-site.

## Why is Lighting Needed for Container Recognition Systems?

### Choose LED

When specifying lighting for an offshore application, we would always recommend that you opt for a luminaire which uses LED technology. Compared to more traditional light sources, such as fluorescent or high-pressure sodium, LEDs offer many advantages for use offshore;

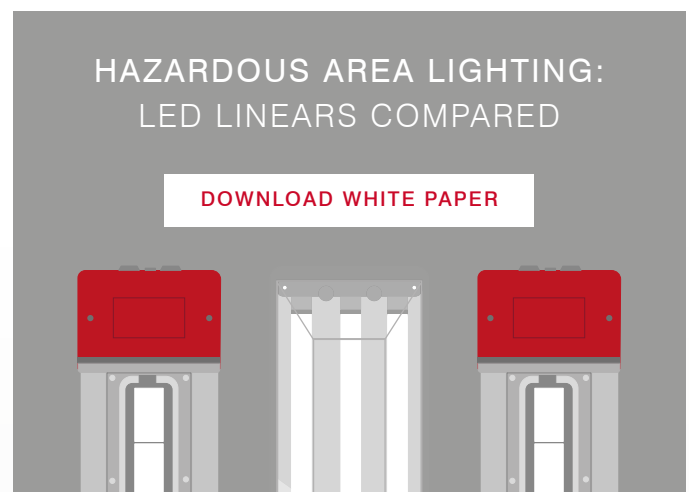
- Vibration resistance - LEDs are naturally more resistant to vibration helping to reduce the number of failures related to vibration.
- Lower maintenance with no need for re-lamping – the long-life LEDs mean that, unlike traditional light sources, there is no requirement for ongoing lamp changes over the course of the luminaire's life.
- More consistent light output – the performance of traditional light sources will degrade much faster. For example, over time a fluorescent luminaire will lose almost 40% of its initial lumens, compared to an LED fitting which will lose just a fraction of this figure.
- Better performance under higher temperatures – unlike conventional fittings, LED equivalents are largely unaffected by extreme hot or cold temperatures.
- Voltage drops – traditional light sources may have re-strike delays which could cause temporary loss of light after a voltage drop. In contrast, SPARTAN and WARRIOR LED luminaires will continue to operate at full light output during short-term voltage drops, down to 100V, before the emergency function comes into operation, and will strike instantly if power is lost.

When specifying Linear luminaires, you will generally find that there are two styles of LED fittings. Bespoke luminaires that have been specifically designed to house LED technology, or 'boat' style luminaires which use the same Glass Reinforced Plastic (GRP) housing as a traditional fluorescent fitting. We will discuss the suitability of GRP for offshore locations in the next section, but we would always recommend a bespoke luminaire which has been designed around the LEDs to provide the best lifetime and reliability.

### Opt for a Luminaire with a Metal Enclosure

With a better understanding of an offshore location's harsh environment, our recommendation is to specify a heavy-duty luminaire which has been constructed using a metal enclosure.

SPARTAN and WARRIOR products are designed and tested with offshore use in mind, constructed using marine-grade aluminium, epoxy powder coating and 316 stainless-steel fixings. In addition to this, Raytec luminaires are also IP66/67 rated and ABS approved to marine standards.



Our recommendation is to avoid luminaires constructed from Glass Reinforced Plastic (GRP) when specifying for offshore use. The prolonged exposure to the sun and UV rays can degrade GRP and cause the enclosure to become brittle over time, compromising the integrity of its IP rating. This causes maintenance issues and degrades the structural integrity of the luminaire's enclosure. For offshore applications designated as a hazardous area, this could also provide a critical safety risk.

Luminaires designed with a GRP enclosure must also be mounted to a completely flat surface. Any 'twist' in the enclosure when mounted to a slightly uneven surface may compromise the outer seal and lead to water ingress problems.

When considering Linear luminaires specifically, we'd also recommend choosing a more modern LED fitting that has been designed around the LEDs. The most susceptible part of any Linear luminaire is the light-transmitting outer cover, generally made from polycarbonate. This outer cover tends to be much larger on traditional fluorescent fittings (or those that have been converted to LED while using the same enclosure). Largely this is because the luminaires were originally designed for fluorescent tubes which emit light at 360 degrees. In contrast, the outer cover on a bespoke LED Linear does not need to be as large (given that LEDs are a directional light source). This allows the luminaire to be far more robust. See the durability of SPARTAN Linear in action here!



## How Tough is SPARTAN? Linear vs. Strongman

Watch our latest video to discover how tough SPARTAN Linear really is!

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## Bracketry and Fixings

As well as the luminaire itself, you should also consider any bracketry or fixings which the luminaire is supplied with; they will be exposed to the same harsh weather and environmental conditions. If the bracketry is inadequate, the luminaire is susceptible to failing. This not only risks the luminaire being damaged but also presents a serious drop hazard. For this reason, many offshore locations stipulate that the luminaire must be supplied with a secondary retention point where a safety cable can be attached, so it's important to check if your chosen luminaire is available with this option. Alternatively, safety nets designed to shroud the luminaire and protect the luminaire from falling are available, but they can block some of the light output.



## Maintenance

Given that access is so restricted in offshore locations, it's critical to consider how frequently a luminaire must be maintained, but also how easy maintenance is to carry out.

Firstly, specifying an LED luminaire will help to significantly reduce the number of maintenance interventions required compared to traditional light sources (such as fluorescent or high-power sodium luminaires), so long as it has been designed with proper thermal management. This means choosing a luminaire which has a bespoke housing designed around the LEDs, rather than opting for an LED fitting using a more traditional housing that was originally intended for fluorescent tubes.

To keep costs and downtime to a minimum, you should specify a luminaire where maintenance can be carried out on-site and does not have to be returned to the manufacturer for repairs. SPARTAN and WARRIOR luminaires are designed with maintenance in mind and feature a unique modular design which means maintenance can be carried out quickly and easily. A power supply or battery module can be replaced on-site in a matter of minutes.



## How Fast Can You Change a Power Supply on Spartan Linear?

Did you know SPARTAN Linear features a unique modular design to increase ease and speed of maintenance?

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## Emergency Lighting

Given the high-risk nature of offshore environments, combined with the understanding that power sources are often unstable and unreliable, emergency luminaires that provide backup illumination in the event of a power outage are critical when specifying lighting for offshore.

Two of the main factors to consider when specifying emergency lighting are the duration and output.

- Emergency duration - the length of time the luminaire can provide backup illumination.
- Emergency output - the light output the luminaire will provide in emergency mode - generally measured as a percentage of its total light output in normal operation.

These factors are always a trade-off against each other, and the higher the emergency output, the shorter the emergency duration will be.

Duration and lux requirements differ by country, area, and task, but due to the increased risk levels, and the fact that escape routes may be less clearly defined when emergency scenarios occur, offshore the shutdown must generally happen quickly with maximum light levels to aid workers during evacuation.

SPARTAN and WARRIOR luminaires are available with up to 100% output for a 1-hour duration, which ensures there is no loss of output when switching to emergency mode. Maintaining a high output on emergency means the lux requirements could also be achieved with a smaller quantity of emergency luminaires, maximising efficiency. SPARTAN and WARRIOR luminaires also have the added flexibility of being available with different emergency output levels to enhance back-up duration if required.

